# Project EnergyConnect

TransGrid

## Preliminary Ecological Constraints Assessment

## (SA, NSW and Red Cliffs spur line into Victoria)

IA204500-0000-NE-RPT-PECA_Rev1

Final Report Rev1

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# Project EnergyConnect

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## Contents

# Executive Summary

Project EnergyConnect is proposed to strengthen the national electricity transmission network by providing connection between SA and NSW. A preferred alignment for the project (at the time of this study) runs between the Robertstown substation in SA to the Buronga substation in NSW, a total length of 309 km (183 km of which is in SA, and 126 of which is in NSW). A spur line leaves the main alignment to connect the Buronga substation (in NSW) with the Red Cliffs substation (in Victoria). At the time of this study, an optional alignment within the SA section of the alignment (of approximately 174 km) was also under consideration.

Jacobs were engaged by ElectraNet and TransGrid to undertake a high level ecological constraints assessment of the EnergyConnect preliminary alignment (including the optional alignment in SA) from Robertstown substation (SA) to Buronga substation (NSW). Subsequently, the spur line to Red Cliffs was included in the assessment. This high level assessment was undertaken to feed into the alignment selection process, and included a desktop review component, along with a Spring 2018 in-field characterisation of ecological communities along the alignment. Follow-up in-field assessments occurred in January 2019 to capture data from areas (within NSW) not accessible during the initial visit or addtional scope (Red Cliffs Spur, April 2019).

Vegetation associations along the alignment are described, and vegetation conditions are provided at a high level based on field survey at point locations along the alignment. Vegetation condition along the alignment ranged from high and medium to high predominantly within areas of conservation reserve, but also within larger areas of intact remnant vegetation outside of reserves to low value vegetation within cleared agricultural paddocks and heavily grazed areas.

The desktop review highlighted 35 nationally threatened flora species and 19 nationally threatened fauna species (14 birds, 1 frog, 2 mammals, 2 reptiles) as potentially present within the Study Area. Sixteen migratory bird species protected under the *Environment Protection Biodiversity Act 1999* (EPBC Act) were highlighted as potentially occurring within the Study Area (of which a number were also highlighted as threatened species). In addition, a large number of state listed species were also identified as relevant to the project area (52 from NSW, 82 from SA, and 52 from Victoria), noting that some of these species also have ratings under the EPBC Act, so have already been considered.

Both NSW and SA each have two EPBC Act Threatened Ecological Communities (TEC) and Victoria has one TEC which may be present within the Study Area, though the field assessments undertaken to date have not identified any vegetation communities which meet the criteria of any of these communities.

The alignment in SA traverses or runs adjacent to a number of conservation reserves. Stations within the Riverland Biosphere Reserve in particular represent elevated ecological and project approval constraints, as they are recognised as critical habitat for the nationally listed Black-eared Miner. The alignment in SA also runs along the boundary of a Ramsar listed wetland, the Riverland Wetland complex. In NSW, conservation reserves are avoided by the current alignment. In Victoria the Red Cliffs spur traverses an existing transmission line corridor from the Murray River / Monak (Vic / NSW border) to Red Cliffs substation which occurs within Kings Billabong Wildlife Reserve.

A number of broad mitigation strategies are presented to reduce or avoid impacts to identified ecological values. Mitigation measures will be further developed as the project develops. Some examples of alternate alignment options are provided to demonstrate options to reduce ecological impacts, noting that the final alignment must consider numerous constraints as well as ecological.

## Important note about your report

*This report has been prepared on behalf of, and for the exclusive use of, Jacobs's Clients; originally ElectraNet and TransGrid, and subsequently for this revision which includes information relevant to the Red Cliffs spur, for TransGrid, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and ElectraNet and TransGrid. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party*

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*The sole purpose of this report and the associated services performed by Jacobs is to document results of desktop assessments and high level field assessments of ecological constraints for the proposed EnergyConnect transmission line project. The report is based on a desktop review of available data and documents, and a high level field assessment of select sites along the alignment. The scope of services, as described in this report, was developed with ElectraNet and TransGrid.*

*In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.*

*Jacobs collected and reviewed data and information sourced from ElectraNet and TransGrid and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law*

# 1. Introduction

Jacobs were engaged by ElectraNet and TransGrid to undertake a high level ecological constraints assessment of the Project EnergyConnect preliminary alignment from Robertstown substation (SA) to Buronga substation (NSW), and subsequently, an additional spur line from Buronga substation to Red Cliffs substation in Victoria. This high level assessment was undertaken to inform a broader alignment selection process, and included a desktop review component, along with a Spring 2018 in-field characterisation of ecological communities along the alignment. A follow-up assessment in-field occurred in January 2019 to capture data from areas (within NSW) not accessible during the initial visit. An additional follow-up for a short spur line from Buronga substation (NSW) to Red Cliffs substation (Victoria) occurred in March 2019. The assessment was undertaken to identify high level ecological constraints within the Study Area to assist with finalising the project alignment.

The study corridor included a preferred alignment (at the time of commencing this assessment, November 2018), along with an alternate alignment, and a broader corridor which included a 25 km buffer around the alignments. A smaller buffer of 15 km (EPBC search) and 20 km (existing records search) was used for the Victorian Red Cliffs spur section. Alignments were provided to Jacobs by ElectraNet / TransGrid, who were progressing an alignment selection process concurrently with this assessment.

## 1.1 Study Objectives

The primary objective of this assessment was to identify existing and potential ecological constraints along the alignment to inform the route selection process which is being undertaken by ElectraNet and TransGrid for the project.

The broad objectives of this report are to:

- Conduct a desktop and high level field assessment of ecological constraints along the proposed alignment (as per November 2018) for South Australia, NSW and Victorian sections of the alignment.
- Provide high level background information about the vegetation types and conservation areas present within the Study Area of both states, and the potential for nationally and state listed threatened species to occur across the Study Area.
- Use desktop data to inform field assessment and broad ground-truthing of existing vegetation mapping.
- Describe vegetation communities present, including high level condition assessment, from field inspections.
- Highlight key constraints identified during the field assessment.
- Provide recommendations regarding impact mitigation measures to reduce or avoid ecological impacts, and recommendations regarding future field assessments likely to be required to meet project approval.

Data collected here is envisaged to support the ongoing alignment selection and design process, impact assessment works, along with future vegetation clearance applications for the project.

# 2. Project EnergyConnect

At the time of this study, a preferred project alignment with an optional alignment was provided to Jacobs. These alignments represent 'the study alignments' for this assessment. A 25 km buffer was applied to the alignments, representing 'the Study Area' for this assessment (noting that a slightly reduced buffer was applied to the Buronga to Red Cliffs spur section, given the short length of this spur).

The Study Area and study alignments (preferred and alternative) are provided in Figure 2-1 below.

## 2.1 Project Assumptions

Project assumptions used in the consideration of potential ecological impacts arising from the project, and therefore in identifying ecological constraints and considerations for the project, are outlined below:

**Alignment**

The Project EnergyConnect alignment which is the subject of this report runs between the Robertstown substation in South Australia to the Buronga substation in New South Wales, a total length of 320 km (190 km of which is in South Australia, and 130 of which is in NSW, based on the preferred study alignment). An optional alignment in SA is 174 km. There is also an added spur connection from the Buronga substation to the Red Cliffs substation in Victoria, referred to as the Red Cliffs Spur.

**Substation**

The project requires a new substation to be sited near Robertstown at Bundey. The footprint of the substation will measure approximately 200 x 200 m, comprising primary plant such as gantries, switch gear, 275/330kV transformers, control building and lightning masts to approximately 20 m high. Siting of the substation is subject to further constraints analysis, landholder negotiations, environmental investigations and engineering design.

**Transmission line and structures**

The transmission line would be a dual circuit construction with three conductors strung on steel lattice structures, typically 50 m in height. Approximate distances between towers would be 400 to 500 metres.

Approximately 10 km of 275kV transmission line supported by steel towers from the existing Robertstown substation to the proposed new substation towards the western extent of the transmission line at Bundey, near Robertstown. Approximately 180 km of 330 kV transmission line will be supported by steel towers from the new Bundey substation to the SA/NSW border.

Alternative construction techniques can be utilised where the need arises such as near towns or in visually sensitive regions (different towers/poles), wide river crossings taller structures), or environmentally sensitive areas (e.g. helicopter installations).

**Access**

Vehicular access would be required to each tower site, including the installation of any necessary access gates. Access would generally be along easements or as negotiated with property owners. Access for vehicles would need to be cleared and maintained unless existing access tracks along infrastructure easements or boundary fences could be used between individual tower sites. Access tracks would typically be five metres wide.

### Foundation installation

Large lattice towers generally require a cleared construction working area of approximately 50 m by 50 m. In more sensitive areas this can potentially be reduced to approximately 30 m by 30 m. Each tower foundation would require the excavation and installation of concrete footings utilising heavy equipment such as backhoe/excavators, borers and concrete trucks (typically over 20 tonne).

### Tower assembly and erection

Towers would be manufactured off-site and delivered to the tower site by truck, and erected by crane (typically 40 tonne).

### Laydown areas

Structures will be delivered directly to the installation site - At each structure location there will be a need for a cleared and flat laydown area to enable tower footing construction and structure erection, including line stringing and tensioning. Depending upon terrain and structure type, the clearance areas will be approximately 50 m x 50 m. No separate laydown areas are proposed at this stage.

### Conductor stringing

Helicopter stringing is proposed. Helicopter stringing involves pulling the draw wire from winch point to each tower and through to the next strain location. Although more expensive, using this method can save time and minimise ground impacts.

Land-based conductor stringing may be used. Conductor stringing utilises winch and brake sites approximately every 5 to 8 kilometres. Conductor and earth wire drums are mounted on the braking machines. The conductor is pulled out of the drums using draw wires from sheaves mounted on the tower cross arms. The draw wire is pulled between tower sites along the easement by dozer.

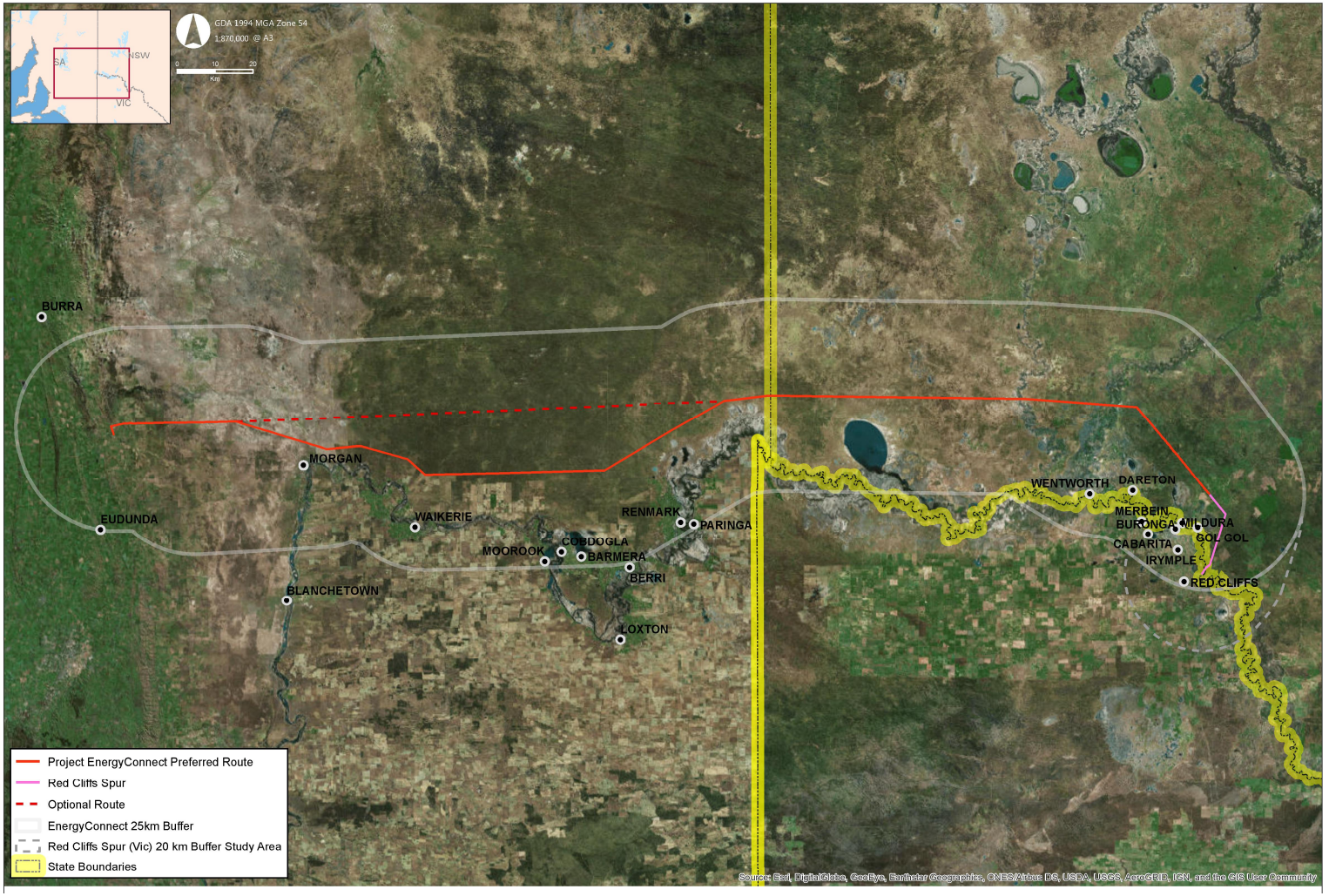


Figure 2-1: Project Location, with Study Area (25/20 km buffer on preferred route)

## 2.2 Project History

An Environmental Impact Statement (EIS) (SKM 2002) and associated working papers were previously prepared for a similar Study Area to this project as part of an earlier proposal for a transmission line between Monash and the NSW border (the SNI Project) which did not proceed.

Previous ecological constraints identified in the Study Area were as follows:

- Crossing on the Darling River and Anabranch in NSW.
- Stand of Eucalyptus along the existing Buronga – Broken Hill Transmission Line in NSW.
- Stand of Eucalyptus between Angle Point 9 and the NSW/SA border.
- Mallee vegetation within the Bookmark Biosphere (now Riverland Biosphere), generally north of the nominal alignment.
- The Riverland Wetland Complex, as listed in the Ramsar Convention, within SA.
- Threatened flora and fauna (National, State and Regional)
  - SA, state-listed and regional rated flora species were located in the Study Area
  - NSW, records for EPBC Act and the TS Act (now the BC Act) flora species, some state-listed species located during field visits
  - No nationally significant TECs (at the time of the study) were recorded within the Study Area
  - No state listed TECs (at the time of the study) were recorded within the Study Area.
- Negative impacts on avifauna in two particular areas:
  - The River Murray floodplain wetlands comprising the Ramsar Wetlands
  - The Mallee dunefields of the Cooltong Conservation Reserve and Calpernum Station.

<u>Impacts to Avifauna</u>

Key ecological impacts suggested for the earlier proposal (SKM 2002) were related to bird collision with transmission lines. It was considered that collisions would occur during periods of low visibility. The greatest risks are when transmission lines span wetlands, but risks were also highlighted where the alignment spanned waterbird flight paths. A working paper (Carpenter 2002) considered impacts to individual species. It was considered that the previously proposed transmission line would not significantly impact waterbirds that disperse during daylight hours, but species that were known to disperse at dusk or nocturnally may be at greater risk. The desktop study concluded that significant mortality could not be ruled out given the extent of nocturnal flights implied from large fluctuations of waterbird numbers in adjacent wetlands, however it was considered that overall numbers of bids strikes would likely to be low. The study provided individual species assessments in terms of the effect on mortality and overall populations (Carpenter 2002).

As suggested above, the earlier EIS also considered the impacts of terrestrial fauna in the mallee dunefields within the Bookmark Biosphere Reserve (including Calpernum Station) (now known as the Riverland Biosphere) which support significant resident populations of Nationally listed threatened Black-eared Miner and Malleefowl. Major threats to these species are habitat fragmentation and extensive fires. It was considered that if vegetation was left uncleared beneath transmission lines that the proposal would not significantly impact these species. It was also considered that whilst fire risk may be increased during construction, it would be decreased during normal operation of the line as a result of the improved access into the area as a result of construction of fire breaks for access tracks

along the line. Therefore, significant impacts to avifauna of the mallee dunefields (high plain) were not expected to be substantial as a result of the previously proposed SNI Buronga Project (Carpenter 2002).

# 3. Relevant Legislation

The sections below identify legislation relevant to the planning and delivery of the Interconnector Project in relation to terrestrial ecology.

## 3.1 Commonwealth Legislation

### 3.1.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as Matters of National Environmental Significance (MNES). Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of National Environmental Significance are identified as 'controlled actions' and cannot be undertaken without referral to the Department of the Environment and Energy (DotEE) for consideration and approval under the EPBC Act.

The nine matters of national environmental significance identified in the EPBC Act are:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Threatened species and ecological communities
- Migratory species as listed under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- A water resource, in relation to coal seam gas development and large coal mining development.

If an action has the potential to have a significant impact on a MNES, the proposed action is referred to the Department of the Environment and Energy to determine the requirement for formal assessment and approval under the EPBC Act.

## 3.2 SA Legislation

A summary of South Australian Legislation relevant to fauna and flora for this project area is provided below.

### 3.2.1 Native Vegetation Act 1991 (SA) (NV Act)

The *Native Vegetation Act 1991* (NV Act) and associated *Native Vegetation Regulations* 2017 outline incentives, education measures, and assistance to land owners in relation to the preservation and enhancement of native vegetation and acts to control the clearance of native vegetation. Under the SA NV Act, legal clearance of native vegetation may be permissible through one of two mechanisms: either by an application to the Native Vegetation Council (NVC), or under exemptions contained within the associated regulations.

Remnant native vegetation is present within the project footprint and is represented in DEWNR vegetation mapping (NatureMaps 2018). Clearance of native vegetation for the project will likely be

subject to the provisions of a Pathway 4. Risk Assessment under Regulation 12 (34) if the minister declares the infrastructure in the public interest public infrastructure.

### 3.2.2 National Parks and Wildlife Act (SA) (NPW Act)

The *National Parks and Wildlife Act 1972* (NPW Act 1972) allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters) and provides for the use of wildlife through a system of permits allowing certain actions, i.e. keeping, selling, trading, harvesting, farming, hunting and the destruction of native species.

The NPW Act 1972 assigns flora and fauna species to state conservation categories (i.e. threatened species); Endangered (Schedule 7), Vulnerable (Schedule 8), and Rare (Schedule 9). Potential impacts to NPW species would be addressed following on-site assessment of native vegetation and are not discussed in detail in this report.

### 3.2.3 Development Act 1993

The *Development Act 1993* and associated regulations is the legislation related to planning and development matters. The Act establishes an integrated development and environmental assessment process.

Development Approval is required prior to the commencement of development as defined in the *Development Act 1993*, for example, a building, building work, change in the use of land. In order to obtain Development Approval, Development Plan Consent and Building Rules Consent/Certification is required. Development Plan Consent is obtained by lodging a development application with the relevant authority (either the Minister for Planning, State Commission Assessment Panel, or the local Council depending on the approval pathway). Building Rules Consent can be issued by Council or by a Private Certifier.

### 3.2.4 Natural Resources Management Act 2004 (NRM Act)

The intent of the *Natural Resources Management Act 2004* (NRM Act) is to assist in the achievement of ecologically sustainable development in the State by establishing an integrated scheme to promote the use and management of natural resources that recognises and protects the intrinsic values of natural resources. The NRM Act addresses management of water resources, soil resources and pest control among other issues.

The NRM Act establishes Natural Resources Management Regions and Boards and requires development of Natural Resources Management Plans for each region. The NRM Boards may be a referral agency for a development application and will consider how the development meets the requirements of the Act including management of water affecting activities (e.g. construction in a watercourse or use of prescribed water resources).

The Act further legislates for designated control requirements for a series of ‘Declared’ plants (as specific to each region or statewide), which effectively:

- Bans the sale of Declared weeds.
- Controls the movement of Declared weeds.
- Requires landowners / managers to destroy or control infestations of Declared weeds.
- Requires further notification of authorities when an infestation is detected.

This project occurs in the South Australian Murray Darling Basin NRM region.

### 3.2.5 Environment Protection Act 1993 (EP Act)

The *Environment Protection Act 1993* provides for the protection of the environment and defines the Environment Protection Authority's (EPA) functions and powers. The Act promotes ecologically sustainable development and the use of precautionary principles to minimise environmental harm. It requires polluters to bear an appropriate share of the costs and responsibilities of protecting the environment from their activities.

## 3.3 NSW Legislation

### 3.3.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

This Act provides for guiding principles that need to be considered by planning authorities, such as councils and Local Planning Panels, when making decisions under the Act. Key objects of the Act relevant to biodiversity include:

- To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resourcesThe sustainable management of built and cultural heritage (including Aboriginal cultural heritage).
- To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.
- To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.

Depending on the approvals pathway for this project, there are a number of ecological assessments that are used to inform the process. If an Environmental Impact Statement (EIS) is required under the EP&Act, an initial Scoping Report is prepared which informs the preparation of the Secretary's Environmental Assessment Requirements (SEARs) for an EIS for the project. The Scoping Report can also be used inform investigations and the design process.

Section 5.7(1) provides that 'a determining authority shall not carry out an activity, or grant an approval in relation to an activity … that is likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats, unless (a) the determining authority has obtained or been furnished with and has examined and considered an environmental impact statement in respect of the activity'.

A biodiversity impact assessment would be prepared to assess the biodiversity impacts of the proposal to meet the requirements of the EP&A Act and the *Biodiversity Conservation Act 2016* (BC Act). The assessment of potential impacts would be in accordance with the Biodiversity Assessment Method (BAM) (OEH 2017) and documented in a Biodiversity Development Assessment Report (BDAR).

An example of the types of activities and associated effects that may need to be considered includes:

- Any conservation agreement entered into under the *National Parks and Wildlife Act 1974* (NP&W Act) or any plan of management adopted under the NP&W Act for the conservation area to which the agreement relates.
- Any joint management agreement entered into under the BC Act.
- Any Biodiversity Stewardship Agreement entered into under the BC Act.
- Any wilderness area (within the meaning of the Wilderness Act 1987) in the locality.

- Critical habitat.
- Threatened species, populations and ecological communities, and their habitats and whether there is likely to be a significant effect.
- Any other protected fauna or protected native plants within the meaning of the BC Act.

### 3.3.2 Biodiversity Conservation Act 2016

The stated purpose of the BC Act is to maintain a healthy, productive and resilient environment consistent with the principles of ecologically sustainable development in particular, to conserve biodiversity at bioregional and State scales through a variety of mechanisms such as supporting research, knowledge-sharing, regulation of human interaction with wildlife, assessment of the extinction risk of species and ecological communities, supporting conservation action, and establishing market-based conservation mechanisms.

The BC Act and associated Biodiversity Conservation Regulations 2017 are the key pieces of legislation that identify and protect terrestrial threatened species, populations and ecological communities in NSW. This Act began on 25 August 2017 and replaces the *Threatened Species Conservation Act 1995.*

Section 7.3 of the BC Act requires that the significance of the impact on threatened species, populations and endangered ecological communities listed under the BC Act is assessed using the 'test of significance'. Where a significant impact is likely to occur the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS). in accordance with the Environment Agency Head's requirements.

### 3.3.3 National Parks and Wildlife Act 1974 (NSW)

Land management and biodiversity conservation reforms commenced on 25 August 2017. The reforms repealed the TSC Act and several parts and provisions of the NPW Act 1974 that dealt with threatened species and communities, and protected wildlife. Provisions under the EP&A Act that dealt with threatened species impact assessments were also repealed.

The repealed provisions were replaced with the (BC Act) and supporting regulations, which are administered by OEH.

The NPW Act provides that land may be reserved as a national park, nature reserve, historic site, state conservation area, regional park, Aboriginal area or karst conservation reserve. There are a number of areas of national parks estate within the project Study Area.

### 3.3.4 Biosecurity Act 2015

The *Biosecurity Act 2015* (BA Act) and its subordinate legislation commenced on 1 July 2017. The BA Act replaces wholly or in part 14 separate pieces of biosecurity related legislation including the *Noxious Weeds Act 1993*. Under the BA Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. For weeds, the General Biosecurity Duty (GBD) means that any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).

The BA Act and Regulations provide specific legal requirements for high risk activities and state level priority weeds. The State level priority weeds and associated legal requirements relevant to the region are outlined in the Western Regional Strategic Weed Management Plan (NSW LLS 2017) together

with the high risk priority weeds from the regional prioritisation process. As such if present, priority weeds on the site should be assessed and controlled to fulfil the GBD and minimise biosecurity risks.

## 3.4 Victorian Legislation

### 3.4.1 Environment Protection Amendment Act 2018

Provides the foundation for a transformation of Victoria's environment protection laws and Environment Protection Authority Victoria (EPA).

The aims of this act are to enhance the protection of Victoria's environment and human health through a more proportionate, risk-based environment protection framework that includes:

- A preventative approach through a general environmental duty.
- A tiered system of EPA permissions to support risk based and proportionate regulatory oversight.
- Significant reforms to contaminated land and waste management.
- Increased maximum penalties.
- Requirements for more environmental information to be publicly available.
- Modernising and strengthening EPA's compliance and enforcement powers.

### 3.4.2 Flora and Fauna Guarantee Act 1988 (FFG)

Key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.

The Act's objectives aim to conserve all of Victoria's native plants and animals. The Act establishes a range of mechanisms to achieve this objective, including:

- Listing threatened species, communities and threats to native species.
- Requiring an overarching strategy for Victoria's biodiversity.
- Enabling the declaration of habitat critical to the survival of native plants and animals.
- Placing a duty on public authorities to have regard to the objectives of the Act in their operations.
- Requiring permits for activities that could harm threatened plants and fish and communities.

Over 700 species and communities and 42 threats are listed under the Act.

### 3.4.3 Threatened Species Advisory Lists

The Advisory Lists are maintained by the Department of Environment, Land, Water and Planning and are based on technical information and advice obtained from a range of experts. They are reviewed periodically. The information in these lists may be of use in a range of planning processes, such as the preparation of National Park Management Plans, local government planning schemes, regional catchment strategies and in setting priorities for actions to conserve biodiversity.

There are no direct legal requirements or consequences that flow from inclusion of a species in advisory lists, although they are afforded some protection through Victoria's Native Vegetation Management Framework.

Relevant lists to this project include:

- Advisory list of rare or threatened plants in Victoria (Department of Environment and Primary Industries (DEPI) 2014).
- Advisory list of threatened vertebrate fauna (Department of Sustainability and Environment (DSE) 2013)
- Advisory list of threatened invertebrate fauna in Victoria (DSE 2009)

### 3.4.4 Native Vegetation Regulations 2017

The aims of the regulations are to protect Victoria's sensitive native vegetation, by:

- Accounting for the environmental value of large scattered trees, endangered vegetation types and sensitive wetlands and coastal areas in decision making.
- Making the system fairer, by allowing some site based information to supplement mapped information, and ensuring the information used in the regulations better reflects the vegetation on the ground.
- Improving monitoring and reporting on the implementation of native vegetation removal and offsets.

Application requirements for an application to remove native vegetation depend on the application's assessment pathway. There are three assessment pathways, Basic, Intermediate and Detailed.

The assessment pathway is determined by the amount of native vegetation to be removed (in hectares), whether any large trees are to be removed, and the location of the native vegetation in the landscape.

Refer Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017).

## 3.5 Other Important Considerations

### 3.5.1 Directory of Important Wetlands in Australia

The Directory of Important Wetlands of Australia is a list of nationally recognised important wetlands.

A wetland may be considered nationally important if it meets at least one of the following criteria:

- It is a good example of a wetland type occurring within a biogeographic region in Australia.
- It plays an important ecological or hydrological role in the natural functioning of a major wetland system or complex.
- It is habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail.

### 3.5.2 Migratory Shorebirds of the East Asian-Australasian Flyway

Internationally important sites for Migratory Shorebirds of the East Asian-Australasian Flyway consist of wetland and coastal areas that are habitat for one or more migratory shorebird species.

For further information about the East Asian-Australasian Flyway and designating important sites for migratory shorebirds within it, see: http://www.environment.gov.au/resource/migratory-shorebirds-east-asian-australasian-flyway-population-estimates-and 'identification of Significant shorebird areas'

### 3.5.3 Important Habitat

NSW BioNET biodiversity profiles have detailed mapping of sites that are important for the rehabilitation and management for most threatened species and Victoria NatureKit also provides habitat importance maps per threatened species.

# 4. Method

## 4.1 Desktop Approach

The desktop study of the proposed project area included the following:

- Review of the EPBC Act Protected Matters database via the online search tool (including a 15 km buffer from the preferred and optional alignment, given the linear nature of the proposed Study Area) and high level consideration of the likelihood of occurrence for EPBC listed threatened flora and fauna species, listed migratory fauna species and Threatened Ecological Communities (TEC). EPBC Protected Matters Search Tool outputs (November 2018, SA; February 2019, NSW and Victoria) are provided in Appendix A.
- Review of the Biological Database of South Australia (BDBSA) records from within a 25 km buffer on the preferred spatial alignment of the project for threatened flora, fauna and ecological community records, with a focus on records within the last 20 years.
- Review of the SA Department of Water's (DEW) online mapping tool (NatureMaps 2018) to identify any ecologically significant features that may occur within the Study Area or surrounds. This includes information about conservation areas and Interim Biogeographical Regionalisation of Australia (IBRA) bioregion, subregion information where available. It is noted that IBRA statistics have been updated for version 7.0, but for some bioregions in SA only the historical information is available.
- General ecology flora and fauna reference material (as referenced throughout) e.g. fauna field guides, native and exotic plant identification sources, Biological surveys of the area (Armstrong et al. 2003), Bush Condition Manual (Croft et al. 2005).
- Review of NSW Threatened Species Data Records for the buffer obtained from NSW Office of Environment and Heritage (OEH) (nominally 25 km), for records within the last 20 years (provided by TransGrid).
- Review of NSW threatened ecological community (TEC) data (25 km buffer).
- Review of NSW Office of Environment and Heritage (OEH) Threatened Biodiversity Profile Database for Fact Sheets for high level information about survey timing, where available (OEH 2018, 2019).
- Review of IBRA information for NSW (OEH 2016).
- NSW BioNet Atlas and species profiles (BioNet 2018 2019)
- Review of the SNI Environmental Impact Statement for the previously proposed project (SKM 2002) and relevant working papers within (Carpenter 2002).
- Review of Victorian flora and fauna data extracted from NatureKit (20 km buffer).
- Review of Kings Billabong Wildlife Reserve Management Plan (Parks Victoria 2008).

### 4.1.1 Vegetation classification in SA

Vegetation classification in SA varies and is not formalised as with other states, however use of the classification in the region specific Bushland Condition Monitoring (BCM) Manuals (e.g. Croft et al, 2005; Croft et al. 2009) is preferred by the authorities that approved vegetation clearance and offsetting. The BCM process has classified specific 'vegetation communities' within most regions of South Australia. Vegetation associations that can occur with these recognised vegetation communities are listed in the manuals for each region. Benchmarked data associated with BCM classifications is included in both region specific manuals and formalised electronic data sheets (Bushland Assessment Manual, DEWNR 2017) used to provide information about vegetation condtion

and vegetation type to approval authorities (e.g Department of Water and Natural Resources, Native Vegetation Council). The electronic data sheets, which are used to calculate offsets, also include remnancy information about the percentage of vegeatation communities that remain, which is based on IBRA regions.

### 4.1.2 Vegetation classification in NSW

NSW vegetation comprised of 16 Vegetation Formations (VF) as described by Keith (2004). Within these VF, 99 Vegetation Classes (VCs) have been defined (Keith 2004). Within the VCs 1500 NSW Plant Community Types (PCTs) have been defined. There are details around per centage of vegetation cleared and benchmarks for these PCTs (NSW OEH 2019). In NSW the preferred method of assessming vegetation is the Biodversity Assessment Method (BAM) (OEH 2017).

### 4.1.3 Vegetation classification in Victoria

The Victorian landscape is classified into 28 bioregions, which classifies the environment using a range of attributes such as climate, geomorphology, geology, soils and vegetation. Each of these bioregions is then classified by EVC (Ecological Vegetation Class) benchmarks. Within each region there are a number of EVCs, for which there are detailed benchmark characteristics (BioEVC) used for comparison when determining the condition of remaining vegetation (DEWLP 2019).

In Victoria, biodiversity conservation status is assigned to each of the BioEVCs; categories include presumed extinct (no longer present in the region), endangered, vulnerable, depleted, rare and least concern. These categories are based on the per centage of pre-European extent of the EVC that remains and the extent and quality compared to original.

Where impacts to vegetation or habitat will occur assessments are required using the Habitat Hectares scoring method (DSE 2004).

## 4.2 Field Assessments

High level field assessments of the preferred and optional alignment were undertaken to highlight ecological constraints and gather preliminary information about vegetation condition and potential habitat for threatened species.

Methods for the field assessments were as follows:

- The Study Area (preferred and alternate option) was surveyed between 19-22 November 2018, and a follow-up in 15-16 January 2019 for Buronga substation to the Darling River, which could not be accessed during the initial site visit. In addition, the spur line between the Buronga substation and the Red Cliffs Substation (Victoria) was surveyed between 2-3 April 2019.
- Sites were accessed via available public roads (with the exception of the Buronga substation easement follow-up in January and April 2019, where Jacobs staff were accompanied by TransGrid representatives).
- Field mobile mapping units were used to capture field waypoints and GPS reference photo records from assessment sites.
- Data was collected aligning to SA Bushland Assessment Methods (DEWNR 2017) and high level NSW BAM methods and Victorian EVC, including full species lists and other landform and habitat characteristics.
- Some sites were also assessed rapidly to assist with future mapping and extensive areas of similar vegetation, i.e. brief description, location point and photo taken.

- Vegetation condition for SA sites is a result of the electronic Bushland data sheet (e.g. vegetation condition graph) which considers the spread of native and exotic species recorded for the benchmarked BCM (Bush Condition Monitoring) Community for the MDBSA region.
- Benchmarking for NSW and Victorian sites was not undertaken, but information was collected for later assessment and preliminary vegetation conditions were provided consistent with the SA approach considering diversity of flora, impacts from grazing or drought and habitat potential (e.g. presence of hollows and leaf litter).

# 5. Desktop Results

## 5.1 Landscape Context

The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information (Thackway and Cresswell 1995; Environment Australia 2000). The bioregions are further refined into subregions and environmental associations. Further details for each state are provided below.

### 5.1.1 SA Landscape Context

Given the linear nature of the project, three IBRA Bioregions and five IBRA subregions occur within the SA portion of the Study Area. Table 5-1 summarises the IBRA statistics within the 25 km buffer of the alignment. Further detail about each IBRA region and IBRA subregion are provided in Table 5-2 below.

Table 5-1: IBRA area statistics for SA portion of alignment

| IBRA Region | IBRA Subregion | Hectares within footprint (25km buffer) | % of the footprint (25 km buffer) |
|---|---|---|---|
| Flinders Lofty Block (FLB) | Broughton (FLB02) | 112,323 | 10.09% |
| Murray Darling Depression (MDD) | South Olary Plain (MDD01) | 462,121 | 41.52% |
| | Murray Mallee (MDD02) | 295,298 | 26.53% |
| | Braemer (MDD07) | 140,298 | 12.61% |
| Riverina (RIV) | Murray Scroll Belt (RIV06) | 102,922 | 9.25% |

Table 5-2: IBRA details and descriptions for the SA portion of the alignment

| **Flinders Lofty Block IBRA Bioregion** | |
|---|---|
| Temperate to arid Proterozoic ranges, alluvial fans and plains, and some outcropping volcanics, with the semi arid to arid north supporting native cypress, black oak (belah) and mallee open woodlands, Eremophila and Acacia shrublands, and bluebush/saltbush Chenopod shrublands on shallow, well-drained loams and moderately-deep, well-drained red duplex soils. The increase in rainfall to the south corresponds with an increase in low open woodlands of *Eucalyptus obliqua* and *E. baxteri* on deep lateritic soils, and *E. fasciculosa* and *E. cosmophylla* on shallower or sandy soils. | |
| **Broughton IBRA subregion** | |
| Remnant vegetation | Approximately 10% (106330 ha) of the subregion is mapped as remnant native vegetation, of which 3% (3064 ha) is formally conserved. |
| Landform | Hills and valleys; alternating subparallel hilly ridges and valleys with a general N-S trend in north. In south, hilly dissected tableland. |
| Geology | Dissected lateritized surface in south |
| Soil | Hard setting loams with red clayey subsoils, Highly calcareous loamy earths, Hard setting loams with mottled yellow clayey subsoil, Coherent sandy soils, Cracking clays |
| Vegetation | Assumed native vegetation cover |

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| Conservation significance | 55 species of threatened fauna, 113 species of threatened flora and no National or Ramsar wetlands occur within the subregion. |
| **Murray Darling Depression (MDD) Bioregion** | |
| An extensive gently undulating sand and clay plain of Tertiary and Quaternary age frequently overlain by aeolian dunes. Vegetation consists of semi-arid woodlands of Black Oak / Belah, Bullock Bush / Rosewood and Acacia spp., mallee shrublands and heathlands and savanna woodlands.<br>The region is known in Victoria as the Victorian Mallee region and characteristically has few surface water bodies because its soils are highly permeable and its climate promotes high evaporative losses. Approximately 70 per cent of Victoria's mallee vegetation has been cleared and as a direct consequence of farming practices, the 1930s saw a part of the Victorian Mallee become one of the worst wind eroded areas in Australia. Substantial areas of mallee remain today in the western aeolian dunes, mainly in South Australia and but also western NSW. Clearing has also been widespread in the north eastern portion of the bioregion in NSW particularly on the undulating plains and relict river channels and lakes associated with the Murray and Darling Rivers. | |
| **Murray Mallee IBRA subregion** | |
| Remnant vegetation | Approximately 18% (72200 ha) of the subregion is mapped as remnant native vegetation, of which 31% (22035 ha) is formally conserved |
| Landform | Very gently undulating, to flat aeolian sand covered depositional plain of the central-southern Murray Basin |
| Geology | East-west linear dunes, regularly spaced with cusp-like crests which are consistently steeper on the southern side. Up to four buried paleosols within the dune. Dunes composed of pale to dark reddish-brown calcareous sand with some clay fraction. |
| Soil | Brown calcareous earths and highly calcareous brown loamy earths, Hard setting loamy soils with red clayey subsoils, Cracking clays. |
| Vegetation | Mallee heath and shrublands. |
| Conservation significance | 39 species of threatened fauna, 17 species of threatened flora and 2 National protected Wetland occur within the subregion |
| **South Olary Plain IBRA subregion** | |
| Remnant vegetation | Approximately 97% (1,179,139 ha) of the subregion is mapped as remnant native vegetation, of which 33% (394341 ha) is formally conserved (not updated to IBRA 7) |
| Landform | Plains with variable dune cover ,from dune formations with relatively small plains between to plains with isolated tracts of dunes. Claypans, saline soils, swamps, and intermittent lakes in low-lying areas. |
| Geology | Exposed caliche & crusty loamy soils; colluvial sand,silt, clay & gravel along footslopes of Olay Spur. Evaporite deposits; gypsum & halite. |
| Soil | Brown calcareous earths, Highly calcareous loamy earths, Cracking clays, yellow grey, Hard setting loamy soils with red clayey subsoils. |
| Vegetation | Mallee with an open shrubby understorey |
| Conservation significance | 52 species of threatened fauna, 33 species of threatened flora, 2 National Wetlands and 1 Ramsar Wetland Occur within the subregion. |

| | |
|---|---|
| **Braemer IBRA subregion** | |
| Remnant vegetation | Approximately 100% (957367 ha) of the subregion is mapped as remnant native vegetation, of which 0.36% (3461 ha) is formally conserved (not updated to IBRA 7). |
| Landform | Plains with variable dune cover, from dune formations with relatively small plains between to plains with isolated tracts of dunes. Claypans, saline soils, swamps, and intermittent lakes in low-lying areas. |
| Geology | Exposed caliche & crusty loamy soils; colluvial sand, silt, clay & gravel along footslopes of Olay Spur. Evaporite deposits; gypsum & halite. |
| Soil | Brown calcareous earths, Highly calcareous loamy earths, Cracking clays, yellow grey, Hard setting loamy soils with red clayey subsoils. |
| Vegetation | Chenopod shrublands. |
| Conservation significance | 29 species of threatened fauna, 14 species of threatened flora and no National or Ramsar Wetlands occur in the subregion. |
| **Riverina (RIV) Bioregion** | |
| An ancient riverine plain and alluvial fans composed of unconsolidated sediments with evidence of former stream channels. The Murray and Murrumbidgee Rivers and their major tributaries, the Lachlan and Goulburn Rivers flow westwards across this plain. Vegetation consists of river red gum and black box forests, box woodlands, saltbush shrublands, extensive grasslands and swamp communities. | |
| **Murray Scroll Belt IBRA subregion** | |
| Remnant vegetation | Approximately 56% (92808 ha) of the subregion is mapped as remnant native vegetation, of which 35% (32028 ha) is formally conserved (not updated to IBRA version 7). |
| Landform | Floodplain and channel of Lower Murray River. Floodplains, terraces, residual islands, lakes. |
| Geology | Mainly alluvium: sand, silt & clay. Point bar, shoal, backswamp, splay & lake deposits & gravel. |
| Soil | Cracking clays, Brown sands. |
| Vegetation | Eucalyptus woodlands with a shrubby understorey |
| Conservation significance | 76 species of threatened fauna, 59 species of threatened flora, 8 National Wetlands and 2 Ramsar Wetlands occur within the subregion (not updated for IBRA version 7 (NatureMaps 2018). |

### 5.1.2 NSW Landscape Context

Given the linear nature of the project, three IBRA Bioregions and six IBRA subregions occur within the NSW portion of the Study Area. Table 5-3 summarises the IBRA statistics within the 25 km buffer of the alignment. Further detail about each IBRA region and IBRA subregion are provided in Table 5-4 below.

Table 5-3: IBRA area statistics for NSW portion of alignment

| IBRA Region | IBRA Subregion | Hectares within footprint (25km buffer) | % of the footprint (25 km buffer) |
|---|---|---|---|
| Darling Riverine Plains (DRP) | Great Darling Anabranch (DRP08) | 25,959 | 3.12% |
| | Pooncarie-Darling (DRP09) | 110,819 | 13.32% |
| Murray Darling Depression (MDD) | South Olary Plain (MDD01) | 536,347 | 64.48% |
| | Murray Mallee (MDD02) | 29,855 | 3.59% |
| Riverina (RIV) | Murray Scroll Belt (RIV06) | 106,528 | 12.81% |
| | Robinvale Plains (RIV05) | 22,303 | 2.68% |

Table 5-4: IBRA details and descriptions for the NSW portion of the alignment

| **Darling Riverine Plains (DRP) Bioregion - NSW** | |
|---|---|
| The Darling Riverine Plains Bioregion occupies most of the upper catchments of the Darling and Barwon Rivers in northern NSW and southern Qld and includes the channels and floodplains of the lower reaches of these catchments.<br>The upper catchment landscape is a series of overlapping, low gradient alluvial fans. The lower tract of the river is a narrow floodplain confined between bedrock landscapes, or by extensive sandplains and dunefields.<br>Discharge from past and present streams control patterns of sediment deposition, soils, landscapes and vegetation. Much of the geology and geomorphology of the region is similar to that of the Riverina Bioregion.<br>(https://www.environment.nsw.gov.au/bioregions/DarlingRiverinePlains-Landform.htm) | |
| Flora | Nineteen species listed in the TSC Act 1995 are known to occur within the Darling Riverine Plains Bioregion. Nine of these species are endangered and 10 are considered vulnerable (NSW NPWS 2001). |
| Fauna | Within the bioregion there are 25 amphibian species, 104 reptile species, 319 bird species and 58 mammal species. Of these, 63 species are listed in the TSC Act: 9 as extinct, 12 as endangered and 47 as vulnerable |
| **Great Darling Anabranch IBRA subregion** | |
| Landform | Channel and floodplain features of the Great Darling Anabranch with overflow lakes, lunettes and extensive sandplains and low dunes. This system carries high level Darling River flows. |
| Geology | Quaternary alluvial complex of river and lake sediments with associated aeolian landforms. |
| Soil | Grey clay in channels, floodplains and lake beds. Limited areas of red sands and texture contrast soils. Lunettes of white or pale yellow sand alternating with layers of pale brown pelleted clay. |
| Vegetation | River red gum on channels, black box and river cooba widespread on floodplains. Lignum and black box on lake margins. Belah, white cypress pine, prickly wattle and bluebush on lunettes. |
| **Pooncarie IBRA subregion** | |

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|---|---|
| Landform | This system carries low level Darling River flows. |
| Geology | As for the Great Darling Anabranch. |
| Soil | As for the Great Darling Anabranch |
| Vegetation | As for the Great Darling Anabranch |
| **Murray Darling Depression (MDD) Bioregion - NSW** | |
| The Murray Darling Depression Bioregion lies in the southwest corner of NSW and extends into Vic and SA. The total area of the bioregion is 19,717,651 hectares with 40.71 per cent (8,026,167 ha) of this area in NSW and covering 10.03 per cent of the state.<br>The NSW portion of the bioregion is bounded in the north by the Broken Hill Complex Bioregion, with the Cobar Peneplain to the northeast and the Riverina Bioregion to the east. The Murray Darling Depression Bioregion also borders the Darling Riverine Plains to the northwest and contains outlying remnants of the Darling River and tributaries as they meet the Murray River at the Victorian border.<br>The bioregion lies entirely in the Western Division of NSW and contains few town centres, with Ivanhoe, just near the tip of the Riverina Bioregion, being the major settlement aside from Manilla, Emmdale and other pastoral stations in the bioregion.<br>The bioregion includes the Murray, Murrumbidgee, Lachlan, Darling, Barwon, Yanda River and Peacock Creek catchments. https://www.environment.nsw.gov.au/bioregions/MurrayDarlingDepressionBioregion.htm | |
| Flora | Stipa nullanulla, now *Austrostipa nullanulla*, has been identified as regionally endemic to the Murray Darling Depression Bioregion and is listed as endangered in the TSC Act 1995 (Bowen and Pressey 1993, cited in Morton et al. 1995).<br>Significant flora species in the bioregion include *Austrostipa metatoris*, Mossgiel daisy (*Brachycome papillosa*), *Atriplex infrequens*, and *Swainsona pyrophila*, all listed as vulnerable in NSW. |
| Fauna | The malleefowl (*Leipoa ocellata*), which is listed as endangered in the TSC Act, is found throughout western NSW, including in the Murray Darling Depression Bioregion (Priddel 1990, Garnett 1992, cited in Morton et al. 1995). The plains-wanderer (*Pedionomus torquatus*), listed as vulnerable in the TSC Act, is found in this bioregion as well as in the Riverina Bioregion (Baker-Gabb et al. 1990, Garnett 1992).<br>Black-eared miners (*Manorina melanotis*) are listed as endangered in both state and Commonwealth legislation, as they are at great risk of extinction and, within NSW, are now found only in the Murray Darling Depression Bioregion (Garnett 1992, cited in Morton et al. 1995). https://www.environment.nsw.gov.au/bioregions/MurrayDarlingDepression-Biodiversity.htm |
| **South Olary Plains IBRA subregion** | |
| Landform | Dunefields, sandplains, dry lakes and groundwater basins. |
| Geology | Quaternary aeolian sands and lake sediments. |
| Soil | Deep siliceous and calcareous red to yellow sands, sandy earths, brown texture contrast soils on dunes and sandplains. Saline, gypseous and calcareous clays on lake beds, mixed sands and pelleted clays in lunettes. |
| Vegetation | Diverse mallee on sands with; pointed mallee, congoo mallee, red mallee, lerp mallee, slender-leaf mallee, yorrell, white cypress pine, mallee cypress pine, belah, rosewood, with porcupine grass and diverse shrubs. Belah, rosewood, black bluebush, pearl bluebush, old man saltbush, on sandplains |

| | |
|---|---|
| | and heavier soils. Black box fringing depressions, halophytes on salinas, and Chenopod shrublands on lunettes, sometimes with white cypress pine. |
| **Murray Mallee / Darling Depression IBRA subregion** | |
| Landform | Extensive sandplains. Dunefields piled against Cobar Peneplain ranges. freshwater overflow lakes fed by rare floods in the Darling River. Stony ridges and ranges. |
| Geology | Quaternary aeolian sands and lake sediments. Isolated Devonian quartz sandstone outcrops. |
| Soil | Deep siliceous and calcareous red to yellow sands, sandy earths, brown texture contrast soils on dunes and sandplains. Brown and grey and calcareous clays on lakes. Pale yellow sands on lunettes. Stony loams on hills. |
| Vegetation | Belah, rosewood, nelia, mulga wilga and woody shrubs on western sandplains. Pointed mallee, congoo mallee, yorrell with diverse shrubs and porcupine grass, occasional kurrajong and mallee cypress pine on eastern sandplains. Mulga, white cypress pine, red box, mallee, belah and poplar box on central dunes. Lignum, canegrass, black bluebush and black box or poplar box on margins and beds of swamps and lakes. Mulga with red box and shrubs on rocky hills (OEH 2016). **https://www.environment.nsw.gov.au/bioregions/MurrayDarlingDepression-Subregions.htm** |
| **Riverina (RIV) Bioregion - NSW** | |
| The Riverina Bioregion lies in southwest NSW, extending into central-north Vic. The bioregion is approximately 9,576,964 hectares, with 7,090,008 hectares or 74.03 per cent of it lying in NSW (IBRA 5.1external link). The NSW portion of the bioregion occupies approximately 8.86 per cent of the State (Eardley 1999 and IBRA 5.1external link).<br>The Riverina Bioregion extends from Ivanhoe in the Murray Darling Depression Bioregion south to Bendigo, and from Narrandera in the east to Balranald in the west. Within its boundaries lie the towns of Hay, Coleambally, Deniliquin, Leeton, Mossgiel, Hillston, Booligal and Wentworth, while Griffith, Ivanhoe, Narrandera and Albury lie just outside its boundary in neighbouring bioregions.<br>The bioregion also includes outlying remnants of the Murray Darling Depression Bioregion in its western boundary, and the Victorian Midlands Bioregion in the south.<br>The Murray and Murrumbidgee Rivers and their major tributaries, the Lachlan and Goulburn Rivers, flow from the highlands in the east, westward across the Riverina plain.<br>https://www.environment.nsw.gov.au/bioregions/RiverinaBioregion.htm | |
| Flora | Twenty-eight threatened species from the Riverina Bioregion are listed in the schedules of the TSC Act (NSW NPWS 2001). Twelve of these are listed as endangered, 15 are listed as vulnerable and one species, *Tetratheca pilosa* ssp. *pilosa*, is considered extinct in the bioregion. |
| Fauna | Significant fauna known to occur in the riverine forests of the Riverina Bioregion include the superb parrot (*Polytelis swainsonii*), sugar glider (*Petaurus breviceps*), feathertail glider (*Acrobates pygmaeus*), squirrel glider (*Petaurus norfolcensis*), brush-tailed phascogale (*Phascogale tapoatafa*), koala (*Phascolarctos cinereus*), carpet python (*Morelia spilota*), freckled duck (*Stictonetta naevosa*) and peregrine falcon (*Falco peregrinus*) (Eardley 1999).<br>Black box woodlands provide significant habitat to a diversity of bird species including the bush thickknee (*Burhinus magnirostris*) and the superb parrot, which will only nest where box woodland occurs within 10 km of selected nest trees (usually river red gum) (Eardley 1999).<br>Species including the plains-wanderer (*Pedionomus torquatus*), bush thicknee, striped legless-lizard (Delmar Impar) and fat-tailed dunnart (*Sminthopsis crassicaudata*) are found in the shrublands and grasslands of the Riverina Bioregion (Eardley 1999). |

| Robinvale Plains IBRA subregion | |
|---|---|
| Landform | Narrow floodplain with meandering channels, billabongs, levees and low dunes. Overflow lakes with lunettes. |
| Geology | Quaternary alluvial sediments. Clay dominant. Small overflow lakes. |
| Soil | Red brown earths, grey clays, deep sands and yellow texture contrast soils. |
| Vegetation | River red gum on channels. Black box, river cooba, oldman saltbush, belah and lignum on floodplains. White cypress pine, mallee acacias and bluebush on lunettes and sand dunes. |
| **Murray Scroll Belt IBRA subregion** | |
| Landform | Wider floodplain with meandering channels, billabongs, levees and low dunes. Large overflow lakes with large lunettes. |
| Geology | Quaternary alluvial sediments. Clay dominant, wider plains with larger overflow lakes and salinas. Affected by higher water salinity and summer floods from the Darling River. |
| Soil | Red brown earths, grey clays, deep sands and yellow texture contrast soils. |
| Vegetation | River red gum on channels and lake margins. Black box, river cooba, oldman saltbush, belah and lignum on floodplains. White cypress pine, mallee acacias and bluebush on lunettes and sand dunes. |

### 5.1.3 Victoria Landscape Context

Given the linear nature of the project, and very small length of the Victorian spur, two IBRA Bioregions and two IBRA subregions occur within the Victoria portion of the Study Area. Table 5-5 summarises the IBRA statistics within the 20 km buffer of the alignment (smaller buffer used due to smaller length of spur). Further detail about each IBRA region and IBRA subregion are provided in Table 5-5 below.

Table 5-5: IBRA area statistics for Victorian portion of alignment

| IBRA Region | IBRA Subregion | Hectares within footprint (20km buffer) | % of the footprint (20 km buffer) |
|---|---|---|---|
| Murray Darling Depression (MDD) | Murray Mallee (MDD02) | 2,816504 | 95.6% |
| Riverina (RIV) | Robinvale Plains (RIV05) | 13,774 | 0.5% |
| | Murray Scroll Belt (MSB) | 116,144 | 3.94 |

Source: https://www.data.vic.gov.au/data/dataset/victorian-bioregions-mapped-at-1-100-000

Table 5-6: IBRA details and descriptions for the Victorian portion of the alignment

| Murray Darling Depression (MDD) Bioregion |
|---|

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| An extensive gently undulating sand and clay plain of Tertiary and Quaternary age frequently overlain by aeolian dunes. Vegetation consists of semi-arid woodlands of Black Oak / Belah, Bullock Bush / Rosewood and Acacia spp., mallee shrublands and heathlands and savanna woodlands.<br>The region is known in Victoria as the Victorian Mallee region and characteristically has few surface water bodies because its soils are highly permeable and its climate promotes high evaporative losses. Approximately 70 per cent of Victoria's mallee vegetation has been cleared and as a direct consequence of farming practices, the 1930s saw a part of the Victorian Mallee become one of the worst wind eroded areas in Australia. Substantial areas of mallee remain today in the western aeolian dunes, mainly in South Australia and but also western NSW. Clearing has also been widespread in the north eastern portion of the bioregion in NSW particularly on the undulating plains and relict river channels and lakes associated with the Murray and Darling Rivers. |
| **Murray Mallee IBRA subregion / Victorian Bioregion** |
| Murray Mallee, located in the north west of the state, is typified by calcareous material in the form of broad undulating sandy plains that is often associated with linear, east-west aligned, low sand dunes with intervening heavier textured swales developed from Cainozoic deposits of alluvial, aeolian and swampy deposits. The vegetation is dominated by East/West-Dune Mallee with some Chenopod Mallee and Shallow-Sand Mallee.<br>The plains, drainage lines and groundwater discharge landscapes are dispersed with salt lakes and gypsum flats with lunettes developed on the eastern margins of the lakes. The Cainozoic deposits give rise to calcareous earths (Calcarosols), cracking clays (Vertosols), red sands (Rudosols). The vegetation is dominated by Gypseous Plains Shrubland, Saline Shrubland (Raak), Plains Grassland and Drainage-line Grassy Woodland.<br>The bioregion has few surface water bodies due to highly permeable soils and climatic conditions. The Murray river forms the north edge for the bioregion and the Avoca River roughly defines the eastern edge (DELWP 2019). |
| There are 39 EVCs defined for the bioregion within Victoria. Conservation status: 6 depleted, 10 least concern, 13 vulnerable, 1 rare, 9 endangered |
| **Riverina (RIV) IBRA Bioregion** |
| Defined largely on topographical and geological features, However, these features and the vegetation are strongly correlated. The Riverina includes the eastern part of the Murray Basin. The southern and eastern boundary of the region occurs at an elevation of about 150metres and adjoins the low hills and ranges of the Midlands (Victoria) and South-western Slopes(New South Wales). It extends north to a latitude of about 33, including Ivanhoe and Conoble Lake (in New South Wales). The western boundary of this region is the boundary between the aeolian and fluviatile landforms, and associated soils and vegetation. |
| **Robinvale Plain Victoria Bioregion / IBRA subregion** |
| Robinvale Plain, located in the north west of the state, is predominantly a narrow gorge confined by the cliffs along the Murray River - which is entrenched within older up-faulted Cainozoic sedimentary rocks. Alluvium deposits from the Cainozoic period gave rise to the red brown earths, cracking clays and texture contrast soils (Vertosols, Chromosols and Sodosols) this supports Riverine Grassy Forest and Riverine Grassy Chenopod Woodland ecosystems (DELWP 2019). |
| Remnant vegetation: There are 28 EVCs defined for the bioregion. Conservation status: 12 depleted, 3 least concern, 9 vulnerable, 4 endangered (DEWLP 2019) |
| **Murray Scroll Belt Bioregion** |
| Murray Scroll Belt, located in the far north west of the state, is an entrenched river valley and associated floodplain, including lake complexes of numerous oxbow lakes, billabongs, ephemeral lakes, swamps and active meander belts. The River Murray forms a narrow valley where fluvial processes predominate within an otherwise aeolian-dominated landscape. Alluvium deposits from the Cainozoic period gave rise to the red brown earths, cracking clays and texture contrast soils |

| | |
|---|---|
| (Dermosols, Vertosols, Chromosols and Sodosols) which support Alluvial-Plain Shrubland, Riverine Grassy Chenopod Woodland and Riverine Grassy Forest ecosystems | |
| Remnant vegetation | There are 20 EVS defined for the bioregion. Conservation status: 8 depleted, 2 least concern, 8 vulnerable, 2 endangered (DEWLP 2019) |

## 5.2 Conservations Parks / Heritage Agreement Areas

A number of conservation areas occur within the Study Area, including Conservation Parks and Reserves, Heritage Agreement Areas and National Parks. These areas are often significant from a landscape perspective in terms of providing habitat for a diverse range of flora and fauna, including threatened and protected species. A summary of conservation areas, proximity to the alignment and potential ecological constraints are provided in Table 5-7.

In addition, a group of protected areas / conservation parks can also be recognised as an important habitat area. In the SA portion of the alignment a number of the conservation parks / reserves that include contiguous habitat form part of the Riverland Biosphere Reserve (formerly the Bookmark Biosphere Reserve), this area is 900,000 ha. The Reserve is recognised by UNESCO as providing mallee woodland and shrubland, habitat for the Endangered Black-eared Miner, as well as wetlands and riverine communities. Key properties within the reserve include:

- Calperum Station
- Chowilla Regional Reserve
- Chowilla Game Reserve
- Cooltong Conservation Park
- Dannnali Wilderness Protection Area
- Gluepot Reserve
- Loch Luna Game Reserve
- Moorook Game Reserve
- Murray River National Park
- Taylorville Station.

Figure 5-1 (SA) and Figure 5-2 (NSW / Vic) show the key conservation areas within the Study Area for each state.

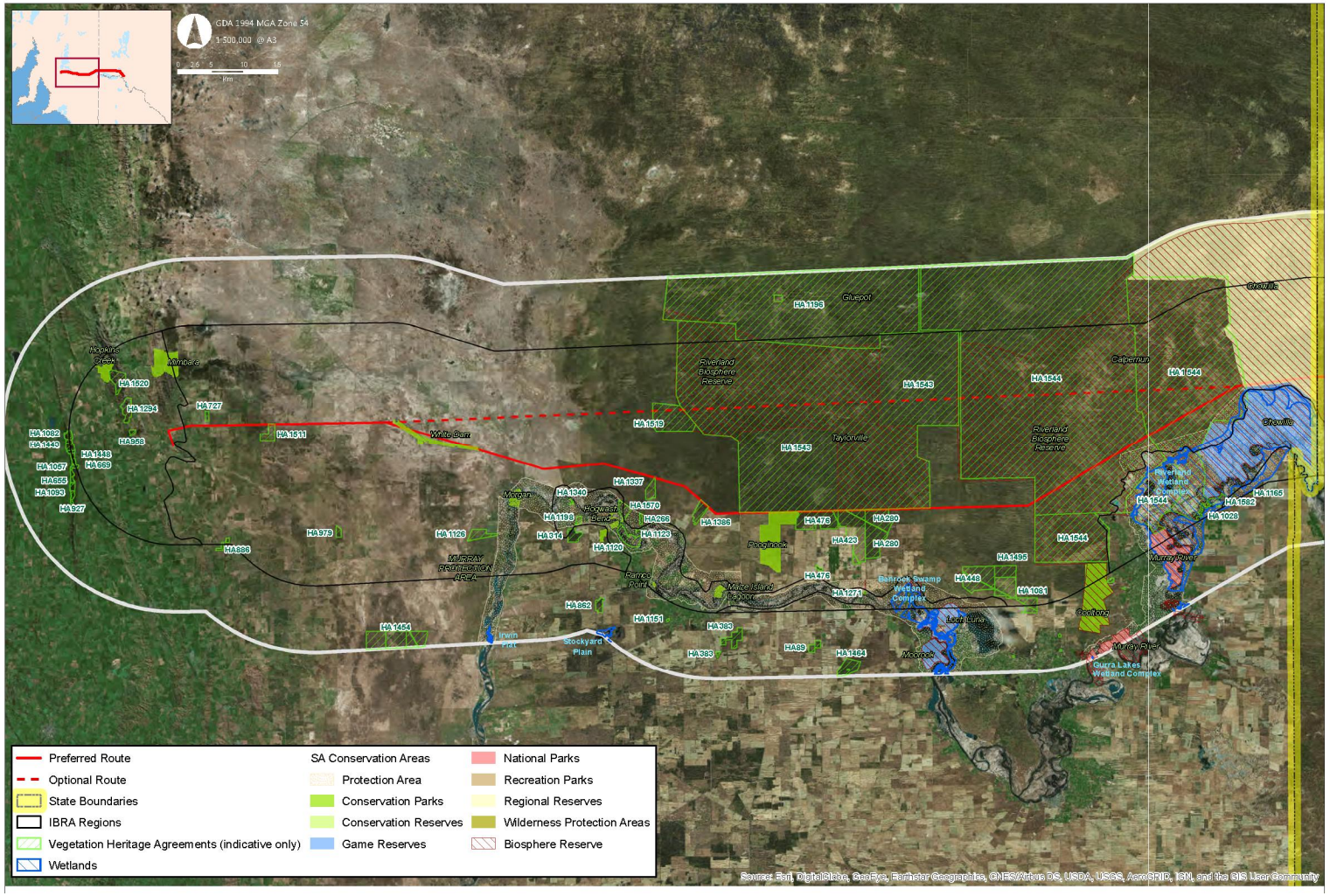


Figure 5-1: Conservation areas within Study Area (SA)

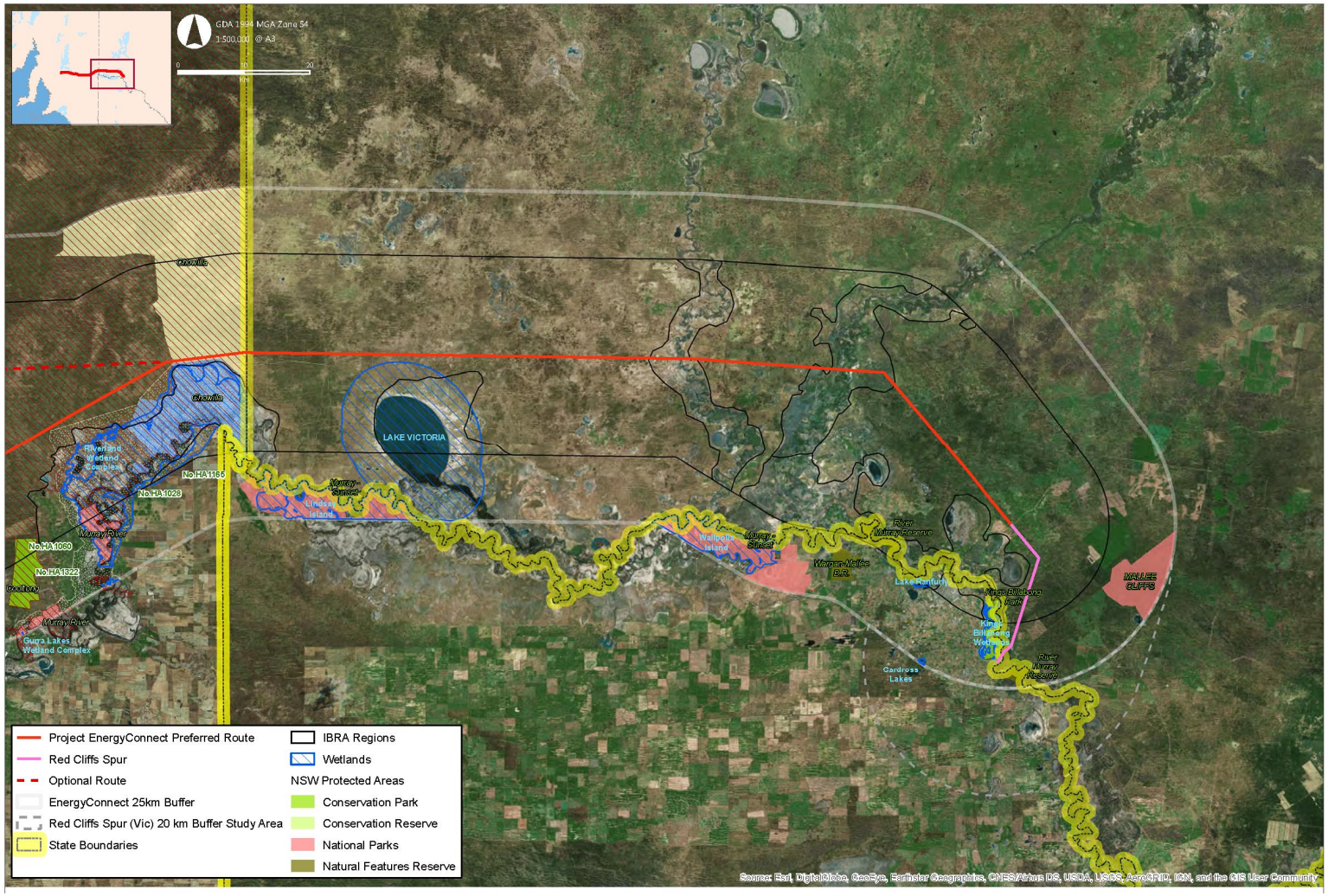


Figure 5-2: Conservation areas within Study Area (NSW and Vic)

Table 5-7: Conservation areas within the Study Area

| Conservation areas within 25 km of the study alignment | Location and interaction with study alignments | High level conservation values identified |
|---|---|---|
| ***South Australia*** | | |
| HA 1543 (Taylorville Station, 938,993,619 ha) | HA 1543 (north of Pooginook) – abuts alignment | These areas have multiple records for EPBC listed fauna; Malleefowl, Regent Parrot and Black-eared Miner, Red-lored Whistler.<br><br>These areas provide extensive areas of old growth mallee habitat with a mosaic of fire scar history, which provides optimal habitat for threatened species, in particular Malleefowl.<br><br>These areas also have habitat linkages with Danggali Wilderness Area, Dangalli Conservation Park, Chowilla Recreation Reserve and Chowilla Games Reserve<br><br>These areas combine to form the EPBC-listed Critical Habitat for Black-eared Miner and are also part of the Riverland Biosphere Reserve |
| HA 1544 (Calpernum Station, (>1,618,185,654.52 ha) | HA 1544 abuts alignment (north of) and (adjacent Chowilla) | |
| HA 1196 (Gluepot Reserve)<br>HA 1519 (small HA adjacent 1543) | HA 1196 north of alignment<br>HA 1519 7 km north of alignment | |
| HA 1520, 1294, 958, 727 | HA 1520, 1294, 958 (within 10 km); 727 (1 km north of alignment) | Smaller HA are more likely to contain threatened flora and provide refuge for threatened fauna, given fragmented nature of remnant vegetation in the region. |
| HA 1511, 1126 | HA 1511 abuts alignment (field site 8), 1126 (south of Morgan, 12 km from line) | |
| HA 314 / 1340/ 1198/1570/1120 /266<br>HA 1337 | HA 314 / 1340/ 1198/1570/1120 /266 – all south of Morgan road within 10 km<br>HA 1337 (northern point abuts alignment) | |
| Hopkins Creek CP | Can be avoided. Near Hallelujah Hills and adjacent HA 1520, near HA1294 | Known to contain EPBC listed and State threatened *Acacia glandulicarpa* (Hairy Pod Wattle). Multiple records for National and State fauna. |
| Mimbara CP | Can be avoided, within 20 km of western end of alignment. Between Worlds End and Burra Creek. | Open Mallee, Hopbush Shrulbland and Sheepbush Shrubland. Records of state listed fauna. |
| White Dam CP | Within proximity to preferred alignment / passes through | Black oak low open woodland with Bluebush. Records of state listed fauna. |
| Morgan CP | East of Morgan, south of alignment | Multiple records for EPBC-listed Regent Parrot and Southern Bell Frog and other state listed fauna. Records for state listed flora. |
| Hogwash Bend CP | East of Morgan, south of alignment | Multiple records for EPBC-listed Regent Parrot and Southern Bell Frog and other state listed fauna. Records for state listed flora. |
| Maize Island Lagoon CP | South of alignment, largely avoided | Multiple records for EPBC-listed Regent Parrot and Southern Bell Frog and other |

| Conservation areas within 25 km of the study alignment | Location and interaction with study alignments | High level conservation values identified |
|---|---|---|
| | | state listed fauna. Records for state listed flora. |
| Pooginook CP | Northern boundary abuts preferred alignment | EPBC listed Malleefowl / Regent Parrot / Red-lored Whistler records and habitat. Multiple records for National and State listed flora and fauna. |
| Cooltong CP | North of Berri, south of preferred alignment | EPBC-listed Malleefowl multiple records and habitat. Multiple records for state-listed fauna.<br>Part of the Riverland Biosphere Reserve. |
| Murray River NP (multiple areas) / Rillis Island CP / Media Island CP / Kapunda Island CP | North of Renmark. South of alignment | Multiple records for EPBC-listed Southern Bell Frog / Regent Parrot. Multiple records for state listed fauna.<br>Part of the Riverland Biosphere Reserve |
| Chowilla Game Reserve | North of Renmark, intercepts / immediately south of alignment | Multiple records for EPBC-listed Regent Parrot, Southern Bell Frog. Multiple records for and State listed flora and fauna.<br>Part of the Riverland Biosphere Reserve |
| Chowilla Regional Reserve | North of Renmark, intercepts / immediately north of alignment | Records for EPBC-listed Malleefowl and state listed fauna.<br>Part of the Riverland Biosphere Reserve |
| ***New South Wales*** | | |
| Mallee Cliffs NP | East of preferred alignment / Study Area | Habitat for EPBC threatened species. Sand plain and sand dune habitats. |
| Lake Victoria | South of preferred alignment | Habitat for EPBC listed migratory birds. |
| Murray – Sunset NP | West of Lake Victoria, south of the alignment, | EPBC-listed Southern Bell Frog Records. Remnant vegetation, samphire habitat, mallee, riverine and salt lake environments. |
| Water areas e.g. Lake Gol Gol plus other water areas – not labelled on map or NSW data, Fletchers Lake | Near Buronga substation | Would provide habitat for some EPBC listed migratory waterbirds / shorebirds when they are in Australia. |
| ***Victoria*** | | |
| Kings Billabong Park | Alignment (including existing transmission line with towers) traverses south-eastern end.<br>Connects to Karadoc Swamp south east of alignment.<br>Eastern Boundary is the Murray River.<br>Alignment route traverse ephemeral Lignum shrubland on floodplains and Black Box Woodland. | Records for Regent Parrot and Southern Bell Frog in the wider area.<br>Would provide habitat for some EPBC listed migratory waterbirds / shorebirds when they are in Australia.<br>Has a Strategic Biodiversity Index (99 – which is considered high).<br>Permanent freshwater marshes and meadows / wetlands north-west of the route.<br>A wetland of National Significance (permanent wetland areas).<br>Not a Ramsar wetland.<br>Not on the shorebird international list. |

| Conservation areas within 25 km of the study alignment | Location and interaction with study alignments | High level conservation values identified |
|---|---|---|
| | | IUCN category 1a (strict nature reserve to protect and conserve biodiversity). |

CP – Conservation Park, HA – Heritage Agreement Area, NP – National Park

## 5.3 EPBC Matters of National Environmental Significance (MNES)

As per Section 3.1, MNES are protected under the *EPBC Act.* This section summarises the outcomes of the review of the Protected Matters Search Tool (PMST) outputs for MNES that are broadly mapped as potentially occurring in the area. It is noted that the mapping for this tool is high level and includes multiple buffers, hence the outputs require both desktop rationalisation against current records (within the last 20 years), known ranges (based on current literature and experience) and ground-truthing in the field.

### 5.3.1 Wetlands of International Importance (Ramsar)

The EPBC PMST suggested the following two Wetlands of International Importance potentially occur within the Study Area:

- Banrock Station Wetland Complex. This Wetland Complex occurs within the Study Area located approximately 11 km south of the alignment, south of Morgan Road.
- Riverland Ramsar Reserve. The boundary of this area generally overlaps with the Chowilla Game Reserve identified in Table 5-7 above, which is located within 1 km of the alignment near the SA / NSW border.
- The Coorong, and lower lakes Alexandrina and Albert wetland. This area is located over 100 – 150 km from the Study Area and is not considered further in this report.

No Ramsar wetlands in the Victorian section of the Study Area.

#### 5.3.1.1 Nationally Important Wetlands

Nationally Important Wetlands near the alignment, which occur in SA, are mainly located in or as part of the conservation areas or Ramsar areas already identified (refer Figure 5-1),and include:

- Riverland Wetland Complex
- Banrock Station
- Loveday Swamps
- Loch Luna Wetland Complex
- Stockyard Plain
- Pike-Mundic Wetland Complex
- Gurra Lakes Wetland Complex.

Nationally Important Wetlands in proximity to the alignment in NSW primarily occur to the south of the alignment (refer Figure 5-2), and include:

- Lindsay Island
- Wallpolla Island.

Nationally Important Wetlands that occur within the Victorian portion of the Study Area (refer Figure 5-2) include:

- Lake Ranfurly
- Kings Billabong Wetlands (which occur within the wider Kings Billabong Wildlife Reserve, west of the proposed route / existing transmission line)
- Cardross Lakes.

### 5.3.2 Listed Threatened Ecological Communities (TECs)

The EPBC PMST outputs indicated that five TECs potentially occur within the Study Area (four in SA, two in NSW and one in Vic). The likelihood of these occurring in the Study Area (based on high level available desktop data) is briefly discussed below in.

1. Peppermint Box (*E. odorata*) Grassy Woodland – Critically Endangered

   *Areas of 'likely to occur' and 'may occur' within project buffer – SA portion only*

   Conservation areas and patches of remnant vegetation present within the Study Area, may include areas classified as this TEC.

   Criteria of this community are detailed in Department of the Environment, Water, Heritage and the Arts (2008). Approved Conservation Advice for Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/36-conservation-advice.pdf

   It should be noted that the spatial layers of these TECs often have errors and require ground-truthing, hence field assessment of the Study Area is required (refer Section 6 below).

2. Iron-grass (*Lomandra* spp.) Natural Temperate Grassland – Critically Endangered

   *Areas of 'likely to occur' and 'may occur' within project buffer from alignment - EPBC PMST – SA portion only.*

   Conservation areas and patches of remnant vegetation present within the Study Area, may include areas classified as this TEC.

   Criteria for this community, including several condition classes of the community are described in - Department of the Environment, Water, Heritage and the Arts (2008). Approved Conservation Advice for Iron-grass Natural Temperate Grassland of South Australia. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/37-conservation-advice.pdf.

3. Buloke (*Allocasuarina luehmannii*) Woodlands of the Riverina and Murray-Darling Depression Bioregions - Endangered

   *Areas of 'May occur' within project buffer – EPBC PMST (SA, NSW and Vic)*

   State databases suggested that there were '*Areas of 'likely occur'* within Study Area (SA/VIC/NSW).

Conservation areas and patches of remnant vegetation present within the Study Area, may include areas classified as this TEC.

Criteria for this community are described in Endangered Species Scientific Subcommittee (2000). Commonwealth Listing Advice on Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/buloke-grassy-woodlands.html.

Recovery Actions are outlined in the National Recovery Plan for Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions (Cheal, Lucas and Macauley 2011).

Refer DotEb 2013 map for Victoria online at https://environment.gov.au/system/files/pages/1ac813fa-9aa1-482c-9210-1591dd74005d/files/vic-tec_0.pdf

4. Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions – Endangered

*Area of 'May occur' – NSW portion of Study Area only*

High level mapping suggests this TEC may occur in the Darling Anabranch areas.

Criteria for this community are described in Department of Sustainability, Environment, Water, Population and Communities (2011). Approved Conservation Advice for Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions ecological community. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/66-conservation-advice.pdf

5. River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea

*Approval (for listing) disallowed; therefore Not Applicable here.*

### 5.3.3 Listed Critical Habitat

The EPBC PMST also listed suggested a 'Listed Critical Habitat' occurs within the Study Area (in SA).

*Manorina melanotis* (Black-eared Miner) - Gluepot Reserve, Taylorville Station and Calperum Station, excluding the area of Calperum Station south and east of Main Wentworth Road (an area of ~ 380,000 ha).

As per Table 5-7 above, the reserves and stations that are known to contain critical habitat for the Black-eared Miner occur within the Study Area to the north of the preferred alignment in South Australia. A map of all the remaining Black-eared Miner Colonies and Black-eared Miner Hybrid colonies is provided in the recovery plan for the species (Baker-Gabb 2003, provided in Appendix B). The plan includes intensive management program to protect the remaining colonies and critical mallee habitat north-west of Renmark. Critical features of the mallee habitat include long-unburnt (> 40 years) status and large tracts. Major threats to the species include habitat clearance, genetic introgression (hybridisation) with the Yellow-throated Miner (*Manorina flavigula*), large wildfires, too frequent fires and ongoing habitat degradation by grazing herbivores (Baker-Gabb 2003).

### 5.3.4 EPBC Listed Fauna and Flora Species

The EPBC PMST identified 16 fauna and 19 flora species as potentially occurring in the Study Area. In addition, state databases indicated records for three additional EPBC listed / Migratory fauna species with records in the Study Area. The species, their PMST likelihood status (which requires further likelihood assessment against database records and actual condition of habitat present) and history of records per state are summarised in Table 5-8 below.

Table 5-8: EPBC listed species that have potential to occur within the Study Area

| *Species Name* | Common Name | Cwth Status[1] | PMST Likelihood | SA Records | NSW Records | VIC Records |
|---|---|---|---|---|---|---|
| ***Birds*** | | | | | | |
| *Botaurus poiciloptilus* | Australian Bittern | E | likely | SA - 7 records (2010) | NSW - 1 record (2010) | Vic – 1 record (1994) |
| *Calidris ferruginea* | Curlew Sandpiper | CE | known | SA - 3 records (1999-2003) | NSW - 1 record (2016) | Vic – 18 records (1973-2004) |
| *Calidris ruficollis* | Red-necked Stint | Mi | Not in search output | SA- 42 records (1999-2017) | NSW – 1 record 1998 | No records |
| *Grantiella picta* | Painted Honeyeater | V | Known | SA - 5 records (2000) | NSW – 3 records (2005, 2006) | Vic - 2 records (1965-1995) |
| *Haliaeetus leucogaster* | White-bellied Sea-eagle | Mi | Not in search output | SA – 16 records (1999-2016) | NSW- 2 record (2016) | Vic - 19 records (1966-2011). Sensitive records |
| *Hydroprogne caspia* | Caspian Tern | Mi | Not in search output | SA – 340 records (1998-2018) | NSW – 12 records (2003-2015) | Vic – 118 records (1945-2011) |
| *Leipoa ocellata* | Malleefowl | V | known | SA - 1028 records (1998-2014) | NSW – 9 records (1998-2007) | Vic – 3 records (1975-1997) |
| *Manorina melanotis* | Black-eared Miner | V | known | SA - 284 records (1998-2015), plus large number of records for Yellow-throated Miner | NSW – 34 records (1998-2012) | Vic – 1 records (1963) |
| *Numenius madagascariensis* | Eastern Curlew | CE | may | | No historical or recent records within the buffer | No records |
| *Pachycephala rufogularis* | Red-lored Whistler | V | known | SA - 131 records 1998-2011) | NSW – 3 records (2005, 2015) | No records |
| *Pedionomus torquatus* | Plains-wanderer | CE | likely | SA - 3 historical records, most recent 1964’ | NSW – 2 records (2003, 2006) | Vic – 1 records (1974) |
| *Pezoporus occidentalis* | Night Parrot | E | Extinct within area | No historical or recent records within the buffer | No historical or recent records within the buffer | No historical or recent records within the buffer |

| *Species Name* | Common Name | Cwth Status[1] | PMST Likelihood | SA Records | NSW Records | VIC Records |
|---|---|---|---|---|---|---|
| *Polytelis anthopeplus monarchoides* | Regent Parrot | V | Breeding likely | SA - 804 records (1998-2017) | NSW – 4 records (2006 -2015) | Vic- 54 records (1904-2008); sensitive records |
| *Rostratula australis* | Painted Snipe | E | likely | SA - 2 records (2001), 1 historical record | NSW – 1 record (2011) | No records |
| ***Frog*** | | | | | | |
| *Litoria raniformis* | Southern Bell Frog / Growling Grass Frog | V | known | SA - 281 records (1998-2017) | NSW – 36 records (1998-2018) | Vic – 25 records (1956-1995) |
| ***Mammals*** | | | | | | |
| *Nyctophilus corbeni* | South-eastern Long-eared Bat | V | Likely | SA - 4 record (1998-2004), Bookmark Reserve | NSW – 2 records (1999-2006) | No records |
| *Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)* | Koala | V | may | SA- 2 records (1988, 2003) | NSW – 1 record (2014) | Vic – 8 historical records (1957-1963). Translocated. |
| ***Reptiles*** | | | | | | |
| *Aprasia pseudopulchella* | Flinders-ranges Worm-lizard | V | likely | SA - 8 records (2003,2011) | NSW NA | No records |
| *Tiliqua adelaidensis* | Pygmy Blue-tongue Lizard | E | likely | SA - 2 records (2008) | NSW NA | No records |
| ***Plants*** | | | | | | |
| *Acacia glandulicarpa* | Hairy-pod Wattle | V | known | SA - 3 records (1998-2007) | No records | No records |
| *Acacia menzelii* | Menzel's Wattle | V | may | No records | No records | No records |
| *Acacia spilleriana* | Spiller's Wattle | E | known | SA - 11 records (2003-2012) | No records | No records |
| *Acanthocladium dockeri* | Spiny Everlasting | CE | Translocated population known to occur within area | SA - 1 historical record 1910 | No records | No records |
| *Atriplex infrequens* | | V | May | No records | No records | No records |
| *Brachyscome papillosa* | Mossgiel Daisy | V | May | No records | No records | No records |
| *Caladenia tensa* | Greencomb Spider-orchid | E | Known / likely for Vic | SA - 1 record (2007) | No records | No records |
| *Caladenia xantholeuca* | White Rabbits | E | May | No records | No records | No records |
| *Codonocarpus pyramidalis* | Slender Bell-fruit | V | known | SA - 1 record (2013) Hallelujah Hills | No records | No records |

| *Species Name* | Common Name | Cwth Status[1] | PMST Likelihood | SA Records | NSW Records | VIC Records |
|---|---|---|---|---|---|---|
| *Dodonaea procumbens* | Trailing Hop-bush | V | likely | SA - 4 records (2000-2004) | No records | No records |
| *Dodonaea subglandulifera* | Peep Hill Hop-bush | E | likely | SA - 23 records (2000-2012) | No records | No records |
| *Lepidium monoplocoides* | Winged Pepper-cress | E | likely | No records | No records | VIC – 2 records, 1923 |
| *Lachnagrostis limitanea* | Spalding Blown Grass | E | likely | SA - 1 record 2005 | No records | No records |
| *Olearia pannosa subsp. pannosa* | Silver Daisy-bush | V | known | SA - 5 records (2001, 2003) | No records | No records |
| *Prasophyllum pallidum* | Pale Leek-Orchid | V | may | No records | No records | No records |
| *Pterostylis cheraphila* | Floodplain Rustyhood | V | May (Vic only) | No records | No records | No records |
| *Senecio megaglossus* | Superb Groundsel | V | likely | SA - 1 record, date unknown | No records | No records |
| *Solanum karsense* | Menindee Nightshade | V | May / (known for Vic) | No records | No records | No records |
| *Swainsona murrayana* | Slender Darling-Pea | V | likely | No records | No records | No records |
| *Swainsona pyrophila* | Yellow Swainson-pea | V | likely | SA - 3 historical records, most recent 1981 | No records | No records |

[1]Commonwealth Status as per the EPBC Act; CE = Critically Endangered, E = Endangered, V = Vulnerable, Mi = Migratory

In addition to the terrestrial species above, five river dwelling fish were also highlighted in the PMST outputs as potentially occurring in the Study Area, however these species are not considered further, given river habitats will be avoided (i.e. at the Darling River and Anabranch, Murray River crossings the transmission line will span the river, so no direct impacts to the river channel). The fish included: Silver Perch, Murray Hardyhead, Flathead Galaxias, Murray Cod and Macquarie Perch.

Sixteen migratory bird species were also highlighted by the PMST, including Osprey, sandpipers, plovers, Fork-tail Swift, Satin flycatcher, Wagtails. Some of these species that also have threatened species status are also discussed in Table 5-8. A number of these species would have real potential to occur in the Study Area and would require further likelihood assessment.

The BDBSA highlighted records for two additional EPBC threatened species, however these species are unlikely to occur in the Study Area, consequently the records may be errors or very rare occasional visits. A record for the Slender-billed Thornbill (*Acanthiza iredalei*) (in 2010, Graham Carpenter) is unlikely to be the EPBC listed subspecies *Acanthiza iredalei rosinae* (Gulf St. Vincent), given the location, but rather the widespread subspecies (*Acanthiza iredalei iredalei*). Similarly, there was one record for the Hooded Plover (*Thinornis rubricollis,* now known as *Thinornis cucullatas*) at a wetland near Overland Corner (from 2006), which is well outside the known habitat for this species, which generally occurs in coastal areas. Based on the above, these species have not been considered further.

## 5.4 State-listed Threatened Species

### 5.4.1 SA State-listed Species

In addition to Commonwealth listed species, there are records for threatened flora and fauna listed under the SA NPW Act within the Study Area. Species with records within the last 20 years (includes duplication of EPBC listed species from Table 5-8 above) are provided below in Table 5-9 (fauna) and Table 5-10 (flora). It should be noted that while there are records for several subspecies of fauna that have conservation ratings, given the known range of some of these subspecies is well away from the Study Area it is likely the records are for the common subspecies, the irrelevant subspecies are highlighted in bold within Table 5-9.

Table 5-9: SA State-listed threatened fauna with records in the Study Area within last 20 years

| Species | Common Name | Cwth Status[1] | SA Status[1] |
|---|---|---|---|
| ***Birds*** | | | |
| *Botaurus poiciloptilus* | Australasian Bittern | EN | V |
| *Anhinga novaehollandiae* | Australasian Darter | | R |
| *Anas rhynchotis rhynchotis* | Australasian Shoveler | | R |
| *Ixobrychus dubius* | Australian Little Bittern (Black-backed Bittern) | | E |
| *Rostratula australis* | Australian Painted-snipe | EN | V |
| *Manorina flavigula melanotis* | Black-eared Miner | EN | E |
| ***Northiella haematogaster narethae*** | **Bluebonnet (Western Subspecies) not in Study Area** | | **R** |
| *Entomyzon cyanotis cyanotis* | Blue-faced Honeyeater | | R |
| *Grus rubicunda* | Brolga | | V |
| *Coturnix ypsilophora* | Brown Quail | | V |
| *Burhinus grallarius* | Bush Stonecurlew | | R |
| *Cereopsis novaehollandiae (NC)* | Cape Barren Goose | | R |
| *Cinclosoma castanotus castanotus* | Chestnut-backed Quailthrush (Chestnut Quailthrush (Eastern subspecies) | | R |
| *Actitis hypoleucos* | Common Sandpiper | | R |
| *Bubulcus ibis coromandus* | Eastern Cattle Egret | | R |
| *Falcunculus frontatus frontatus* | Eastern Shriketit | | R |
| *Stictonetta naevosa* | Freckled Duck | | V |
| *Pachycephala inornata* | Gilbert's Whistler | | R |
| *Plegadis falcinellus* | Glossy Ibis | | R |
| ***Strepera versicolor plumbea*** | **Grey Currawong (north western subspecies)** | | **E** |
| *Thincornis cucullatus* | Hooded Plover (Hooded Dotterel) | VU | V |
| *Melanodryas cucullata cucullata* | Hooded Robin (SE, MM, MLR, AP, YP, MN) | | R |
| *Ardea intermedia* | Intermediate Egret | | R |
| ***Microeca fascinans fascinans*** | **Jacky Winter (south east subspecies)** | | **R** |
| *Gallinago hardwickii* | Latham's Snipe | | R |
| *Egretta garzetta* | Little Egret | | R |
| *Philemon citreogularis citreogularis* | Little Friarbird | | R |
| *Biziura lobata* | Musk Duck | | R |

| Species | Common Name | Cwth Status[1] | SA Status[1] |
|---|---|---|---|
| *Oriolus sagittatus sagittatus* | Olive-backed Oriole | | R |
| *Grantiella picta* | Painted Honeyeater | VU | V |
| *Falco peregrinus* | Peregrine Falcon | | R |
| *Lichenostomus cratitius occidentalis* | Purple-gaped Honeyeater (mainland SA) | | R |
| *Turnix pyrrhothorax* | Red-chested Buttonquail | | R |
| *Polytelis anthopeplus monarchoides* | Regent Parrot (eastern ssp) | VU | V |
| *Myiagra inquieta* | Restless Flycatcher | | R |
| *Petroica boodang boodang* | Scarlet Robin (SE, MLR, FR, EP) | | R |
| *Neophema splendida* | Scarlet-chested Parrot | | R |
| *Calamanthus (Hylacola) cauta cauta* | Shy Heathwren (EP, MM, upper SE, YP, FR) | | R |
| *Plectorhyncha lanceolata* | Striped Honeyeater | | R |
| *Haliaeetus leucogaster* | White-bellied Sea Eagle | | E |
| *Climacteris affinis superciliosa* | White-browed Treecreeper (FR, LNE, MM) | | R |
| *Corcorax melanorhamphos* | White-winged Chough | | R |
| ***Mammals*** | | | |
| *Chalinolobus picatus* | Little Pied Bat | | E |
| *Acrobates pygmaeus* | Feathertail Glider | | E |
| *Saccolaimus flaviventris* | Yellow-bellied Sheath-tailed Bat | | R |
| Trichosurus vulpecula | Common Brushtail Possum | | R |
| ***Reptiles*** | | | |
| *Chelodina expansa* | Broadshelled Turtle | | V |
| Morelia spilota | Carpet Python | | R |
| *Aprasia aurita* | Eared Worm-lizard | | E |
| ***Frogs*** | | | |
| *Pseudophryne bibronii* | Brown Toadlet | | R |

[1]Commonwealth Status as per the EPBC Act, State Status as per the NPW Act. Bolded rows refer to subspecies that have conservation ratings that are unlikely to occur in the Study Area, based on their known distribution and range.

Table 5-10 SA: State-listed threatened flora with records in the Study Area within last 20 years

| Species | Common Name | Cwth Status | SA Status |
|---|---|---|---|
| *Austrostipa nullanulla* | Club Spear-grass | | V |
| *Austrostipa pilata* | Prickly Spear-grass | | V |
| *Brachyscome eriogona* | | | R |
| *Brachyscome graminea* | Grass Daisy | | R |
| *Brachyscome (Craspedia) paludicola* | Swamp Daisy | | V |
| *Calotis scapigera* | Tufted Burr-daisy | | R |
| *Codonocarpus pyramidalis* | Slender Bell-fruit | VU | E |
| *Corynotheca licrota* | Sand Lily | | R |
| *Cryptandra campanulata* | Long-flower Cryptandra | | R |
| *Daviesia benthamii* ssp. *humilis (NC)* | Mallee Bitter-pea | | R |
| *Diuris behrii* | Behr's Cowslip Orchid | | V |
| *Dodonaea subglandulifera* | | EN | E |
| *Duma horrida* ssp. *horrida* | Spiny Lignum | | R |
| *Eryngium ovinum* | Blue Devil | | V |
| *Goodenia gracilis* | Grampians Goodenia | | V |
| *Goodenia heteromera* | Spreading Goodenia | | R |
| *Gratiola pumilo* | Dwarf Brooklime | | R |
| *Hydrilla verticillata* | Waterthyme | | R |
| *Lachnagrostis robusta* | Tall Blown-grass | | R |
| *Leptorhynchos elongatus* | Lanky Buttons | | R |
| *Logania saxatilis* | Rock Logania | | R |
| *Maireana pentagona* | Slender Fissure-plant | | R |
| *Myoporum parvifolium* | Creeping Boobialla | | R |
| *Myriophyllum crispatum* | Upright Milfoil | | V |
| *Najas tenuifolia* | Water Nymph | | E |
| *Olearia picridifolia* | Rasp Daisy-bush | | R |
| *Osteocarpum acropterum* var. *deminutum* | Wingless Bonefruit | | R |
| *Ottelia ovalifolia* ssp. *ovalifolia* | Swamp Lily | | R |
| *Phebalium glandulosum* ssp. *glandulosum* | Glandular Phebalium | | E |
| *Phlegmatospermum eremaeum* | Spreading Cress | | R |
| *Rumex dumosus* | Wiry Dock | | R |
| *Rytidosperma tenuius* | Short-awn Wallaby-grass | R | |
| *Thelymitra aristata* | Great Sun-orchid | | E |
| *Thysanotus tenellus* | Grassy Fringe-lily | | R |

### 5.4.2 NSW State-listed Species

In addition to Commonwealth listed species, there are records for threatened flora and fauna listed under the NSW BC Act within the Study Area. Species with records within the last 20 years (includes duplication of EPBC listed species from Table 5-8 above are provided below in Table 5-11 (fauna) and Table 5-12 (flora).

Table 5-11: NSW State-listed threatened fauna with records in the Study Area within last 20 years

| Species Name | Common Name | Cwlth Status[1] | NSW Status[1] | Records[2] | Linked VCs / Core Habitat Comment[2] |
|---|---|---|---|---|---|
| ***Birds*** | | | | | |
| *Ardeotis australis* | Australian Bustard | Not rated | E | 5 records, (2004-2015) | 29 VCs<br>prefers tussock / hummock grasslands, also low shrubland, open grassy woodlands can occur in pastoral / cropping / golf courses. Breeds on bare ground. Will converge on post fire areas and mouse plague sites. |
| *Rostratula australis* | Australian Painted Snipe | E | E | 1 record 2011 | 16 VCs<br>prefers fringes of swamps, dams, marshy areas with a cover of grasses, Lignum, low scrub open timber. Forages nocturnally on mud-flats / shallow water. Nest on ground amongst tall vegetation, grasses / tussocks / reeds. Breed Sept-Dec. |
| *Falco subniger* | Black Falcon | Not rated | V | 1 record (1999) | NA VCs<br>Highly mobile. Single population in NSW is continuous with broader continental population. Wide distribution. |
| *Hamirostra melanosternon* | Black-breasted Buzzard | Not rated | V | 5 records (2006-2008) | 25 VCs<br>sparse occurrence, lives in a range of habitat, especially along timbered watercourses. Hunts over grassland. Breeds August to Oct near water in a tall tree. |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) | Not rated | V | 8 records (2012-2013) | 39 VCs<br>prefers upper levels of drier open forests and woodlands dominated by box and ironbark eucalypts. Also smooth-bark, stringybark, river sheoak (nesting trees) and tea-tree. Gregarious – occurs in groups of up to 12. Breeds solitarily or co-operatively June-Dec. |
| *Manorina melanotis* | Black-eared Miner | E | CE | 34 records (1998-2012) | 2 VCs<br>restricted to large tracts (>30,000 ha) of mature unfragmented mallee on fertile soils. Will occur in 25 year post fire mallee, but prefers 50 year post fire mallee. Communal breeding (8-40 birds), related to conditions, but generally Sept-Dec. |
| *Oxyura australis* | Blue-billed Duck | Not rated | V | 6 records (2006-2016) | 10 VCs<br>prefers deep water in permanent wetlands, swamps with dense aquatic vegetation, but will also occur in farm dams. Nest solitarily in Bulrush between Sept-Feb, young disperse April-May. Breed in inland swamps in NSW on Murray River and coastal lakes. |
| *Climacteris picumnus victoriae* | Brown Treecreeper (eastern subspecies) | Not rated | V | 69 records (1998-2012) | 45 VCs<br>eucalypt woodlands, dry open forest dominated by rough bark eucalypts / stringybarks. Sedentary, gregarious species (8-12 birds). Breed cooperatively in territories. Territorial year-round. |

| Species Name | Common Name | Cwlth Status[1] | NSW Status[1] | Records[2] | Linked VCs / Core Habitat Comment[2] |
|---|---|---|---|---|---|
| *Burhinus grallarius* | Bush Stone-curlew | Not rated | E | 5 records (2004, 2013) | 60 VCs<br>forest and woodlands, sparse grassy ground layer and fallen timber. Largely nocturnal, nest on scape or small patch on the ground. Eggs laid in spring and early summer. |
| *Cinclosoma castanotum* | Chestnut Quail-thrush | Not rated | V | 35 records (1998-2015) | 4 VCs<br>wide range arid and semi-arid, mainly in low shrubs and undergrowth of mallee scrub, acacia scrub. In NSW exclusive to mallee habitats with understory dominated by spinifex, Chenopods, Acacia. Occupies vegetation of most fire history status, but preference for 2-15 post fire history. Nest on ground near mallee trunk, sparse grass tuft. Always lays 2 eggs. |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | Not rated | V | 19 records (1998-2013) | 104 VCs<br>dry open eucalypts, mallee with sparse understorey, groundcover of grasses, sedges or woody debris. Can be resident or migratory depending on temperature and rainfall. Breed in spring, migrate north in March-May. Nests in low shrub / trees. |
| *Stictonetta naevosa* | Freckled Duck | Not rated | V | 2 record (2004, 2006) | 14 VCs<br>prefers permanent freshwater swamps and creeks with Bulrush, Lignum or Tea-tree. In drier times will occur in permanent waters, lakes, reservoirs, farm dams and sewage ponds. Nesting Oct-Dec in dense vegetation at or near water level. |
| *Pachycephala inornata* | Gilbert's Whistler | Not rated | V | 21 records (1998-2015) | 14 VCs<br>range of habitats, but with dense shrub layer. Mallee, box-ironbark woodlands, cypress pine and belah woodlands and river red gum forests, primarily along the Murray, Edwards and Wakool Rivers. Breeding Aug-Nov, in fork of dense foliage. |
| *Pomatostomus temporalis temporalis* | Grey-crowned Babbler | Not rated | V | 8 records (2014) | 47 VCs<br>box-gum woodlands on slopes, box-cypress-pine and open box woodlands on alluvial soils. Family groups / territories (1-50ha) are defended year-round. Breed July-Feb. |
| *Melanodryas cucullata cucullata* | Hooded Robin (south-eastern form) | Not rated | V | 25 records (1998-2016) | 60 VCs<br>Lightly wooded country, open eucalypt woodland, acacia scrub and mallee, territorial during breeding season (July to Nov), several broods. |
| *Hieraaetus morphnoides* | Little Eagle | Not rated | V | 9 records (1998-2013) | 99 VCs<br>Eucalypt forest / woodland, sheoak or Acacia woodlands, nests in tall living trees with large stick nests in winter, eggs during spring, young fledge in early summer. |
| *Lophochroa leadbeateri* | Major Mitchell's Cockatoo | Not rated | V | 47 records (1998-2016) | 33 VCs<br>Arid habitats, wide range of tree and treeless habitats, near water, pairs or flocks, nest in hollow trees; breed June |

| Species Name | Common Name | Cwlth Status[1] | NSW Status[1] | Records[2] | Linked VCs / Core Habitat Comment[2] |
|---|---|---|---|---|---|
| | | | | | – Dec, nest 1 km apart, no more than 1 pair every 30 squ km. |
| *Leipoa ocellata* | Malleefowl | V | E | 9 records (2000-2006) | 6 VCs<br>Create conspicuous mounds in unburnt mallee (> 5 year preferer), but will forage in agricultural areas, grasslands and areas with *Acacia, Cassia, Beyeria*. Occupy mosaic of habitats for nesting and foraging. Male more easily detected during breeding season whilst maintain nest. |
| *Grantiella picta* | Painted Honeyeater | V | V | 3 records (2005-2006) | 51 VCs<br>Boree / Weeping Myall / Brigalow and Box-gum woodlands and box-ironbark forests. Specialist feeder of insects and nectar from mistletoe. Nest from Spring to Autumn. |
| *Meliphagidae* | Pied Honeyeater | Not rated | V | 4 records (2006-2009) | 23 VCs<br>Acacia (Mulga) / mallee / spinifex shrublands; nectar feeding, highly nomadic following flowering shrubs can be locally common. |
| *Pedionomus torquatus* | Plains-Wanderer | E | CE | 2 records (2003-2006) | 3 VCs<br>Grasslands / agricultural areas, refer EPBC table above.<br>Difficult to detect, requires night survey using spotlighting techniques.<br>Sedentary unless native grasslands are overgrazed or cultivated or during drought conditions. |
| *Glossopsitta porphyrocephala* | Purple-crowned Lorikeet | Not rated | V | 8 records (2008-2015) | 14 VCs<br>Open forests, flowering Eucalypts. Breed away from feeding areas, roost in dense vegetation, several km from breeding areas. Heard in flight with distinctive metallic call. |
| *Pachycephala rufogularis* | Red-lored Whistler | V | CE | 3 records (2005-2015) | 2 VCs<br>Mallee with broombush / mallee pine, spinifex; prefers post fire 21-40 years. Known from Nombinnie Nature Reserve, old records from Scotia Mallee and Tarawi Nature Reserve. |
| *Pyrrholaemus brunneus* | Redthroat | Not rated | V | 5 records (2007-2017) | 5 VCs<br>Chenopod shrublands, Acacia near drainage lines, canegrass / lignum swamps on depressions / floodplains. Breed late winter to spring. Males can be very vocal and mimic calls of other birds. Shy / unobtrusive sp. Can be difficult to detect. |
| *Polytelis anthopeplus m* | Regent Parrot (eastern subspecies) | E | V | 4 records (2006-2015) | 7VCs<br>RRG forests, large trees with hollows, close to watercourses. Move away from riverine plain outside breeding season. Breeding is colonial (up to 27 nests per colony) |
| *Hylacola cautus* | Shy Heathwren | Not rated | V | 7 records (2001-2015) | 3VCs<br>Mallee woodlands, dense understorey from either 1-5 year post fire sprouting Eucalypts or >40 years unburnt. Breed late winter to early summer, males |

| Species Name | Common Name | Cwlth Status[1] | NSW Status[1] | Records[2] | Linked VCs / Core Habitat Comment[2] |
|---|---|---|---|---|---|
| | | | | | sing more in spring from top of low shrubs. |
| *Drymodes brunneopygia* | Southern Scrub-robin | Not rated | V | 2 records (2008) | 3 VCs<br>Restricted to mallee and dense long unburnt shrubland (broombush) in two main areas. Calls more regularly from elevated perch during breeding season |
| *Circus assimilis* | Spotted Harrier | Not rated | V | 11 records (2010-2018) | 58 VCs<br>Grassy open woodlands, agricultural land, breed in spring / sometimes autumn, young present for several months |
| *Lophoictinia isura* | Square-tailed Kite | Not rated | V | 1 record (2007) | 70 VCs<br>Variety of habitats, prefers timbered watercourses / or Chenopod / grassy stony areas. Breeding July to Feb near watercourses |
| *Daphoenositta chrysoptera* | Varied Sittella | Not rated | V | 9 records (1998-2015) | 80 VCs<br>Rough barked Eucalypt forests / woodlands |
| *Haliaeetus leucogaster* | White-bellied Sea-eagle | LM / Not relevant | V | 2 records (2016) | 68 VCs<br>Inland rivers, wetlands of MDB; breed June to September |
| *Epthianura albifrons* | White-fronted Chat | Not rated | V | 19 records (1998-2018) | 24 VCs<br>Bare or grassy ground in wetland areas; breed late July to March |
| ***Mammals*** | | | | | |
| *Myotis macropus* | Southern Myotis | Not rated | V | 3 records (2004, 2005) | 68 VCs<br>Does not require targeted survey. Generally roosts in caves close to water or mine shafts, in groups of 10-15. Rarely found more than 100 km inland except along major rivers. In NSW females have young in Nov-Dec. |
| *Ningaui yvonneae* | Southern Ningaui | Not rated | V | 11 records (2004-2015) | 2 VCs<br>Spinifex clumps / mallee woodlands<br>Juveniles weaned late summer (Feb) |
| *Cercartetus concinnus* | Western Pygmy Possum | Not rated | E | 51 records (2004) | 4 VCs<br>Mallee Cliffs National Park, Mungo NP, mallee shrubland dominated by spinifex; Belah with dense saltbush. |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | Not rated | Vu | 2 records (2008) | 87 VCs<br>Roosts singly in groups of up to 6 in tree hollows and building; will use mammal burrows. Breed Dec to mid-march.<br>Survey in hot, warm or mild and calm conditions. Refer Bat guidelines for effort. |
| *Nyctophilus corbeni* | Corben's Long-eared Bat | V | V | 2 records (1999, 2006) | 41 VCs<br>Variety of vegetation including mallee, Buloke and box dominated; more common in box/ironbark/cypress-pine vegetation.<br>Survey in hot, warm or mild and calm conditions. Refer Bat guidelines for effort. |

| Species Name | Common Name | Cwlth Status[1] | NSW Status[1] | Records[2] | Linked VCs / Core Habitat Comment[2] |
|---|---|---|---|---|---|
| *Vespadelus baverstocki* | Inland Forest Bat | Not rated | V | 6 records (1998, 2008) | 13 VCs<br>Roosts in tree hollows and abandoned buildings, and very small hollows in short tree (a few metres high). Limited knowledge but use trees like mallee, Mulga and River Red Gum. Small colony size to groups of 60. Young from Nov-Dec.<br>Survey in hot, warm or mild and calm conditions. Refer Bat guidelines for effort. |
| *Phascolarctos cinereus* | Koala | V | V | 1 record (2014) | 62 VCs<br>eucalypt woodland and forests, feed on 70+ eucalypt and 30 non-eucalypt species.<br>TSD suggests known from 5 IBRA subregions in the DRPlains<br>Lists a number of Veg Classes they may occupy in the region. |
| *Chalinolobus picatus* | Little Pied Bat | Not rated | V | 4 records (2000-2015) | 40VCs<br>open forest, open woodland, Mulga woodlands, Chenopod shrublands, cypress pine forest and mallee and bimbii box woodlands. Also roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.<br>Hot, warm or mild and calm conditions. Refer Bat guidelines for effort. |
| ***Reptiles*** | | | | | |
| *Strophurus elderi* | Jewelled Gecko | Not rated | V | | 3 VCs, small gecko, mallee spinifex, active at night, |
| *Pseudonaja modesta* | Ringed Brown Snake | Not rated | E | 1 record (2013) | 19 VCs,<br>Distinct features, drier habitats, diurnal but may forage during warm nights |
| *Tiliqua occipitalis* | Western Blue-tongued Lizard | Not rated | V | 1 record (2008) | 6 VCs,<br>Diurnal forager, prefers mallee / Triodia. Detectable in warmer temperature |
| *Aprasia inaurita* | Mallee Worm-lizard | Not rated | E | 4 record, (2004-2008) | 2 VCs, mallee, burrowing sp. but active during day, breeding in spring |
| *Delma australis* | Marble-faced Delma | Not rated | E | 4 records (2000-2008) | 3 VCs, restricted to mallee woodland / spinifex.<br>Active during day, but also night / sunset |
| ***Amphibian*** | | | | | |
| *Litoria raniformis* | Southern Bell Frog | V | E | 36 records (1998-2018) | 11 VCs,<br>Usually occur around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. Also found in irrigated rice crops, particularly where there is no available natural habitat.<br>Breeding peaks after heavy Jan-Feb rains, Males call Sept – Jan.<br>tadpoles require standing slow-moving water for 4 months to develop. |

[1]Status codes as per EPBC Act and BC Act: CE= Critically Endangered, E=Endangered, V=Vulnerable, LM = Listed Marine, not relevant to terrestrial location; Timing based on: Amphibian Survey Methods (DECC 2009), TSPD NSW; VCs = Vegetation

Communities. [2]Records from OEH extract for Study Area; Vegetation Community / species information from BioNET threatened species profiles accessed at: https://www.environment.nsw.gov.au/threatenedSpeciesApp/

Note whilst this table has not been updated with number of actual records per species recorded in the Study Area (including buffers) for Buronga substation to NSW / Vic border, no new species or recent records were recorded in the additional search area.

Table 5-12: NSW State-listed threatened flora with records in the Study Area within last 20 years

| Species Name | Common | Cwth | NSW | Records | Survey Timing / VC / PCTs |
|---|---|---|---|---|---|
| *Acacia acanthoclada* | Harrow Wattle | - | E | 1 record (2006) | 2 VCs, wide distribution in Study Area. Flowers August to October |
| *Cratystylis conocephala* | Bluebush Daisy | - | E | 4 records (1999, 2000) | 3 VCs, < 10% occurs in NSW, in Study Area, very similar in appearance to Pearl Bluebush. |
| *Austrostipa nullanulla* | A Spear-grass | - | E | 11 records (2000, 2001, 2009) | 2 VCs, restricted to Lunettes and grows on margins of relict lakes, salt lakes, gypsum in soils of habitat. |
| *Santalum murrayanum* | Bitter Quandong | - | E | 8 records (2002-2008) | 2 VCs, Flowers August to Jan spring to early summer, fruits Sept and Oct, but can also collect fruit / seed Jan-August. |
| *Solanum karsense* | Menindee Nightshade | V | V | 1 record (2009) | 8 VCs, restricted to far south-western plains, floodplains of grey clay with Black Box Old Man Saltbush, lakebeds, floodplains; Flowers in Spring |
| *Senecio behrianus* | | E | Presumed Extinct | 1 record (2008) | Endemic to SE Australia. Only known from 5 wild population and 2 reintroduced in Vic. Floodplain, requires specific hydrological regime. |

[1]Status codes as per EPBC Act and BC Act: E=Endangered, V=Vulnerable; VCs = Vegetation Communities. 2 Records from OEH extract for Study Area; Vegetation Community / species information from BioNET threatened species profiles accessed at: https://www.environment.nsw.gov.au/threatenedSpeciesApp/.

Note whilst this table has not been updated with number of actual records per species recorded in the Study Area (including buffers) for Buronga substation to NSW / Vic border, no new species or recent records were recorded in the additional search area.

### 5.4.3 Victorian State-listed Species

In addition to Commonwealth listed species, there are records for threatened flora and fauna listed under the Victoria FFG Act within the Study Area. Species with records within the last 20 years (includes duplication of EPBC listed species from Table 5-8 above are provided below in Table 5-13 (fauna) and Table 5-14 (flora). although not legislated (refer 3.4.3 above), Victorian Advisory List ratings are also provided.

Table 5-13: Victorian State-listed threatened fauna with records in the Study Area within last 20 years

| Scientific Name | Common Name | Cwealth Status[1] | FFG[2] | VIC ADV[2] | Records |
|---|---|---|---|---|---|
| ***Reptiles*** | | | | | |
| *Chelodina expansa* | Broad-shelled Turtle | | L | E | 2 records (2007-2015) |
| *Emydura macquarii* | Murray River Turtle | | NL | V | 2 records (2001-20150 |
| *Lerista timida* | Dwarf Burrowing Skink | | L | E | 1 record (1998) |
| *Morelia spilota metcalfei* | Carpet Python | | L | E | 5 records (2000-2005) |

| Scientific Name | Common Name | Cwealth Status[1] | FFG[2] | VIC ADV[2] | Records |
|---|---|---|---|---|---|
| *Varanus varius* | Lace Monitor | | NL | E | 3 records (1999-2013) |
| ***Birds*** | | | | | |
| *Accipiter novaehollandiae novaehollandiae* | Grey Goshawk | | L | V | 3 records (1999-2007) |
| *Anas rhynchotis* | Australasian Shoveler | | | V | 71 records (1998-2009) |
| *Ardea intermedia* | Intermediate Egret | | L | E | 8 records (1999-2011) |
| *Ardea modesta* | Eastern Great Egret | Mi | L | V | 59 records (1998-2012) |
| *Arenaria interpres* | Ruddy Turnstone | Mi | | V | 1 record (1999) |
| *Aythya australis* | Hardhead | | NL | V | 65 records (1998-2012) |
| *Biziura lobata* | Musk Duck | | NL | V | 29 records (1998-2011) |
| *Calidris ferruginea* | Curlew Sandpiper | CE / Mi | NL | E | 9 records (1999-2004) |
| *Climacteris affinis* | White-browed Treecreeper | | L | V | 2 records (2000-2001) |
| *Egretta garzetta nigripes* | Little Egret | | L | E | 7 records (1999-2001) |
| *Gelochelidon nilotica macrotarsa* | Gull-billed Tern | | L | E | 1 record (1999) |
| *Geopelia cuneata* | Diamond Dove | | L | NT | 1 record (1999) |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | Mi | L | V | 11 records (1999-2011) |
| *Hydroprogne caspia* | Caspian Tern | Mi | L | NT | 70 records (1998-2011) |
| *Limosa lapponica* | Bar-tailed Godwit | VU / Mi | NL | | 2 records (2000) |
| *Lophocroa leadbeateri* | Major Mitchell's Cockatoo | | L | V | 5 records (1999-2010) |
| *Melanodryas cucullata cucullata* | Hooded Robin | | L | NT | 54 records (1998-2012) |
| *Oreoica gutturalis gutturalis* | Crested Bellbird | | L | NT | 39 records (1998-2012) |
| *Oxyura australis* | Blue-billed Duck | | L | E | 27 records (1999-2006) |
| *Polytelis anthopeplus monarchoides* | Regent Parrot | VU | L | V | 13 records (1999-2008) |
| *Porzana pusilla palustris* | Baillon's Crake | | L | V | 4 records (1999-2007) |
| *Stagonopleura guttata* | Diamond Firetail | | L | NT | 2 records (2000) |
| *Stictonetta naevosa* | Freckled Duck | | L | E | 19 records (1999-2015) |
| *Struthidea cinerea* | Apostlebird | | L | | 35 records (1998-2011) |
| *Tringa nebularia* | Common Greenshank | | NL | V | 10 records (1999-2003) |
| *Tringa stagnatilis* | Marsh Sandpiper | Mi | NL | V | 15 records (1999-2011) |

[1]EPBC Act: NL = Not Listed, Mi = Migratory; [2]Victorian Flora and Fauna Guarantee Act (1988); NL = Not listed, = Listed; VIC ADV = Victoria Advisory Threatened Fauna List (DSE 2013); E = Endangered, V = Vulnerable, R = Rare, NT = Near Threatened.

Table 5-14: Victoria State-listed threatened flora with records in the Study Area within last 20 years

| Scientific Name | Common Name | Cwlth Status[1] | FFG[2] | VIC ADV[3] | Records |
|---|---|---|---|---|---|
| *Abutilon fraseri* | Dwarf Lantern-flower | NL | L | P? | 8 records (2001-2002) |
| *Abutilon fraseri subsp. fraseri* | Dwarf Lantern-flower | NL | L | E | 2 records (2002, 2013) |
| *Abutilon malvifolium* | Mallow-leaf Lantern-flower | NL | L | E | 6 records (2000-2007) |
| *Abutilon otocarpum* | Desert Lantern | NL | NL | V | 13 records (1999-2011) |
| *Acacia colletioides* | Wait-a-while | NL | NL | R | 13 records (1999-2003) |
| *Acacia loderi* | Nealie | NL | L | V | 3 records (1999-2001) |
| *Acacia melvillei* | Yarran | NL | L | V | 10 records (1998-2002) |

| Scientific Name | Common Name | Cwlth Status[1] | FFG[2] | VIC ADV[3] | Records |
|---|---|---|---|---|---|
| *Acacia notabilis* | Mallee Golden Wattle | NL | NL | V | 1 record (2014) |
| *Acacia oswaldii* | Umbrella Wattle | NL | L | V | 26 records (1999-2014) |
| *Acacia victoriae subsp. victoriae* | Bramble Wattle | NL | NL | R | 2 records (2000-2011) |
| *Allocasuarina luehmannii* | Buloke | NL | L | E | 6 records (1999-2009); note part of a TEC |
| *Amyema linophylla subsp. orientalis* | Buloke Mistletoe | NL | NL | V | 4 records (2002-2005) |
| *Aristida holathera var. holathera* | Tall Kerosene Grass | NL | NL | V | 2 records (2000-2011) |
| *Asperula gemella* | Twin-leaf Bedstraw | NL | NL | R | 8 records (1999-2010) |
| *Asperula wimmerana* | Wimmera Woodruff | NL | NL | R | 3 records (2003-2004 |
| *Atriplex acutibractea subsp. acutibractea* | Pointed Saltbush | NL | L | R | 4 records (2003-2011) |
| *Atriplex acutibractea subsp. karoniensis* | Pointed Saltbush | NL | NL | R | 1 record (2003) |
| *Atriplex holocarpa* | Pop Saltbush | NL | L | V | 1 record (2009 |
| *Atriplex limbata* | Spreading Saltbush | NL | L | V | 3 records (2003-2014) |
| *Atriplex lindleyi subsp. conduplicata* | Baldoo | NL | NL | R | 1 record 2011 |
| *Atriplex nummularia subsp. omissa* | Dwarf Old-man Saltbush | NL | NL | R | 4 records (1999-2014) |
| *Atriplex papillata* | Coral Saltbush | NL | NL | R | 8 records (1998-2001) |
| *Atriplex pseudocampanulata* | Mealy Saltbush | NL | NL | R | 5 records (2003-2006) |
| *Atriplex spinibractea* | Spiny-fruit Saltbush | NL | NL | E | 8 records (1999) |
| *Calandrinia volubilis* | Twining Purslane | NL | NL | R | 10 records (1999-2011) |
| *Calotis cuneifolia* | Blue Burr-daisy | NL | NL | R | 12 records (1998-2012) |
| *Cardamine moirensis* | Riverina Bitter-cress | NL | NL | R | 1 record (2004) |
| *Carpobrotus aff. rossii (N.W. Victoria)* | Mallee Pigface | NL | NL | R | 1 record (2000) |
| *Casuarina obesa* | Swamp Sheoak | NL | L | E | 5 records (1999-2004) |
| *Centipeda crateriformis subsp. crateriformis* | Lagoon Sneezeweed | NL | NL | E | 1 record (2010) |
| *Centipeda pleiocephala* | Tall Sneezeweed | NL | NL | E | 1 record (2010) |
| *Chenopodium desertorum subsp. desertorum* | Frosted Goosefoot | NL | NL | R | 5 records (1999-2002) |
| *Chenopodium desertorum subsp. rectum* | Frosted Goosefoot | NL | NL | V | 1 record (2002) |
| *Craspedia haplorrhiza* | Plains Billy-buttons | NL | L | K | 3 records (2003-2008) |
| *Cullen discolor* | Grey Scurf-pea | NL | L | E | 3 records (2011) |
| *Cullen pallidum* | Wool+B185:B210l y Scurf-pea | NL | L | E | 15 records (2005-2011) |
| *Cullen tenax* | Tough Scurf-pea | NL | L | E | 1 record 2011 |
| *Cycnogeton dubium* | Slender Water-ribbons | NL | NL | R | 1 record 2008 |
| *Dactyloctenium radulans* | Finger Grass | NL | NL | R | 14 records (2001-2007) |
| *Dianella porracea* | Rive+B226:B256ri ne Flax-lily | NL | NL | V | 21 records (1998-2014) |
| *Dissocarpus biflorus var. biflorus* | Twin-flower Saltbush | NL | NL | R | 21 records (1998-2014) |
| *Dodonaea viscosa subsp. angustifolia* | Giant Hop-bush | NL | NL | R | 3 records (2000-2003) |
| *Duma horrida subsp. horrida* | Spiny Lignum | NL | NL | R | 45 records (1998-2011) |

| Scientific Name | Common Name | Cwlth Status[1] | FFG[2] | VIC ADV[3] | Records |
|---|---|---|---|---|---|
| *Eragrostis australasica* | Cane Grass | NL | NL | V | 9 records (2000-2009) |
| *Eragrostis lacunaria* | Purp+B335:B358le Love-grass | NL | NL | V | 23 records (1998-2011) |
| *Eragrostis setifolia* | Bristly Love-grass | NL | NL | V | 1 record (2011) |
| *Eremophila divaricata subsp. divaricata* | Spreading Emu-bush | NL | NL | R | 20 records (1999-2015) |
| *Eremophila maculata subsp. maculata* | Spotted Emu-bush | NL | L | V | 9 records (1999-2012) |
| *Eremophila oppositifolia subsp. oppositifolia* | Twin-leaf Emu-bush | NL | NL | R | 7 records (1999-2011) |
| *Eremophila polyclada* | Twiggy Emu-bush | NL | NL | V | 2 records (2012) |
| *Eriochlamys behrii s.s.* | Woolly Mantle | NL | NL | R | 16 records (1998-2004) |
| *Ethuliopsis cunninghamii* | Tall Nut-heads | NL | NL | V | 3 records (2002-2004) |
| *Eucalyptus phenax subsp. phenax* | Green-leaf Mallee | NL | NL | R | 2 records (2000) |
| *Frankenia foliosa* | Leafy Sea-heath | NL | NL | R | 2 records (2003-2004) |
| *Frankenia serpyllifolia* | Bristly Sea-heath | NL | NL | R | 10 records (2000-2012) |
| *Frankenia sessilis* | Small-leaf Sea-heath | NL | NL | R | 1 record (2002) |
| *Gnephosis tenuissima* | Dwarf Cup-flower | NL | NL | R | 7 records (1998-2008) |
| *Hibiscus brachysiphonius* | Low Hibiscus | NL | L | E | 4 records (1998-2007) |
| *Jasminum didymum subsp. lineare* | Desert Jasmine | NL | NL | V | 4 records (2000-2012) |
| *Leiocarpa leptolepis* | Pale Plover-daisy | NL | L | E | 3 records (2000-2002) |
| *Leiocarpa tomentosa* | Woolly Plover-daisy | NL | NL | R | 5 records (2008-2014) |
| *Maireana georgei* | Slit-wing Bluebush | NL | NL | V | 3 records (2001-2003) |
| *Maireana sedifolia* | Pearl Bluebush | NL | NL | R | 1 record (2013) |
| *Maireana triptera* | Three-wing Bluebush | NL | NL | R | 2 records (2011) |
| *Malacocera tricornis* | Goat Head | NL | NL | R | 51 records (1998-2015) |
| *Marsdenia australis* | Doubah | NL | NL | V | 10 records (2000-2013) |
| *Melaleuca armillaris subsp. armillaris* | Giant Honey-myrtle | NL | NL | R | 1 record (2008) |
| *Minuria cunninghamii* | Bush Minuria | NL | NL | R | 11 records (2000-2011) |
| *Minuria denticulata* | Woolly Minuria | NL | NL | R | 2 records (2008-2013) |
| *Minuria integerrima* | Smooth Minuria | NL | NL | R | 8 records (2000-2012) |
| *Myoporum montanum* | Waterbush | NL | NL | R | 12 records (2000-2002) |
| *Parietaria cardiostegia* | Mallee Pellitory | NL | NL | V | 2 records (2003) |
| *Phlegmatospermum eremaeum* | Spreading Cress | NL | NL | V | 1 record (2003) |
| *Phyllanthus lacunarius* | Lagoon Spurge | NL | NL | V | 1 record (2007) |
| *Phyllanthus lacunellus* | Sandhill Spurge | NL | NL | R | 10 record (2011) |
| *Ptilotus polystachyus* | Long Tails | NL | NL | E | 6 records (2000) |
| *Radyera farragei* | Desert Rose Mallow | NL | NL | V | 1 record (2012) |
| *Rhagodia ulicina* | Spiny Goosefoot | NL | NL | R | 4 records (2011) |
| *Rhyncharrhena linearis* | Purple Pentatrope | NL | NL | V | 4 records (2001) |
| *Sarcozona praecox* | Sarcozona | NL | NL | R | 140 records (2014 |
| *Sclerolaena decurrens* | Green Copperburr | NL | NL | V | 1 record (2011) |
| *Sclerolaena patenticuspis* | Spear-fruit Copperburr | NL | NL | V | 4 record (2014) |

| Scientific Name | Common Name | Cwlth Status[1] | FFG[2] | VIC ADV[3] | Records |
|---|---|---|---|---|---|
| *Sclerolaena uniflora* | Two-spined Copperburr | NL | NL | R | 1 record (2005) |
| *Senecio gregorii* | Fleshy Groundsel | NL | NL | R | 1 record (2011) |
| *Senecio productus subsp. productus* | Riverina Groundsel | NL | NL | V | 1 record (2010) |
| *Senna form taxon 'artemisioides'* | Silver Cassia | NL | NL | E | 2 record (2013) |
| *Sesbania cannabina var. cannabina* | Yellow Pea-bush | NL | NL | V | 2 records (1998) |
| *Sida aff. corrugata (grey-leaf Boort form)* | Variable Sida (grey-leaf form) | NL | NL | E | 2 records (1998) |
| *Sida ammophila* | Sand Sida | NL | NL | V | 19 records (2001-2011) |
| *Sida fibulifera* | Pin Sida | NL | NL | V | 36 records (2001-2013) |
| *Sida intricata* | Twiggy Sida | NL | NL | V | 18 records (1999-2014) |
| *Sida spodochroma* | Limestone Sida | NL | L | V | 18 records (1999-2014) |
| *Swainsona microphylla* | Small-leaf Swainson-pea | NL | NL | R | 22 records (2003-2014) |
| *Swainsona reticulata* | Kneed Swainson-pea | NL | L | V | 300 records (1999-2011) |
| *Swainsona sericea* | Silky Swainson-pea | NL | L | V | 6 records (2011) |
| *Tecticornia triandra* | Desert Glasswort | NL | NL | R | 1 record (2002) |
| *Templetonia egena* | Round Templetonia | NL | NL | V | 2 records (2011) |
| *Velleia arguta* | Grassland Velleia | NL | NL | R | 4 record (2001) |
| *Vittadinia condyloides* | Club-hair New Holland Daisy | NL | NL | R | 1 record (2010) |
| *Wahlenbergia tumidifructa* | Mallee Annual-bluebell | NL | NL | R | 1 record (2003) |
| *Zygophyllum angustifolium* | Scrambling Twin-leaf | NL | NL | R | 9 records (2002-2014) |

[1]EPBC Act: NL = Not Listed; [2]Victorian Flora and Fauna Guarantee Act (1988); NL = Not listed, = Listed; VIC ADV = Victoria Advisory Flora List (DEPI 2014); E = Endangered, V = Vulnerable, R = Rare.

## 5.5 Recommended Timing for Threatened Species Surveys

Timing to conduct surveys to confirm the presence of threatened species within the final footprint (or refined project buffer) will vary depending on the conservation significance of the threatened species, the type of animal or plant and the state of occurrence.

### 5.5.1 EPBC listed species and TECs

There are national guidelines for someEPBC listed bird species that identify the amount of survey effort and timing of survey (e.g. DoTE 2015).

### 5.5.2 South Australia

No specific guidelines for survey timing are legislated in South Australia, with the exception that for approval to clear vegetation it is expected that surveys have been undertaken at the appropriate time of year for optimal species identification. This is likely to be Spring within the project area, given the winter dominant rainfall in this geography.

Depending on the area of vegetation clearance proposed, there may also be a requirement to conduct targeted fauna surveys at the time of the year when that species is most likely to be detected. The area of vegetation to be cleared will impact the level of vegetation assessment (and associated fauna survey effort) that is required under the Native Vegetation Regulations 2017. i.e. where the Total

Biodiversity Score is greater than 250, a level of fauna survey effort is required (ranging from full fauna trapping to bird surveys, depending on the species that require targeting). Given the linear nature of the corridor over a number of kms, the requirement for fauna survey of some level will almost certainly be triggered. Surveys within South Australia generally follow guidance from Owens (2000) for fauna.

### 5.5.3 New South Wales

Threatened plants in NSW should be surveyed according to the NSW Guide to Surveying Threatened Plants (NSW OEH 2016). Minimum standards are as follows:

- Biobanking Assessment Methodology
- Framework for Biodiversity Assessment
- Biodiversity Certification and Assessment Methodology.

This guideline is not mandatory, but proposals that fail to meet the guidelines for reasons of efficacy, cost or validity will need to provide an evidence-based rational for an alternative survey approach.

The objective of threatened-plant survey is to establish with high confidence that threatened species are present or absent and to determine the number of individuals present or the extent of the habitat area. That information is then used to calculate the species credits required for offsetting purposes. Similar to fauna, level of effort varies depending on whether a species is list for ecosystem credits or species credits, i.e.:

- Ecosystem credits – calculated for general biodiversity values and when the occurrence of species can be predicted from plant community type, distribution, landscape and habitat features.
- Species credits – area calculated when the occurrence of a species cannot be confidently predicted by using habitat surrogates. All threatened plant species are treated as species credit species.

Information gathered during the targeted species survey is entered into the credit calculator to determine offsets. Survey data includes inputs from:

- Field study
- Vegetation Information System (VIS) Classification database (PCT Identification Tool and benchmarks)
- Threatened Species Profiles Database (TSPD)
- Over-cleared landscape database (Mitchell Landscapes)
- Directory of Important Wetlands Database.

Candidate species lists include:

- All threatened flora in the threatened species profile database
- Species known or predicted to occur
- Presence of habitat features – including known / preferred PCT
- Past record < 20 years old.

Timing of year for survey for each species in NSW are provided in the BioNet database for registered users. As mentioned above, timing of survey varies for species that require species credits as opposed to ecosystem credits (less specific survey requirement or Not Applicable). Table 5-15 and Table 5-16 below provide the require survey times for the fauna and flora with records in the survey area within the last 20 years.

Table 5-15: BioNET survey timing for NSW threatened fauna identified within project area (records within 20 years)

| Common Name | BioNET recommended Survey Time for NSW listed fauna species |
|---|---|
| **Birds** | |
| Australian Painted Snipe | NA |
| Black-chinned Honeyeater (eastern subspecies) | NA |
| Blue-billed Duck | NA |
| Brown Treecreeper (eastern subspecies) | NA |
| Chestnut Quail-thrush | NA |
| Dusky Woodswallow | NA |
| Freckled Duck | NA |
| Gilbert's Whistler | NA |
| Grey-crowned Babbler | NA |
| Hooded Robin (south-eastern form) | NA |
| Malleefowl | NA |
| Painted Honeyeater | NA |
| Pied Honeyeater | NA |
| Purple-crowned Lorikeet | NA |
| Redthroat | NA |
| Shy Heathwren | NA |
| Southern Scrub-robin | NA |
| Spotted Harrier | NA |
| Varied Sittella | NA |
| White-fronted Chat | NA |
| Black Falcon | NA<br>Identifying nests is difficult, although relatively limited knowledge it is likely the species is flexible enough to use other nests sites once breeding completed. It is known to breed in paddock trees. |
| Australian Bustard | Jan-Dec |
| Black-breasted Buzzard | Sept-Nov.<br>The species is known to breed in sites with cropping, but also requires retained vegetation. |
| Black-eared Miner | Jan, Aug-Dec<br>The species is difficult to identify due to hybrids. Breeding is probably seasonal but may also have an element of spontaneity linked to rainfall. |
| Bush Stone-curlew | Jan-Dec<br>It may be easier to detect during breeding season, possibly calls all year, but it is unclear how well it responds to playback. |
| Little Eagle | Aug-Oct<br>Paddock trees can provide important breeding habitat (there are examples of nest trees in ACT). |
| Major Mitchell's Cockatoo | Sept-Dec<br>The species breeds from Aug to November, foraging may be present all year. |
| Plains-Wanderer | Aug-Oct<br>mapped important areas are a species credit, these areas do not require survey and any impact from development could be potentially serious and irreversible. Ecosystem credit areas are unlikely to be potential serious and irreversible impacts. Mapped areas are primary habitat only. |
| Red-lored Whistler | Jan-Dec<br>Species responds well to playback but easily confused with Gilbert's Whistler, surveyors familiar with the species is required. |
| Regent Parrot (eastern subspecies) | Aug-Nov<br>Breeding habitat can be identified by the presence of habitat features and observed nest OR two or more birds seen on site. Paddock trees can be important for this species as they can link remnant foraging habitat |
| Square-tailed Kite | Jan, Sept, Oct-Dec.<br>Kites will need be in attendance to confirm breeding sites. |
| White-bellied Sea-eagle | July-Dec (Breeding Survey) |
| **Mammals** | |
| Southern Myotis | Jan-March, Oct-Dec |
| Southern Ningaui | NA |
| Western Pygmy Possum | NA |
| Yellow-bellied Sheathtail-bat | NA |
| Corben's Long-eared Bat | NA |

| Common Name | BioNET recommended Survey Time for NSW listed fauna species |
|---|---|
| Inland Forest Bat | NA |
| Koala | Jan-Dec |
| Little Pied Bat | NA |
| Jewelled Gecko | NA |
| **Reptiles** | |
| Ringed Brown Snake | NA |
| Western Blue-tongued Lizard | NA |
| Mallee Worm-lizard | NA |
| Marble-faced Delma | NA |
| **Amphibian** | |
| Southern Bell Frog | Jan, Oct-Dec |

Note: excludes migratory species

Table 5-16: BioNEt survey timing for NSW flora identified within project area (<20 years)

| Species Name | Common | BioNET Survey Timing |
|---|---|---|
| *Acacia acanthoclada* | Harrow Wattle | Aug-Nov |
| *Cratystylis conocephala* | Bluebush Daisy | Jan-Dec<br>Can survey all year round, but must be familiar with species to distinguish foliage from *Maireana sedifolia* foliage |
| *Austrostipa nullanulla* | A Spear-grass | Sept-Dec<br>Flowers after rain any time of year, but most likely after late winter rains (about 4-6 weeks after rain). |
| *Santalum murrayanum* | Bitter Quandong | Jan-Dec |
| *Solanum karsense* | Menindee Nightshade | Sept-Nov |
| *Senecio behrianus* | | Presumed extinct in NSW, contact OEH if located. |

### 5.5.4 Victoria

No specific guidelines for survey timing are legislated in South Australia, with the exception that for approval to clear vegetation it is expected that surveys have been undertaken at the appropriate time of year for optimal species identification. This is likely to be Spring within the project area, given the winter dominant rainfall in this geography.

## 5.6 Vegetation Associations

### 5.6.1 SA Vegetation Associations / Types Mapped as Occurring within the Study Area

Eighteen broad vegetation types and numerous vegetation associations are mapped as occurring within the Study Area in SA. These are summarised in Table 5-17. Note 'vegetation communities' (as described in BCM and BAM) are not mapped for SA, but regional BCM manuals define the vegetation associations that can occur with a specific BCM vegetation community.

Table 5-17: High level summary of vegetation associations mapped as occurring with Study Area in SA

| Broad Vegetation Type | Vegetation Associations |
|---|---|
| Acacia shrubland | *Acacia nyssophylla* shrubland >1m / (mixed) shrubland >1m |
| Acacia woodland | *Acacia stenophylla* woodland |
| Allocasuarina forest and woodland | *Allocasuarina verticillata* woodland / (mixed) woodland |
| Callitris forest and woodland | *Callitris glaucophylla* woodland, *Callitris gracilis* woodland |
| Casuarina woodland | *Casuarina pauper* woodland / (mixed) woodland |
| Chenopod shrubland | *Maireana brevifolia* (mixed) shrubland <1m, *Atriplex lindleyi ssp. lindleyi* shrubland <1m, *Atriplex rhagodioides* shrubland >1m, *Atriplex stipitata* (mixed) shrubland <1m, *Atriplex vesicaria ssp.* (mixed) shrubland <1m, *Chenopodium nitrariaceum* shrubland >1m, *Maireana pyramidata* (mixed) shrubland <1m, *Maireana aphylla* shrubland <1m, *Maireana sedifolia* shrubland >1m / (mixed) shrubland >1m, *Sclerolaena tricuspis* shrubland <1m |
| Eucalyptus forest and woodland | *Eucalyptus camaldulensis var. camaldulensis* (NC), *Acacia stenophylla* forest, *Eucalyptus camaldulensis var. camaldulensis* (NC) forest / woodland, *Eucalyptus camaldulensis ssp*. woodland, *Eucalyptus largiflorens* woodland, *Eucalyptus largiflorens*, *Acacia stenophylla* woodland, *Eucalyptus largiflorens* woodland, *Eucalyptus leucoxylon ssp*. Woodland / mixed woodland, *Eucalyptus odorata* woodland, *Eucalyptus porosa*, *Acacia stenophylla* woodland |
| Eucalyptus mallee forest and mallee woodland | *Eucalyptus brachycalyx* mallee woodland, *Eucalyptus calycogona ssp*. mallee woodland, *Eucalyptus cyanophylla* mallee woodland, *Eucalyptus dumosa* mallee forest / woodland, *Eucalyptus gracilis* mallee woodland, *Eucalyptus incrassata* mallee woodland, *Eucalyptus leptophylla* mallee woodland, *Eucalyptus porosa* mallee woodland, *Eucalyptus socialis ssp*. mallee woodland |
| Fernland / herbland | *Angianthus tomentosus* forbland, *Disphyma crassifolium ssp. clavellatum* forbland, *Polycalymma stuartii* forbland |

| Broad Vegetation Type | Vegetation Associations |
|---|---|
| Grassland | *Phragmites australis* grassland, *Phragmites australis, Typha domingensis* grassland, *Sporobolus virginicus* (mixed) grassland |
| Hummock grassland | *Eragrostis australasica, Muehlenbeckia (Duma) florulenta* grassland |
| Melaleuca forest and woodland | *Melaleuca halmaturorum* forest, *Melaleuca lanceolata* (mixed) forest / shrubland > 1m |
| Myoporum woodland | *Geijera linearifolia*, *Myoporum platycarpum* ssp. woodland, *Myoporum platycarpum ssp*. woodland |
| Rushland/sedgeland | *Lomandra effusa* (mixed) grassland / sedgeland, *Lomandra multiflora ssp. dura* (mixed) grassland /sedgeland, *Typha domingensis* sedgeland, *Typha orientalis* sedgeland |
| Samphire shrubland | *Sarcocornia quinqueflora* shrubland <1m, *Tecticornia arbuscula* shrubland <1m, *Tecticornia indica ssp. leiostachya* shrubland <1m, *Tecticornia pergranulata ssp. pergranulata* shrubland <1m / (mixed) shrubland <1m, *Tecticornia sp*. shrubland <1m |
| Shrubland <1m | *Nitraria billardierei* shrubland <1m, *Suaeda australis* shrubland <1m, *Tecticornia triandra* shrubland <1m |
| Shrubland >1m | *Dodonaea viscosa ssp. angustissima* shrubland >1m / (mixed) shrubland >1m, *Lycium australe* (mixed) shrubland >1m, *Muehlenbeckia florulenta* shrubland >1m, *Senna artemisioides ssp*. (mixed) shrubland >1m |
| Tussock grassland | *Themeda triandra* (mixed) grassland, *Agrostis avenacea var. avenacea* (NC) grassland, *Austrodanthonia caespitosa* grassland, *Austrostipa sp*. grassland, *Enneapogon avenaceus* grassland |
| Woodland | *Salix babylonica* (NC) forest |

#### 5.6.1.1 Other South Australian Values

Within South Australia, a number of other values were considered, including:

- Significant Environmental Benefit (SEB) areas already established as offsets for clearance under the NV Act. e.g. Some sites exist north of the Monash Substation.
- No known Phytophthora sites were noted within the SA portion of the Study Area.
- SA Roadside Vegetation Sites occur within or near the preferred route, near Morgan and Renmark and south of Calpernum Homestead (NatureMaps).
- SA Railside Vegetation Sites occur within or near the preferred route near Morgan and Renmark (NatureMaps).

### 5.6.2 NSW PCTa Mapped as Occurring in the Study Area

A total of 51 PCTs are mapped as occurring within the Study Area in NSW. Table 5-18 provides a summary of these PCTs.

Table 5-18: NSW PCT mapped as occurring with the Study Area

| PCT ID | PCT Description |
|---|---|
| 11 | River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) |
| 13 | Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) |
| 15 | Black Box open woodland wetland with Chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) |
| 16 | Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) |
| 17 | Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion) |
| 23 | Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones |
| 24 | Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains |

| PCT ID | PCT Description |
|---|---|
| 28 | White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone |
| 43 | Mitchell Grass grassland - Chenopod low open shrubland on floodplains in the semi-arid (hot) and arid zones |
| 58 | Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion |
| 61 | Mitchell Grass - saltbush grassland/shrubland of the gibber downs of the arid climate zone |
| 62 | Samphire saline shrubland/forbland wetland of lake beds and lake margins in the arid and semi-arid (hot) zones |
| 63 | Spiny Lignum - Slender Glasswort open forbland saline wetland on lake edges in the semi-arid and arid climate zones |
| 64 | Samphire - Water Weed - Sea-Heath shrubland saline wetland of depressions of the arid and semi-arid (warm) zones |
| 65 | Halosarcia lylei low, open shrubland saline wetland of arid and semi-arid regions |
| 104 | Gum Coolabah woodland on sedimentary substrates mainly in the Cobar Peneplain Bioregion |
| 115 | Eurah shrubland of inland floodplains |
| 128 | Nelia (Acacia Loderi) tall open shrubland of semi-arid sandplains |
| 139 | Prickly Wattle tall open shrubland of dunes and sandplains of semi-arid and arid regions |
| 143 | Narrow-leaved Hopbush - Scrub Turpentine - Senna shrubland on semi-arid and arid sandplains and dunes. |
| 150 | Bottlewasher - Copperburr grassland of the arid zone |
| 152 | Lunette Chenopod shrubland mainly of the Murray Darling Depression Bioregion |
| 153 | Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones |
| 154 | Pearl Bluebush low open shrubland of the arid and semi-arid plains |
| 157 | Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion |
| 158 | Old Man Saltbush - mixed Chenopod shrubland of the semi-arid hot (persistently dry) and arid climate zones (north-western NSW) |
| 159 | Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW) |
| 160 | Nitre Goosefoot shrubland wetland on clays of the inland floodplains |
| 163 | Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones |
| 165 | Derived Copperburr shrubland of the NSW northern inland alluvial floodplains |
| 166 | Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW |
| 168 | Chenopod low open shrubland - ephemeral partly derived forbland saline wetland on occasionally flooded pale clay scalds in the NSW North Western Plains |
| 170 | Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones |
| 171 | Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion |
| 172 | Deep sand mallee of irregular dunefields of the semi-arid (warm) zone |
| 191 | Snap and Rattle Mallee - Moonah open mallee shrubland in the Murray Darling Depression Bioregion |
| 193 | Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW |
| 198 | Sparse saltbush forbland wetland of the irregularly inundated lakes of the arid and semi-arid (persistently hot) climate zones |
| 199 | Hooked Needlewood - Needlewood - Mulga - Turpentine Bush open shrubland of the semi-arid and arid plains |
| 207 | Poplar Box grassy low woodland of drainage lines and depressions of the semi-arid (hot) and arid zone climate zones |
| 215 | Woollybutt Grass open grassland on red earths of the inland plains |
| 221 | Black Oak - Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones |
| 229 | Derived mixed shrubland on loamy-clay soils in the Cobar Peneplain Bioregion |
| 236 | Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone |
| 238 | Permanent and semi-permanent freshwater lakes wetland of the inland slopes and plains |
| 247 | Lignum shrubland wetland on regularly flooded alluvial depressions in the Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion |

| PCT ID | PCT Description |
|---|---|
| 252 | Sugarwood open woodland of the inland plains mainly Murray Darling Depression Bioregion |
| 253 | Gypseous shrubland on rises in the semi-arid and arid plains |
| 254 | Black Oak - Bladder Saltbush on light clays in the arid zone |
| 376 | Mixed scrub low open woodland on sand rises and dunes on floodplains in the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion |
| 631 | White Cypress Pine - Western Rosewood - spinifex grass open woodland on sand-dunes in the Murray Darling Depression Bioregion |

### 5.6.3 Victorian EVCs Mapped for the Study Area

Twenty six EVCs are mapped as occurring in the Study Area in Victoria. Given the length of the alignment in Victoria is only 2 km, the majority of these probably occur in the buffer area (20 km). The site walkover has futher defined which EVCs occur within the preferred route (refer Section 6.3).

Table 5-19: EVCS mapped as occurring in the Victorian Study Area

| EVC ID | EVC Description | EVC Conservation Status |
|---|---|---|
| 86 | Woorinen Sands Mallee | Depleted |
| 91 | Loamy Sands Mallee | Least Concern |
| 97 | Semi-arid Woodland | Vulnerable |
| 98 | Semi-arid Chenopod Woodland | Vulnerable |
| 102 | Low Chenopod Shrubland | Depleted |
| 103 | Riverine Chenopod Woodland | Depleted |
| 104 | Lignum Swamp | Vulnerable |
| 106 | Grassy Riverine Forest | Depleted |
| 107 | Lake Bed Herbland | Vulnerable |
| 158 | Chenopod Mallee | Vulnerable |
| 200 | Shallow Freshwater Marsh | Vulnerable |
| 295 | Riverine Grassy Woodland | Depleted |
| 803 | Plains Woodland | Endangered |
| 806 | Alluvial Plains Semi-arid Grassland | Vulnerable |
| 808 | Lignum Shrubland | Least Concern |
| 810 | Floodway Pond Herbland | Depleted |
| 811 | Grassy Riverine Forest/Floodway Pond Herbland Complex | Depleted |
| 813 | Intermittent Swampy Woodland | Depleted |
| 818 | Shrubby Riverine Woodland | Least Concern |
| 819 | Spike-sedge Wetland | Vulnerable |
| 820 | Sub-saline Depression Shrubland | Depleted |
| 821 | Tall Marsh | Depleted |
| 823 | Lignum Swampy Woodland | Depleted |
| 824 | Woorinen Mallee | Vulnerable |
| 992 | Water Body - Fresh | not applicable |
| 993 | Bare Rock/Ground | not applicable |

### 5.6.4 State-listed Threatened Ecological Communities (TECs)

SA TECs

Whilst TECs have been described in SA, protection is not legislated, hence they are not discussed further in this report.

NSW TECs

In NSW, TECs are listed under the BC Act, and these have been mapped in the Study Area. The NSW TECs and associated PCTs and threatened species are summarised in Table 5-20 below.

Victorian TECs

In Victoria, 40 TECs are listed under the FFG Act. They can include both flora and fauna (e.g. Butterfly Community 1, Lowland Riverine Fish Community of the SAMDB).

Victorian TECs mapped as occurring in the Study Area are summarised in Table 5-21 below.

Table 5-20: An overview of NSW TECs and PCT Associations mapped within the Study Area (source BioNet 2018)

| BC Act TEC | NSW Status | Cwth Status | PCT mapped in Study Area | Key information (Bionet) | Threatened species affiliations (BioNet) | |
|---|---|---|---|---|---|---|
| *Acacia loderi* shrublands | EN | - | 154: Pearl Bluebush low open shrubland of the arid and semi-arid plains | *Maireana sedifolia, Maireana pyramidata, Atriplex vesicaria, Maireana sclerolaenoides / Enchylaena tomentosa , Sclerolaena obliquicuspis , Sclerolaena patenticuspis , Austrostipa nitida /* | EPBC Act Flora<br>· *Brachyscome papillosa (V)*<br>· *Calotis moorei* (E)<br>· *Aspidites ramsayi* (V)<br>BC Act Flora<br>· *Austrostipa nullanulla* (E) | BC Act Fauna<br>· *Antechinomys laniger (E)*<br>· *Ardeotis australis (E)*<br>· *Lophocroa leadbeateri (V)*<br>· *Calyptorhynchus banksii samueli* (V) |
| *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions | EN | - | 128: Nelia (*Acacia Loderi*) tall open shrubland of semi-arid sandplains | *Acacia loderi, Casuarina pauper, Acacia aneura / Eremophila sturtii, Maireana pyramidata / Enchylaena tomentosa, Chloris truncata, Austrostipa scabra subsp. scabra* | EPBC Act Flora<br>· *Acacia carneorum* (V)<br>· *Atriplex infrequens* (V)<br>· *Calotis moorei* (E)<br>BC Act Flora<br>· *Acacia notabilis* (E) | BC Act Fauna<br>· *Antechinomys laniger* (E)<br>· *Ardeotis australis* (E)<br>· *Aspidites ramsayi* (E)<br>· *Burhinus grallarius* (E)<br>· *Lophocroa leadbeateri* (V) |
| | | | 23: Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones | *Acacia melvillei, Eremophila sturtii, Dissocarpus paradoxus, Sclerolaena obliquicuspis / Austrostipa nodosa, Pycnosorus pleiocephalus , Goodenia fascicularis , Leiocarpa leptolepis* | EPBC Act Flora<br>· *Atriplex infrequens* (V)<br>· *Calotis moorei* (E)<br>BC Act Flora<br>· *Acacia notabilis* (E) | BC Act Fauna<br>· *Antechinomys laniger* (E)<br>· *Ardeotis australis* (E)<br>· *Aspidites ramsayi* (E)<br>· *Burhinus grallarius* (E)<br>· *Lophocroa leadbeateri* (V)<br>· *Certhionyx variegatus* (V)<br>*Chalinolobus picatus* (V) |
| | | | 28: White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone | *Callitris glaucophylla / Hakea leucoptera subsp. leucoptera, Pittosporum angustifolium , Maireana pyramidata , Maireana enchylaenoides / Enchylaena tomentosa , Dissocarpus paradoxus , Austrostipa scabra subsp. scabra , Tribulus terrestris* | EPBC Act / BC Act Flora<br>· *Austrostipa metatoris* (V)<br>· *Austrostipa wakoolica* (E)<br>· *Caladenia arenaria* (E) | BC Act Fauna<br>· *Ardeotis australis* (E)<br>· *Burhinus grallarius* (E)<br>· *Lophocroa leadbeateri* (V)<br>· *Certhionyx variegatus* (V)<br>· *Chalinolobus picatus* (V)<br>· *Falco hypoleucos* (E) |
| *Allocasuarina luehmannii* (Buloke) Woodland in the Riverina and Murray-Darling Depression Bioregions | EN | EN | None | | | |
| *Halosarcia lylei* low open-shrubland in the | EN | - | 065: *Halosarcia lylei* low, open shrubland saline wetland of arid and semi-arid regions | This community occurs near the more widespread samphire shrubland (ID64) in the Scotia | BC Act Flora<br>· *Leptorhynchos waitzia* | BC Act Fauna<br>· *Ardeotis australis* (E)<br>· *Calidris alba* (V) |

| BC Act TEC | NSW Status | Cwth Status | PCT mapped in Study Area | Key information (Bionet) | Threatened species affiliations (BioNet) | |
|---|---|---|---|---|---|---|
| Murray Darling Depression Bioregion | | | | region and could be considered a sub-association of it. | | · *Chalinolobus picatus* (V)<br>· *Falco hypoleucos* (E)<br>· *Hieraaetus morphnoides* (V)<br>· *Circus assimilis* (V<br>· *Epthianura albifrons* (V)<br>· *Artamus cyanopterus cyanopterus* (V) |
| Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions | EN | - | 028: White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone | As above | As above | |

EN = Endangered; PCT = Plant Community Types

Table 5-21: Victoria threatened ecological communities listed under the FFG Act 1988 in the wider Study Area

| TEC ID | TEC Name | TEC Description[1] |
|---|---|---|
| 431 | Semi-arid North-West Plains Buloke Grassy Woodland | This TEC is a woodland or open woodland mainly dominated by slender cypress-pines, and with few or no shrubs. The dominant tree is Slender Cypress-pine (*Callitris gracilis*), with occasional Buloke (*Allocasuarina luehmannii*) towards the margins. Shrubs are uncommon, but typically include Small Cooba (*Acacia ligulata*). At Hattah-Kulkyne and elsewhere in the far north of the State, Narrow-leaf Hopbush (*Dodonaea viscosa subsp. angustissima*) has become abundant in many current and former stands.<br>This community was once widespread on relatively dry, deeper sandy soils of the Mallee, especially on the crests of dunes, lunettes and sand-ridges, though many of these sites have since been cleared for farming. It is also present on public land in parts of the Big Desert and Sunset Country. The community appears to be sensitive both to fire and browsing by rabbits. |
| 432 | Semi-arid herbaceous Pine Woodland | This TEC is a woodland or open woodland typically dominated by both Slender Cypress-pine and Buloke trees, without a shrub layer and with a largely herbaceous ground layer. It occurs where the soil surface is sandy, over finer-grained soil.<br>The dominant trees are Slender Cypress-pine usually in association with Buloke. The ground layer consists largely of herbs such as Australian Stonecrop (*Crassula sieberiana*), Dense Crassula (*Crassula colorata*), Hard-headed Daisy (*Brachyscome lineariloba*), Small Purslane (*Calandrinia eremaea*) and Austral Carrot (*Daucus glochidiatus*), with the introduced grasses False Hair-grass (*Pentameris = Pentaschistis airoides*) and Arabian Grass (*Schismus barbatus*). Where this community occurs close to dunes or ridges, there is often a Semi-arid Herbaceous Pine Woodland Community on higher ground on the deeper, drier sand of the crests.<br>This community type is mostly restricted to infrequently-burnt public land in the north-west of the state, especially in the Murray-Sunset, Hattah-Kulkyne and Wyperfeld National Parks, but also occurs on some other sites licensed for grazing. |
| 433 | Semi-arid herbaceous Pine-Buloke Woodland | This TEC is open woodland in which Buloke is the dominant tree, sometimes in association with Black Box (*Eucalyptus largiflorens*) and/or Yellow Gum (*E. leucoxylon*).<br>A shrub layer is present, with Gold-dust Wattle (*Acacia acinacea*) as the dominant shrub, usually accompanied by smaller sub-shrubs such as Variable Sida (*Sida corrugata*), Frosted Goosefoot (*Chenopodium desertorum*), Nodding Saltbush (*Einadia nutans*), Fuzzy New Holland Daisy (*Vittadinia cuneata*) and Woolly New Holland Daisy (*Vittadinia gracilis*). The ground layer consists of grasses such as Bristly Wallaby-grass (*Danthonia setacea = Rytidosperma setaceum*), Feather Spear-grass (*Austrostipa elegantissima*), and Crested Spear-grass (*Austrostipa blackii*) as well as Scented Mat-rush (*Lomandra effusa*), Grassland Wood-sorrel (*Oxalis perennans*) and Hare's-foot Clover (*Trifolium arvense*).<br>Once widespread across the plains of north-western Victoria and the Wimmera, on sites where soils are relatively fertile and subject to seasonal water-logging and little fire. Most of the sites on which it occurred are now private land mainly cleared for farming. |
| 430 | Semi-arid Shrubby Pine-Buloke Woodland | This TEC is an open woodland or woodland community with a mix of Slender Cypress-pine and Buloke and a characteristic shrub component; dominated by Slender Cypress-pine with variable numbers of Buloke trees.<br>The shrub layer consists of often-widespread species such as Ruby Saltbush (*Enchylaena tomentosa = E. tomentosa var. tomentosa*), Slender or Narrow-leaf Hop-bush (*Dodonaea viscosa subsp. angustissima*), Weeping Pittosporum (*Pittosporum angustifolium*), Hedge Saltbush (*Rhagodia spinescens*), Pimelea Daisy-bush (*Olearia pimeleoides*), Cattlebush (*Alectryon oleifolius subsp. canescens*) and Horned Bassia (*Sclerolaena diacantha*). The ground layer is dominated by herbaceous annuals such as Small Purslane (*Calandrinia eremaea*), Mediterranean Turnip (*Brassica tournefortii*), Austral Carrot (*Daucus glochidiatus*), Little Medic (*Medicago minima*), Hairy Burr-daisy (*Calotis hispidula*), Hard-headed Daisy (*Brachyscome lineariloba*) and Flannel Cudweed (*Actinobole uliginosum*). Longer-lived herbs are represented by Dissected New Holland Daisy (*Vittadinia dissecta*), and Nodding Saltbush (*Einadia nutans*). Although grass species are not diagnostic of this community, Feather Spear-grass (*Austrostipa elegantissima*) is often present.<br>The TEC typically found on flat or slightly undulating land with sandy loam soils over finer-grained substrates, where the soil is occasionally waterlogged. It is found mainly in the near north-west of the State, typically on sites that have been free of fire for many decades. Nearly all the sites are on public land. |

[1] Reference: Flora and Fauna Guarantee Act 1988 – Threatened List Characteristics of Threatened Communities (DELWP 2018) cited online at https://www.environment.vic.gov.au/conserving-threatened-species/flora-and-fauna-guarantee-act-1988

# 6. Field Results

## 6.1 SA Vegetation Associations

Vegetation at 20 sites within South Australia was characterised following field survey across the SA portion of the proposed corridor. The sites selected represent all of the broad vegetation and habitat types along the SA portion of the alignment which were accessible during the site assessment (19-22 November 2018). Site locations are shown on Figure 6-1 below.

The following Bushland Community Vegetation Associations were identified within the Study Area in SA:

- MDBSA 3.1 Mallee with Very Open Sclerophyll / Chenopod Shrub understorey.
- MDBSA 2.2 Chenopod Open Shrublands.
- MDBSA 2.1 Open mallee / low open woodland with Chenopod shrub understorey.
- MDBSA 1.1 Open woodland with arid adapted shrubland on limestone.
- MDBSA 11.6 semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines.
- MDBSA 4.2 Mallee with understorey dominated by Triodia on moderate / low sand dunes.

As per method (section 4.3 above) vegetation condition for the sites was primarily medium (against benchmarks) but ranged from low through medium to high.

Descriptions of the vegetation associations within SA are provided below, with representative photos provided. It is noted, that Bushland data was collected for these sites and is available for future stages of the project.

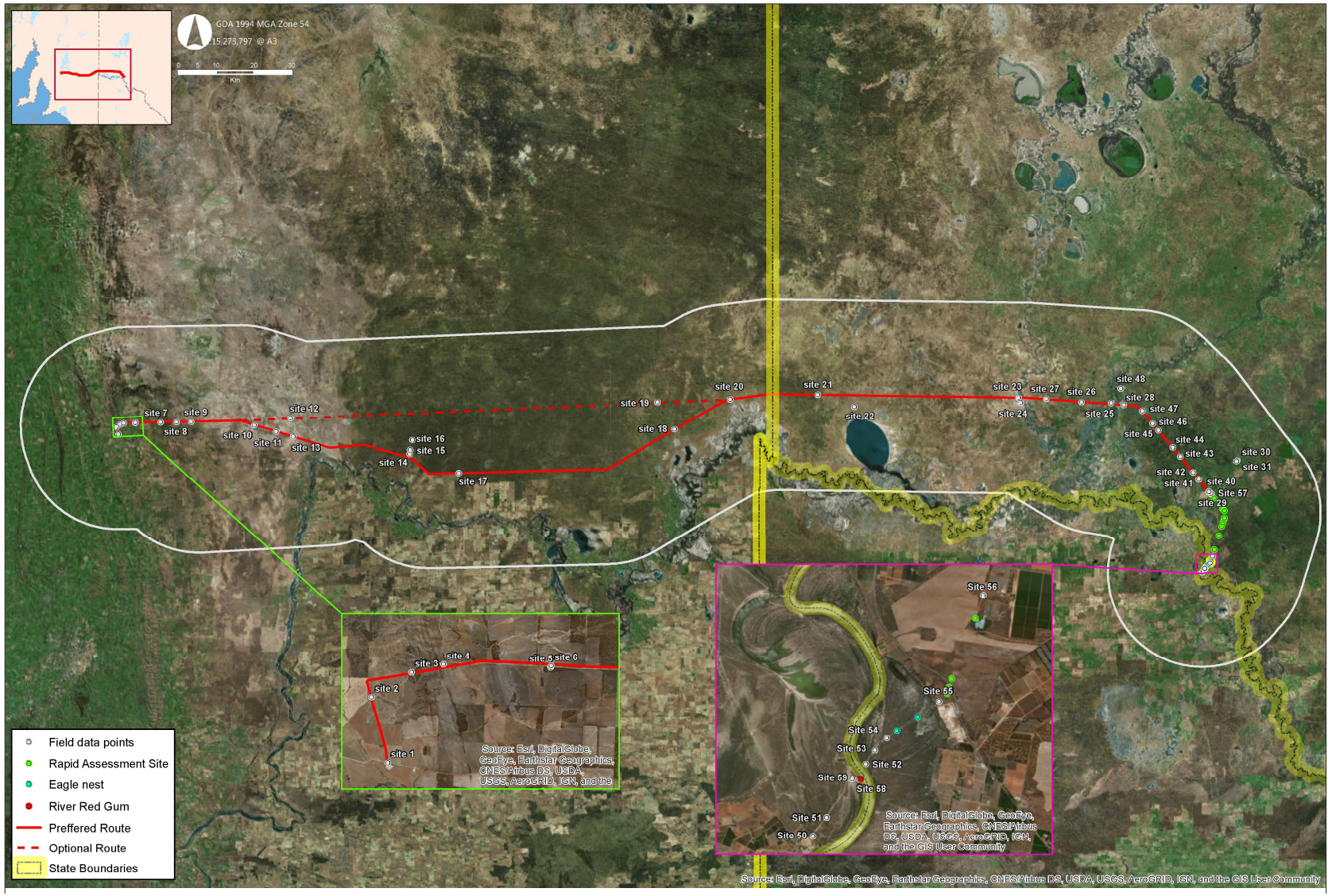


Figure 6-1: Field site survey locations SA, NSW and VIC

Site 1 - *Eucalyptus porosa* (Mallee Box) / *E. oleosa* (Red Mallee) over *Senna artemisioides* (Desert Senna) and Chenopods.

Site 1 comprised roadside vegetation consistent with BCM community MDBSA 3.1 Mallee with Very Open Sclerophyll / Chenopod Shrub understorey. Dominant overstorey species included *Eucalyptus porosa* (Mallee Box) and *E. oleosa* (Red Mallee). The midstorey was dominated by *Senna artemisioides* ssp. *coriacea* (Broad-leaf Desert Senna), *Atriplex stipitata* (Bitter Saltbush) and *Rhagodia parabolica* (Mealy Saltbush). Other naitve species that were present included *Acacia ligulata* (Umbrella Bush), *Grevillea huegelii* (Comb Grevillea), *Maireana brevifolia* (Short-leaved Bluebush) and *Lomandra effusa* (Scented Mat-rush).

No threatened flora or fauna were observed within this community. No weeds were present. Minimal hollows were evident with the Mallee trees that were present (see Plate 6-1). Preliminary Bushland vegetation condition score for this site is medium.

Plate 6-1: Site 1, *Eucalyptus porosa* (Mallee Box) / *E. oleosa* (Red Mallee) over *Senna artemisioides* (Desert Senna) and Chenopods (facing north)

Site 2 - *Eucalyptus porosa* (Mallee Box) over *Senna artemisioides* (Desert Senna) and Chenopods.

Site 2 comprised roadside vegetation consistent with BCM community MDBSA 3.1. At this site *E. porosa* was the dominant overstorey species and *Rhagodia parabolica* was the dominant midstorey species. Other native species present included *Acacia* sp.*, Enchylaena tomentosa* (Ruby Saltbush), *Einadia nutans* (Climbing Saltbush), *Maireana brevifolia* (Short-leaf Bluebush) and grasses *Austrostipa* sp., and *Rytidosperma setaceum* (Small-flowered Wallaby-grass) (See Plate 6-2).

No threatened flora or fauna were observed. Weeds that were sparsely present included *Marrubium vulgare* (Horehound) and *Lycium ferocissimum* (African Boxthorn). Both of these weeds are Declared under the NRM Act, Boxthorn is a Weed of National Significance (WoNS). The preliminary Bushland vegetation condition score for this site is medium.

Plate 6-2: Site 2, *Eucalyptus porosa* (Mallee Box Box) over *Senna artemisioides* (Desert Senna) and Chenopods (facing east)

Site 3 - *Eucalyptus porosa (Mallee Box) / E. oleosa (Red Mallee)* closed mallee *over Chenopods.*

Site 3 was located 150m west of the proposed alignment. This site also comprised vegetation consistent with BCM community MDBSA 3.1. Native vegetation is present within paddocks on low hill slopes and is dominated by *Eucalyptus porosa* (Mallee Box) and *E. oleosa* (Red Mallee). Native understorey species included *Maireana brevifolia* (Short-leaf Bluebush) and *Enchylaena tomentosa* (Ruby Saltbush) (see Plate 6-3).

No threatened flora or fauna were present. Weeds included exotic grass / pasture species; *Hordeum vulgare* (Barley Grass) and *Avena fatua* (Wild Oat). The preliminary Bushland vegetation condition score for this site is low to medium.

Plate 6-3: Site 3, *Eucalyptus porosa* (Mallee Box) / *E. oleosa* (Red Mallee) closed mallee over Chenopods (facing northeast)

Site 4 – *Chenopod Regrowth in cleared paddock*

Site 4 is representative of cleared paddocks in the area with Chenopod regrowth. The regrowth is representative of BCM community MDBSA 2.2 Chenopod Open Shrublands (see Plate 6-4). Dominant native species at this site included *Maireana brevifolia* (Short-leaf Bluebush), *Maireana georgei* (Satiny Bluebush), *Sclerolaena patenticuspis* (Spear-fruit Bindyi) and *Gahnia* sp.

No threatened flora or fauna were observed. Native fauna present included *Merops ornatus* (Rainbow Bee-eater), *Gavicalis virescens* (Singing Honeyeater) and *Macropus sp. (*Kangaroos). Pest fauna species present at the site included *Vulpes vulpes* (Fox) and *Oryctolagus cuniculus* (Rabbit). Weeds present included exotic pasture (*Hordeum vulgare* (Barley Grass) and Weeds *Asphodelus fistulosus* (Onion Weed) and *Marrubium vulgare* (Horehound, Declared). Preliminary Bushland vegetation condition score for this site is low to medium.

Plate 6-4: Site 4, Chenopod regrowth in cleared paddock (facing south)

Site 5 - *Eucalyptus oleosa* (Red Mallee) low mallee over Chenopod shrubs

Site 5 vegetation comprised old growth mallee representative of BCM community MDBSA 2.1 open mallee / low open woodland with Chenopod shrub understorey (see Plate 6-5). The dominant overstorey species was *Eucalyptus oleosa* Red Mallee). The understorey was dominated by *Maireana sedifolia* (Bluebush), *Atriplex stipitata* (Bitter Saltbush) and *Maireana pentatropis* (Erect Mallee Bluebush). Other native species present included *Maireana radiata* (Radiate Bluebush), *Sclerolaena patenticuspis* (Spear-fruit Bindyi), *Zygophyllum aurantiacum* (Shrubby Twinleaf) and *Enchylaena tomentosa* (Ruby Saltbush).

No threatened flora species were observed. One state threatened fauna species was present (*Corcorax melanorhamphos*, White-winged Chough, rare). No weeds were present. The preliminary Bushland vegetation condition score for this site is medium.

Plate 6-5: Site 5, *Eucalyptus oleosa* (Red Mallee) low mallee over Chenopod shrubs (facing south)

Site 6 – Chenopod low open shrubland

Site 6 vegetation comprised grazed low open Chenopod shrublands, representative of BCM community MDBSA 2.2 Chenopod Open Shrubland. Dominant native species included *Maireana pyramidata* (Black Bluebush), *Atriplex stipitata* (Bitter Saltbush), with *Sclerolaena patenticuspis* (Spear-fruit Bindyi) also present (see Plate 6-6). This site is north of the mallee patch at site and is also close to a dam.

No threatened flora or fauna were observed. One exotic species was sparsely present; *Asphodelus fistulosus* (Onion Weed). The preliminary Bushland vegetation condition score for the site is low.

Plate 6-6: Site 6, Chenopod low open shrubland (facing east)

Site 7 – *Eucalyptus oleosa* (Red Mallee) very open mallee over Chenopods

Site 7 vegetation comprised very low open mallee representative of BCM community MDBSA 2.1 open mallee / low open woodland with Chenopod shrub understorey. The dominant overstorey species was *Eucalyptus oleosa* (Red Mallee) and the dominant understorey species was *Atriplex stipitata* (Bitter Saltbush). Other native species that are present include *Zygophyllum aurantiacum* (Shrubby Twinleaf), *Grevillea huegelii* (Comb Grevillea), *Maireana sedifolia* (Bluebush), *Cratystylis conocephala* (Bluebush Daisy) *Acacia nyssophylla* (Prickly Acacia) and *Sclerolaena patenticuspis* (Spear-fruit Bindyi).

No threatened flora or fauna were observed. No weeds were present. The preliminary Bushland vegetation condition score for this site is medium.

Plate 6-7: Site 7, *Eucalyptus oleosa* (Red Mallee) very open low mallee over Chenopods (facing north)

Site 8 – *Eucalyptus oleosa* (Red Mallee) open mallee over *Maireana sedifolia* (Bluebush) shrubland

Site 8 vegetation comprised semi old growth mallee representative of BCM community MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey (see Plate 6-8). The dominant overstory species was *Eucalyptus oleosa* (Red Mallee) and the dominant understorey species was *Maireana sedifolia* (Bluebush). Other native species present included *Atriplex stipitata* (Bitter Saltbush), *Maireana brevifolia* (Short-leaf Bluebush), *Exocarpus aphyllus* (Leafless Cherry), *Rhagodia ulicina* (Intricate Saltbush), *Zygophyllum aurantiacum* (Shrubby Twinleaf), *Enchylaena tomentosa* (Ruby Saltbush), *Acacia nyssophylla* (Prickly Acacia), *Alectryon oleifolius ssp. canescens* (Bullock Bush) and *Myoporum platycarpum* (False Sandalwood). *Amyema miquelii* (Box Mistletoe) was also present.

No threatened flora or fauna were observed. No weeds were present. The preliminary Bushland vegetation condition score for the site is medium.

Plate 6-8: Site 8, *Eucalyptus oleosa* (Red Mallee) open mallee over *Maireana sedifolia* (Bluebush) shrubland

Site 9 – *Myoporum platycarpum* (False Sandalwood) very low open woodland over *Maireana sedifolia* (Bluebush) shrubland).

Site 9 comprises vegetation representative of BCM community MDBSA 2.1 open mallee/ low open woodland with Chenopod understorey. The dominant overstorey species was *Myoporum platycarpum* (False Sandalwood), with *Alectryon oleifolius ssp. canescens* (Bullock Bush), *Casuarina pauper* (Black Oak), *Exocarpus aphyllus* (Leafless Cherry) and emergent *Eucalyptus oleosa* (Red Mallee) also present. The dominant understorey species was *Maireana sedifolia* (Bluebush), with *Sclerolaena patenticuspis* (Spear-fruit Bindyi) and *Scaevola spinescens* (Spiny Fanflower) also present (see Plate 6-9).

No threatened flora or fauna observed. No weeds were present. The preliminary Bushland vegetation condition score for the site is low to medium.

Plate 6-9: Site 9, *Myoporum platycarpum* (False Sandalwood) very low open woodland over *Maireana sedifolia* (Bluebush) shrubland) (facing south)

Site 10 – *Casuarina pauper* (Black Oak) very low woodland over *Maireana pyramidata* (Black Bluebush) open shrubland

Site 10 comprised vegetation representative of BCM community MDBSA 1.1 open woodland with arid adapted shrubland on limestone. The dominant overstorey species was *Casuarina pauper* (Blackoak), with tall shrubs such as *Exocarpus aphyllus* (Leafless Cherry) and *Alectryon oleifolius ssp. canescens* (Bullock Bush) also sparsely present (see Plate 6-10). The understorey was dominated by *Maireana pyramidata* (Black Bluebush) and *Rhagodia ulicina* (Intricate Saltbush) with extensive cover of *Maireana sedifolia* (Bluebush), *Atriplex stipitata* (Bitter Saltbush), *Sclerolaena obliquicuspis* (Oblique-spinded Bindyi). Other native species that were sparsely present included *Rhagodia spinescens* (Spiny Saltbush), *Scaevola spinescens* (Spiny Fanflower) and *Maireana aphylla* (Cotton-bush).

No threatened flora or fauna observed at the site. Whilst no weeds were present, there was evidence of heavy grazing. The preliminary Bushland vegetation condition score for the site is medium.

Plate 6-10: Site 10, *Casuarina pauper* (Black Oak) very low woodland over *Maireana pyramidata* (Black Bluebush) open shrubland (facing south)

Site 11 – *Casuarina pauper* (Black Oak) very low woodland over *Maireana sedifolia* (Bluebush) low open shrubland

Site 11 also consists of vegetation representative of BCM community MDBSA 1.1 open woodland with arid adapted shrubland on limestone. The dominant overstorey species was *Casuarina pauper* (Blackoak), with tall shrubs such as *Alectryon oleifolius ssp. canescens* (Bullock Bush) also sparsely present (see Plate 6-11). Other shrubs included *Acacia oswaldii* (Umbrella Wattle), *Acacia nyssophylla* (Prickly Acacia), *Lysiana exocarpi* (Harlequin Mistletoe) and *Templetonia egena* (Broombush Templetonia). The understorey was dominated by *Maireana sedifolia* (Bluebush) with *Rhagodia ulicina* (Intricate Saltbush). *Maireana pyramidata* (Black Bluebush) was also sparsely present.

No threatened flora or fauna observed at the site. No weeds were present. The preliminary Bushland vegetation condition score for the site is medium.

Plate 6-11: Site 11, *Casuarina pauper* (Black Oak) very low woodland over *Maireana sedifolia* (Bluebush) low open shrubland (facing west)

Site 12 – *Nitraria billardierei* (Nitrebush) low open shrubland

Site 12 consists of a heavily grazed representation of BCM vegetation community MDBSA 11.6 semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines. *Nitraria billardierei* (Nitrebush) was dominant, often prevalent in overgrazed areas of the region, with *Atriplex vesicaria* (Bladder Saltbush) and *Austrostipa* sp. also present (see Plate 6-12).

No threatened flora or fauna observed. Whilst no weeds were observed the vegetation was heavily grazed and stock tanks were present. The preliminary Bushland vegetation condition score for this site is very low.

Plate 6-12: Site 12, *Nitraria billardierei* (Nitrebush) low open shrubland (facing south)

Site 13 – *Maireana sedifolia* (Bluebush) Low open Chenopod Shrubland

Site 13 was a grazed representation of BCM community MDBSA 2.2 Chenopod open shrublands. The dominant species was *Maireana sedifolia* with good cover of *Sclerolaena obliquicuspis* (see Plate 6-13). Other native species present included emergent *Myoporum platycarpum* (False Sandalwood), *Lycium australe* (Australian Boxthorn), *Enneapogon* sp. (Bottlewasher Grasses) and *Acacia nyssophylla* (Prickly Acacia).

No threatened flora or fauna were observed. No weeds were observed, but there was evidence of grazing and Kangaroos (*Macropus sp.*) were present. The preliminary Bushland vegetation condition score for the site is low to medium.

Plate 6-13: Site 13, *Maireana sedifolia* (Bluebush) Low open Chenopod Shrubland (facing north)

Site 14 - *Eucalyptus oleosa* (Red Mallee) open mallee over Chenopods

Site 14 vegetation consists of old regrowth and scattered old growth mallee representative of BCM community MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey. This site is north of Hogwash Bend Conservation Park.

The dominant overstory species was *Eucalyptus oleosa* (Red Mallee) with sparse cover of tall shrub *Acacia nyssophylla* (Prickly Watte) (see Plate 6-14). There was a high level of species diversity in the midstorey and undestorey with a mix of Chenopods dominant including *Atriplex stipitata* (Bitter Saltbush), *Maireana pentatropis* (Erect Mallee Bluebush), *Maireana radiata* (Radiate Bluebush), *Sclerolaena diacantha* (Grey Bindyi), *Atriplex vesicaria* (Bladder Saltbush), *Enchylaena tomentosa* (Ruby Saltbush), *Chenopodium curvispicatum* (Cottony Goosefoot), *Maireana trichoptera* (Hairy-fruit Bluebush) and *Maireana sedifolia* (Bluebush). Other native species present included *Zygophyllum apiculatum* (Pointed Twinleaf), *Zygophyllum aurantiacum* (Shrubby Twinleaf) and *Eremophila scoparia* (Broom Emubush).

No threatened fauna were observed, however a number of common fauna were observed (*Colluricincla harmonica*, Grey Shrike-thrush; *Merops ornatus,* Rainbow Bee-eater; *Barnardius zonarius*, Mallee Ringneck; *Artamus cyanopterus*, Dusky Woodswallow and *Acanthagenys rufogularis*, Spiny-cheeked Honeyeater). Large hollows were present and there was good coverage of leaf litter (see Plate 6-15). One state threatened flora was observed; *Geijera parvifolia* (Wilga), rated rare. No weeds were observed, but there was evidence of moderate to hard grazing. The preliminary Bushland vegetation condition score for the site is medium to high.

Plate 6-14: Site 14, *Eucalyptus oleosa* (Red Mallee) open mallee over Chenopods (facing east)

Plate 6-15: Site 14, Large hollows and leaf litter present at this site provide suitable habitat for fauna, including threatened species

Site 15 - *Eucalyptus oleosa* (Red Mallee) open mallee over Chenopods

Site 15 consists of similar vegetation to site 14, with *Atriplex stipitata* (Bitter Saltbush) dominant in the mixed Chenopod understorey. *Rhagodia ulicina* (Intricate Saltbush) was also present (see Plate 6-16). This site is north of Hogwash Bend Conservation Park.

No threatened fauna were observed. One state threatened flora was observed; *Geijera parvifolia* (Wilga), rated rare. No weeds were observed, but there was evidence of moderate grazing. The preliminary Bushland vegetation condition score for the site is medium to high.

Plate 6-16: Site 15, *Eucalyptus oleosa* (Red Mallee) open mallee over Chenopods (facing north)

Site 16 *Eucalyptus dumosa* (White Mallee) low mallee over *Triodia sp.* (Spinifex) hummock grassland.

Site 16 comprises vegetation that has been burnt (approximately 10 years ago), that is representative of BCM community MDBSA 4.2. *Eucalyptus dumosa* (White Mallee) is dominant in the overstorey. This site is north of Hogwash Bend Conservation Park.

*Triodia sp.* is dominant in the understory with good cover of *Eremophila crassifolia* (Thick-leaf Emubush) and *Maireana pentatropis* (Erect Mallee Bluebush) (see Plate 6-17). Other native species present include *Eremophila glabra* (Tar Bush), *Westringia rigida* (Stiff Westringia), *Sclerolaena diacantha* (Grey Bindyi), *Acacia ligulata* (Umbrella Bush), *Atriplex stipitata* (Bitter Saltbush) and *Myoporum platycarpum* (False Sandalwood).

No threatened flora or fauna were observed. Common fauna included *Acanthiza uropygialis* (Chestnut-rumped Thornbill), *Acanthagenys rufogularis* (Spiny-cheeked Honeyeater), Spotted Pardalote (*Pardalotus punctatus*) and (*Lichenostomus leucotis*) White-eared Honeyeater. The site may provide habitat for threatened fauna such as Malleefowl (*Leipoa ocellata*) and other species that prefer unburnt mallee. The preliminary Bushland vegetation condition score for the site is medium.

Plate 6-17: Site 16, *Eucalyptus dumosa* (White Mallee) low mallee over *Triodia sp.* (Spinifex) hummock grassland (facing east)

Site 17 – *Eucalyptus gracilis* (Yorrell) open low Mallee over *Triodia* sp. (Spinifex) hummock grassland.

Site 17 consist of vegetation that has been burnt (approximately 10 years ago), that is representative of BCM community MDBSA 4.2 mallee with understorey dominated by *Triodia* on sand dunes (see Plate 6-18). The site is adjacent the Pooginook Conservation Park, with the alignment traversing an access tracks along the northern boundary of the park. *Eucalyptus gracilis* (Yorrell) is dominant in the overstorey with *Eucalyptus dumosa* (White Mallee) also present and *Acacia wilhelmii* (Dwarf Nealie), *Eremophila crassifolia* (Thick-leaf Emubush) and *Acacia calamifolia* (Wallowa) are present in the midstorey. *Triodia* sp. is dominant in the understory with good coverage of *Maireana pentatropis* (Erect Mallee Bluebush) and *Sclerolaena diacantha* (Grey Bindyi). Other native species present include *Eremophila glabra* (Tar Bush), *Podolepis capillaris* (Wiry Podolepis), *Lomandra leucocephala* (Woolly Mat-rush) *Codonocarpus cotinifolius* (Desert Polar) and *Grammosolen dixonii* (Star Flower)

This site is adjacent Pooginook NP. No threatened flora and fauna were present, but are likely to utilise this habitat. Common species that were present included *Lichenostomus leucotis* (White-eared Honeyeater), *Artamus cyanopterus* (Dusky Woodswallow), *Acanthiza uropygialis* (Chestnut-rumped Thornbill), *Acanthagenys rufogularis* (Spiny-cheeked Honeyeater), *Oreoica gutturalis* (Crested Bellbird), *Lichenostomus ornatus* (Yellow-plumed Honeyeater) and *Pardalotus punctatus* (Spotted Pardalote). No weeds were present, but there was evidence of low to moderate grazing. The preliminary Bushland vegetation condition score for the site is medium.

Plate 6-18: Site 17, *Eucalyptus gracilis* (Yorrell) open low Mallee over *Triodia sp.* (Spinifex) hummock grassland (facing south)

Site 18 - *Eucalyptus oleosa (*Red Mallee) / *Eucalyptus gracilis* (Yorrell) Mallee over *Senna artemisioides* (Senna) and Chenopods

Site 18, located within Heritage Agreement Area 1544 (Calperum Station) and consists of long unburnt mallee representative of BCM vegetation community MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey (see Plate 6-19).

The dominant overstory species were *Eucalyptus oleosa* (Red Mallee) and *Eucalyptus gracilis* (Yorrell) with *Myoporum platycarpum* (False Sandalwood) and *Exocarpus aphyllus* (Leafless Cherry) present in the midstorey. The dominant understorey species were *Senna artemisioides petiolaris* (Desert Senna) and *Senna artemisioides coriacea* (Broad-leaf Desert Senna) with *Senna artemisioides filifolia* (Fine-leaf Desert Senna) and *Olearia pimeloides* (Pimelea Daisy-bush) also present. There was a high diversity of other native species and Chenopods present in the understorey including three species of *Maireana*, two species of *Zygophyllum,* two species of *Sclerolaena*, *Rhagodia ulicina* (Intricate Saltbush), *Einadia nutans* (Climbing Saltbush), *Chenopodium curvispicatum* (Cottony Goosefoot) and Pimelea microcephala (Shrubby Riceflower).

No threatened flora and fauna were present. Common fauna that were observed included Rainbow Bee-eater, Yellow-plumed Honeyeater, Chestnut-rumped Thornbill, Spiny-cheeked Honeyeater, Grey Shrike-thrush and Willie Wagtail. No weeds were present, but there was evidence of light grazing from Kangaroos and Goats. The preliminary Bushland vegetation condition score for the site is medium to high

Plate 6-19: Site 18, *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus gracilis* (Yorrell) Mallee over Senna artemisioides (Senna) and Chenopods (facing north)

Site 19 - *Eucalyptus oleosa* (Red Mallee) Mallee over *Senna artemisioides* (Senna) and Chenopods

Site 19 consists of long unburnt mallee vegetation representative of BCM community MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey (see Plate 6-20). This site is within Heritage Agreement 1544, also known as **Calpernum Station**.

The dominant overstory species were *Eucalyptus oleosa* (Red Mallee) with *Acacia nyssophylla* (Spine Bush), *Acacia calamifolia* (Wallowa) and *Myoporum platycarpum* (False Sandalwood) present in the midstorey. Dominant species in the understorey included *Senna artemisioides filifolia* (Fine-leaf Desert Senna), *Westringia rigida* (Rigid Westringia), *Maireana pentatropis* (Erect Mallee Bluebush), *Zygophyllum aurantiacum* (Shrubby Twinleaf) and *Sclerolaena diacantha* (Grey Bindyii). Other native species present included *Chenopodium curvispicatum* (Cottony Goosefoot), *Maireana georgei* (Satiny Bluebush), *Austrostipa spp.*, *Olearia muelleri* (Mueller's Daisy-bush) and *Cassytha sp.*

No threatened flora or fauna were recorded. Common fauna that were recorded included White-browed Babbler, Chestnut-rumped Thornbill, Dusky Woodswallow, Grey Shrike-thrush and Mallee Ringneck. No weeds present, some evidence of previous pruning / cutting of vegetation. The preliminary Bushland vegetation condition score for the site is medium to high.

Plate 6-20: Site 19, *Eucalyptus oleosa* (Red Mallee) Mallee over *Senna artemisioides* (Senna) and Chenopods (facing north)

Site 20 - *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus gracilis* (Yorrell) very open mallee over Chenopods

Site 20 consists of highly degraded mallee over Chenopods representative of BCM vegetation community MDBSA 2.1 open mallee / low open mallee with Chenopod understorey (see Plate 6-21). This site is on the boundary of Calpernum Station, Chowilla Game Reserve and Chowilla Regional Reserve, north of the Wentworth Road.

The dominant overstorey species were *Eucalyptus oleosa (Red Mallee)* and *Eucalyptus gracilis* (Yorrell) with *Casuarina pauper* (Black Oak), *Myoporum platycarpum* (False Sandalwood) and *Alectryon oleifolius* (Bullock Bush) present in the midstorey. The dominant understorey species were *Maireana pyramidata* (Black Bluebush) and *Atriplex stipitata* (Bitter Saltbush), with *Sclerolaena obliquicuspis* (Limestone Copperburr), *Rhagodia spinescens* (Spiny Rhagodia) and *Enchylaena tomentosa* (Ruby Saltbush) well represented. Other native species that were present included *Lysiana exocarpi* (Harlequin Mistletoe) and *Dissocarpus paradoxus* (Cannonball).

No threatened flora and fauna were recorded. One weed species was observed (Wild Sage) and there was evidence of heavy grazing from Sheep, Kangaroos and Rabbits. The preliminary Bushland vegetation condition score for the site is medium, though field assessment considered this medium to low.

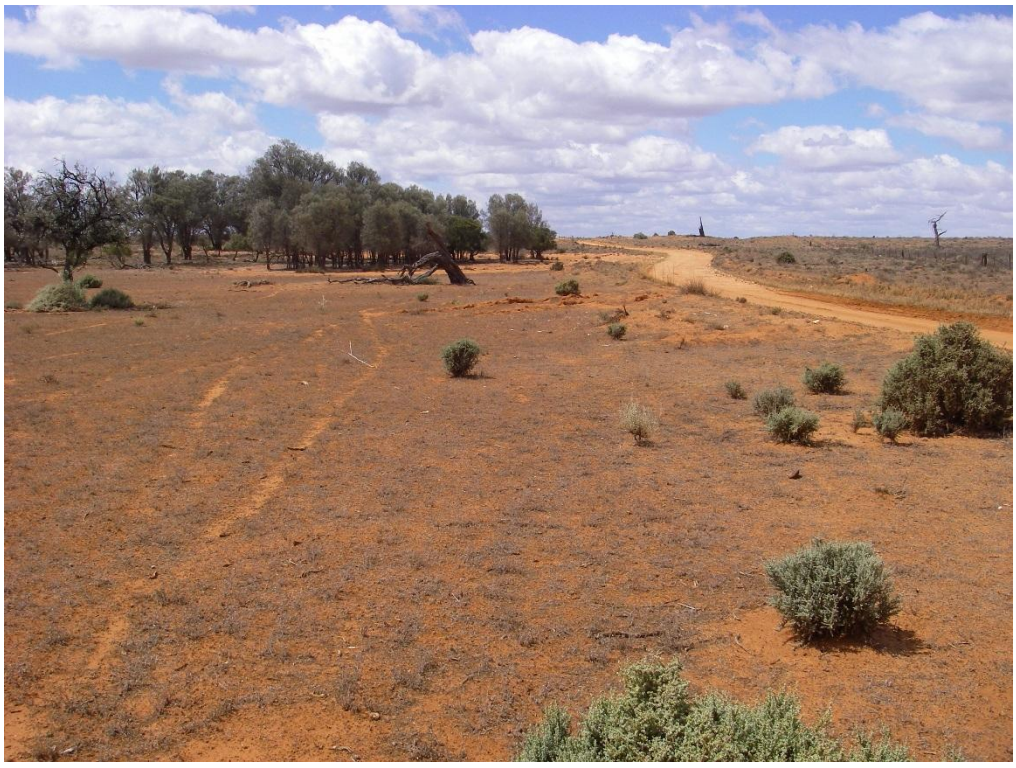

Plate 6-21: Site 20, *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus gracilis* (Yorrell) very open mallee over Chenopods (facing south)

### 6.1.1 SA Summary

A summary of the Vegetation Types encountered in the SA portion of the Study Area, and associated BCM and potential for threatened species is provided in Table 6-1.

Table 6-1: Summary of Vegetation Types along the alignment in SA

| Site | Vegetation Type | BCM | High Level Habitat Value Provided |
|---|---|---|---|
| 1 | *Eucalyptus porosa* (Mallee Box) / *E. oleosa* (Red Mallee) over *Senna artemisioides* (Desert Senna) and Chenopods. | MDBSA 3.1 Mallee with Very Open Sclerophyll / Chenopod Shrub understorey | Medium vegetation condition.<br>Roadside vegetation.<br>Minimal hollows.<br>Potential refuge / corridor habitat for threatened fauna. |
| 2 | *Eucalyptus porosa* (Mallee Box) over *Senna artemisioides* (Desert Senna) and Chenopods | MDBSA 3.1 | Medium vegetation condition.<br>Roadside vegetation.<br>Potential refuge / corridor habitat for threatened fauna. |
| 3 | *Eucalyptus porosa* (Mallee Box) / *E. oleosa* (Red Mallee) closed mallee over Chenopods | MDBSA 3.1 | Low to medium vegetation condition.<br>150 m west of alignment.<br>Sparse vegetation on low hills, which may provide refuge habitat for some threatened fauna. Confirm presence of Pygmy Blue Tongue |
| 4 | Chenopod Regrowth in cleared paddock | MDBSA 2.2 Chenopod Open Shrublands | Low to medium vegetation condition.<br>Limited value for threatened fauna. |
| 5 | *Eucalyptus oleosa* (Red Mallee) low mallee over Chenopod shrubs. | MDBSA 2.1 open mallee / low open woodland with Chenopod shrub understorey | Medium vegetation condition.<br>State threatened fauna present (White Wing Chough).<br>Old regrowth mallee / good habitat for fauna, including threatened species. |
| 6 | Chenopod low open shrubland | MDBSA 2.2 Chenopod Open Shrubland | Low vegetation condition.<br>No grasses present.<br>Limited habitat for threatened fauna. |
| 7 | *Eucalyptus oleosa* (Red Mallee) very open mallee over Chenopods | MDBSA 2.1 open mallee / low open woodland with Chenopod shrub understorey | Medium vegetation condition.<br>Moderate habitat for threatened species. |
| 8 | *Eucalyptus oleosa* (Red Mallee) open mallee over *Maireana sedifolia* (Bluebush) shrubland | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium vegetation condition.<br>Old growth mallee / good habitat for fauna including threatened species. |
| 9 | *Myoporum platycarpum* (False Sandalwood) very low open woodland over *Maireana sedifolia* (Bluebush) shrubland). | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium vegetation condition.<br>Moderate habitat, minimal overstorey, no hollows. |
| 10 | *Casuarina pauper* (Black Oak) very low woodland over *Maireana pyramidata* (Black Bluebush) open shrubland | MDBSA 1.1 open woodland with arid adapted shrubland on limestone | Medium vegetation condition.<br>Moderate habitat with heavy grazing, no hollows. |
| 11 | *Casuarina pauper* (Black Oak) very low woodland over *Maireana sedifolia* (Bluebush) low open shrubland | MDBSA 1.1 | Medium vegetation condition.<br>Moderate habitat. |
| 12 | *Nitraria billardierei* (Nitrebush) low open shrubland | MDBSA 11.6 semi-saline shrublands of river cliffs, floodplains, depressions and drainage lines | Very low vegetation condition.<br>Heavily grazed. |
| 13 | *Maireana sedifolia* (Bluebush) Low open Chenopod Shrubland | MDBSA 2.2 Chenopod open shrublands | Low to medium vegetation condition<br>Moderate habitat, with Kangaroo grazing evident |
| 14 | *Eucalyptus oleosa* (Red Mallee) open mallee over Chenopods | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium to high vegetation condition.<br>State threatened flora present.<br>Large hollows and good coverage of leaf litter, but moderate grazing.<br>Excellent threatened species habitat |

| Site | Vegetation Type | BCM | High Level Habitat Value Provided |
|---|---|---|---|
| 15 | *Eucalyptus oleosa* (Red Mallee) open mallee over Chenopods | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium to high vegetation condition<br>State threatened flora present.<br>Moderate grazing. Similar to site 14.<br>Excellent threatened species habitat |
| 16 | *Eucalyptus dumosa* (White Mallee) low mallee over *Triodia* sp. (Spinifex) hummock grassland | MDBSA 4.2 mallee with understorey dominated by Triodia on sand dunes | Medium vegetation condition.<br>Excellent habitat for threatened fauna, including Malleefowl |
| 17 | *Eucalyptus gracilis* (Yorrell) open low Mallee over *Triodia* sp. (Spinifex) hummock grassland | MDBSA 4.2 mallee with understorey dominated by Triodia on sand dunes | Medium vegetation condition<br>Contiguous with Pooginook CP.<br>Excellent habitat for threatened species<br>Unburnt mallee. |
| 18 | *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus gracilis* (Yorrell) Mallee over *Senna artemisioides* (Senna) and Chenopods | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium to high vegetation condition<br>Northern boundary of Pooginook CP and HAs, existing track<br>Long unburnt mallee, excellent habitat for threatened species |
| 19 | *Eucalyptus oleosa* (Red Mallee) Mallee over *Senna artemisioides* (Senna) and Chenopods | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium to high vegetation condition<br>Good quality habitat for threatened species |
| 20 | *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus gracilis* (Yorrell) very open mallee over Chenopods | MDBSA 2.1 Open mallee / low open mallee with Chenopod shrub understorey | Medium to low vegetation condition<br>Heavy sheep grazing<br>Some habitat for threatened species that could be avoided (e.g. stands of Black Oak). |

## 6.2 NSW Plant Community Types

Vegetation at 29 detailed sites within NSW was characterised following field survey across the NSW portion of the proposed corridor. Refer Figure 6-1 (above) for site locations. In addition, 15 Rapid Assessment sites were characterised for vegetation type and condition and representative photos and high level site characterisation desciptions are available (between Buronga substation and Murray River along the Red Cliffs spur line in NSW). The sites selected represent all of the broad vegetation and habitat types along the NSW portion of the alignment which were accessible during the site assessments (November 2018, January and March 2019). The following preliminary PCTs were identified within the field Study Area in NSW:

- 154 – Pearl Bluebush low open shrubland of the arid and semi-arid plains.
- 16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- 15 - Black Box open woodland wetland with Chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- 13 - Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone.
- 170 Chenopod Sandplain mallee woodland / shrubland of the arid and semi-arid (warm) zones.
- 171 - Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion.
- 21 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones.
- 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone.
- 221 - Black Oak - Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones.
- 155 Bluebush shrubland on stony rises and downs in the arid and semi-arid zones.

Descriptions of the vegetation associations within NSW are provided below, with representative photos.

Site 21 - *Eucalyptus oleosa* (Red Mallee) mallee over *Maireana pyramidata* (Black Bluebush)

Site 21 vegetation consists of old growth mallee on calcareous sandy interdune swales representative of PCT 170 Chenopod Sandplain mallee woodland / shrubland of the arid and semi-arid (warm) zones. The dominant overstorey species was *Eucalyptus oleosa* (Red Mallee) with *Eucalyptus dumosa* (White Mallee) also present (See Plate 6-22). The dominant understorey was *Maireana pyramidata* (Black Bluebush) with a high diversity of other Chenopods present; *Maireana pentatropis* (Erect Mallee Bluebush), *Maireana brevifolia* (Short-leaf Bluebush), *Maireana georgei* (Satiny Bluebush) and *Enchylaena tomentosa* (Ruby Saltbush). Other native species that were present included *Zygophyllum apiculatum* (Pointed Twinleaf), *Zygophyllum aurantiacum* (Shrubby Twinleaf), *Senna artemisioides coriacea* (Broad-leaf Desert Senna), *Senna art. filifolia* (Fine-leaf Desert Senna) and *Triodia sp.* (Spinifex).

No threatened flora or fauna species were observed. Common fauna observed included Raven, Chestnut-rumped Thornbill, Weebill, Spotted Pardalote, Grey-shrike Thrush, Willie Wagtail and Inland Thornbill. No weeds were observed, but there was evidence of sheep grazing (tracks and scats). *Maireana pyramidata* at the site had been heavily grazed. Preliminary condition of this site (not benchmarked against BAM assessment) is therefore considered to be medium to high, with the established mallee at the site providing clear value.

Plate 6-22: Site 21, *Eucalyptus oleosa* (Red Mallee) mallee over *Maireana pyramidata* (Black Bluebush) (facing south)

Site 22 – *Maireana sedifolia* (Pearl Bluebush) low shrubland

Site 22 is a representative site that was away from the main alignment. This site is representative of PCT 154 – Pearl Bluebush low open shrubland of the arid and semi-arid plains. The dominant understorey species was *Maireana sedifolia* (Pearl Bluebush). Other Chenopods present include *Maireana pyramidata* (Black Bluebush), *Maireana georgei* (Satiny Bluebush) and *Sclerolaena obliquicuspis* (Limestone Copperburr) (see Plate 6-23).

No threatened flora or fauna were observed. The common Australasian Pipit was present at the site. Weeds present included isolated clumps of *Carrichtera annua* (Wards Weed), *Medicago minima* (Little Medic) and *Salvia* sp. There was evidence of light grazing by Kangaroos. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be low to medium.

Plate 6-23: Site 22, *Maireana sedifolia* (Pearl Bluebush) low shrubland (facing west)

Site 23 – *Eucalyptus largiflorens* (Black Box) open woodland over Chenopods

Site 23 vegetation consists of open woodland over sandy clay / floodplain landform representative off PCT 16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion). The dominant overstorey species was *Eucalyptus largiflorens* (Black Box) (see Plate 6-24). The dominant understorey was *Enchylaena tomentosa* (Ruby Saltbush) with *Atriplex limbata* (Spreading Saltbush) and *Sclerolaena obliquicuspis* (Limestone Coppeburr) well represented. Other native species sparsely to very sparsely present included *Tetragonia tetragonoides* (Warragul Cabbage), *Salsola australis* (Tumbleweed), *Dissocarpus paradoxus* (Cannonball Burr), *Maireana brevifolia* (Short-leaved Bluebush) and *Portulaca oleracea* (Munyeroo).

No threatened flora or fauna were observed. Only one common pastoral weed was sparsely present, *Tribulus terrestris* (Caltrop). This site has existing impacts of drought and long-term heavy grazing. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be low to medium.

Plate 6-24: Site 23, *Eucalyptus largiflorens* (Black Box) open woodland over Chenopods (facing west)

Site 24 - *Eucalyptus largiflorens* (Black Box) open woodland with *Eucalyptus calmaldulensis* (River Red Gum)

Site 24 consists of Black Box open woodland / River Red Gum riparian vegetation. This site represents the PCT 13 - Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone. The dominant overstorey species present was *Eucalyptus largiflorens* (Black Box), with *Eucalyptus calmaldulensis* (River Red Gum) sub-dominant within the channel habitat. *Acacia stenophylla* (River Cooba) was dominant in the midstorey, with *Enchylaena tomentosa* (Ruby Saltbush) dominant in the understorey (see Plate 6-25). Species that were well represented in the midstorey and understorey included *Calotis sp., Einadia nutans* (Climbing Saltbush), *Disphyma crassifolium ssp. clavellatum* (Rounded Pigface), *Rhagodia spinescens* (Spiny Saltbush) and *Centipeda* sp. Some of the other native species sparely present included *Acaena* sp. (Sheep's Burr), *Cyperus* sp. (Sedge), *Alternanthera sp.* (Joyweed), *Duma florulenta* (Lignum), *Sclerolaena tricuspis* (Giant Redburr), *Marsilea drummondii* (Common Nardoo).

No threatened flora or fauna were observed. Common fauna observed included Magpie, Flycatcher, Willie Wagtail, Weebill and Magpie-lark. Only one minor weed was present, *Hypericum perforatum* (St John's Wort). Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-25: Site 24, *Eucalyptus largiflorens* (Black Box) open woodland on floodplains with *Eucalyptus calmaldulensis* (River Red Gum) in channel (facing south)

Site 25 - *Eucalyptus largiflorens* (Black Box) open woodland over Chenopod low shrubland

Site 25 vegetation consists of open woodland over Chenopod shrubland representative of PCT 15 - Black Box open woodland wetland with Chenopod understorey (see Plate 6-26). The dominant overstorey species is *Eucalyptus largiflorens* (Black Box) with *Maireana pyramidata* (Black Bluebush) and *Atriplex nummularia* (Old-man Saltbush) dominant in the understorey. Other Chenopods present included *Rhagodia spinescens* (Spiny Saltbush), *Chenopodium nitrariaceum* (Nitre Goosefoot), *Atriplex lindleyi ssp. conduplicata* (Baldoo), *Atriplex nummularia* (Tjilyi-tjilyi), *Enchylaena tomentosa* (Ruby Saltbush) and *Maireana georgei* (Satiny Bluebush). *Amyema miquelii* (Box Mistletoe) was also sparsely present.

No threatened flora or fauna species were observed. Common fauna observed include the Whistling Kite. No weeds were present, however there was evidence of historic drought, long-term dieback and regrowth in the region. There is also evidence of long term grazing pressure. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-26: Site 25, *Eucalyptus largiflorens* (Black Box) open woodland over Chenopod low shrubland (facing west)

Site 26 – Low open Chenopod shrubland with emergent *Casuarina pauper* (Black Oak)

Site 26 vegetation consists of low open Chenopod shrubland with emergent Black Oak representative of PCT 154 - Pearl Bluebush low open shrubland of the arid and semi-arid plains. The dominant understorey species present were *Maireana pyramidata* (Black Bluebush) and *Maireana sedifolia* (Pearl Bluebush), with emergent *Casuarina pauper* (Black Oak) (see Plate 6-27). Chenopods present included *Maireana georgei* (Satiny Bluebush), *Sclerolaena obliquicuspis* (Limestone Copperburr), *Sclerolaena brachyptera* (Short-winged Copperburr) and *Sclerolaena tricuspis* (Giant Redburr). Other native species present included *Tetragonia tetragonioides* (Warragul Cabbage), *Sida intricata* (Tangled Sida) and *Austrostipa sp.* (Spear Grass).

No threatened flora or fauna species were observed. No weeds were observed. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be low to medium.

Plate 6-27: Site 26, Low open Chenopod shrubland with emergent *Casuarina pauper* (Black Oak) (facing north)

Site 27 – Cleared Paddock with emergent *Casuarina pauper* (Black Oak) / *Alectryon oleifolius* (Bullock Bush)

Site 27 (similar to site 26) vegetation consists of a cleared paddock on sandy loam with emergent trees, degraded representative of PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (see Plate 6-28). The dominant understorey species was *Maireana pyramidata* (Black Bluebush) with emergent *Casuarina pauper* (Black Oak) / *Alectryon oleifolius* (Bullock Bush). *Dodonaea viscosa angustissima* (Narrow-leaf Hopbush) was also present.

No threatened flora of fauna were observed. No weeds were present, but the site has been historically cleared and there is a water pipeline easement within the road reserve. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be low.

Plate 6-28: Site 27, Cleared Paddock with emergent *Casuarina pauper* (Black Oak) / *Alectryon oleifolius* (Bullock Bush) (facing east)

Site 28 - *Eucalyptus largiflorens* (Black Box) open woodland over Chenopod low shrubland

Site 28 vegetation consists of open woodland on floodplains grading to sandy rise representative of PCT 15 - Black Box open woodland wetland with Chenopod understorey (see Plate 6-29). The dominant overstorey species is *Eucalyptus largiflorens* (Black Box) with *Acacia victoriae* (Elegant Wattle) present in the midstorey. The dominant understorey species is *Maireana pyramidata* (Black Bluebush) with *Sclerolaena diacantha* (Horned Bassia), *Rhagodia spinescens* (Spiny Saltbush) and *Enchylaena tomentosa* (Ruby Saltbush) also well represented. Other native species present include *Enneapogon avenaceus* (Oat Nine Awn), *Vittadinia sp.* (Daisy), *Nicotiana sp.* (Tobacco-bush) and *Boerhavia dominii* (Tar-vine).

No threatened flora or fauna species were observed. Weeds present in the road side sections only, includes *Salvia sp.* and *Asphodelus fistulosus* (Onion Weed). Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be low (within roadside) and medium elsewhere.

Plate 6-29: Site 28, *Eucalyptus largiflorens* (Black Box) open woodland over Chenopod low shrubland (facing west)

Site 29 - *Eucalyptus largiflorens* (Black Box), *Casuarina pauper* (Black Oak) + *Eucalyptus dumosa* (White Mallee) open woodland with a grassy understorey

Site 29 vegetation consists of open woodland with a grassy understorey which may be a representative of PCT 16 - Black Box grassy open woodland wetland of rarely flooded depressions. The dominant overstorey species are *Eucalyptus largiflorens* (Black Box) and *Casuarina pauper* (Black Oak) with *Eucalyptus dumosa* (White Mallee) also present (see Plate 6-30). The dominant understorey species is *Maireana brevifolia* (Short-leaved Bluebush) and *Enteropogon acicularis* (Curly Windmill Grass). Other native species present include *Rytidosperma sp.* (Wallaby Grass), *Austrostipa sp.* (Spear Grass), *Sida intricata* (Tangled Sida), *Atriplex angulata* (Angular Saltbush), *Dissocarpus paradoxus* (Cannonball Burr) and *Vittadinia gracilis* (Woolly New Holland Daisy).

No threatened flora or fauna were observed. Weeds present included *Salvia sp.* (Wild Sage), *Asphodelus fistulosus* (Onion Weed) and *Elymus repens* (Couch). This site was grazed, bare soils present and show effects of wind erosion. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be low to medium.

Plate 6-30: Site 29, *Eucalyptus largiflorens* (Black Box), *Casuarina pauper* (Black Oak) + *Eucalyptus dumosa* (White Mallee) open woodland with a grassy understorey (facing east)

Site 30 - *Alectryon oleifolius* (Bullock Bush) / *Casuarina pauper* (Black Oak) very low open woodland over tussock grassland

Site 30 vegetation consists of very low open woodland over tussock grassland on loamy sand representative of PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (see Plate 6-31). This site is located off the alignment but is a representative site. The dominant overstorey species is *Alectryon oleifolius* (Bullock Bush), with *Casuarina pauper* (Black Oak) also present. The understorey is dominated by tussock grassland of *Austrostipa sp.* (Spear Grass) and *Enneapogon avenaceus* (Oat Nine-awn). Chenopods present include *Atriplex stipitata* (Kidney Saltbush), *Sclerolaena obliquicuspis (*Limestone Copperburr), *Maireana brevifolia* (Short-leaf Bluebush) and *Dissocarpus paradoxus* (Cannonball Burr).

No threatened flora or fauna species were observed. Weeds present included *Carrichtera annua* (Ward's Weed), *Asphodelus fistulosus* (Onion Weed) and *Heliotrope sp.* (Potato Weed). Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

May need to confirm that the *Austrostipa* is not the threatened species *Austrostipa nullanulla*, however given the records within the Study Area are greater than 20 km north of Lake Victoria and 250 km NW of the site it is unlikely.

Plate 6-31 :Site 30, *Alectryon oleifolius* (Bullock Bush) / *Casuarina pauper* (Black Oak) very low open woodland over tussock grassland (facing east)

Site 31 – *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus dumosa* (White Mallee) mallee over Chenopod / *Triodia*

Site 31 vegetation consists of mallee on sandplain over Chenopod and *Triodia sp* (see Plate 6-32). This site is likely a representative of PCT 171 - Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. The dominant overstorey species is *Eucalyptus oleosa* (Red Mallee) and *Eucalyptus dumosa* (Dumosa Mallee / White Mallee) with *Eucalyptus gracilis* (White Mallee) and *Eucalyptus sp.* also present. *Pittosporum angustifolium* (Native Apricot) and *Acacia oswaldii* (Umbrella Bush) are present in the midstorey. The dominant understorey species are *Atriplex stipitata* (Kidney Saltbush) and *Enchylaena tomentosa* (Ruby Saltbush). Other Chenopods present include *Maireana brevifolia* (Short-leaf Bluebush), *Dissocarpus paradoxus* (Cannonball Burr) and *Sclerolaena obliquicuspis* (Limestone Copperburr). Other native species present include *Triodia sp.* and *Austrostipa sp.*

No threatened flora or fauna were observed. One exotic flora specie was present, *Carricatera annua* (Wards Weed). Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium to high.

Plate 6-32: Site 31, *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus dumosa* (White Mallee) closed mallee over Chenopods / *Triodia* (Spinifex) (facing south)

Site 40 - *Eucalyptus oleosa* (Red Mallee) / *Casuarina pauper* (Blackoak) over and Chenopods on sand plains.

Site 40 is comprised of remnant native vegetation approximately 0.6km north west of Buronga substation and the vegetation community is consistent with PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones transition with PCT 21 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones. Sand plains with *Eucalyptus oleosa* mallee and *Casuarina pauper* (Blackoak) dominating the overstorey with scattered individual *Callitris gracilis* (Murray Pine) and *Myoporum platycarpum* (False Sandalwood) also present in the overstorey. Chenopod shrubs and low shrubs dominate the understorey with *Rhagodia spinescens* (Thorny Saltbush), *Enchylaena tomentosa* (Ruby Saltbush) and *Sclerolaena obliquicuspis* (Limestone Copperburr) recorded.

No threatened flora or fauna were observed within this community. Weed species were mainly confined to the existing cleared easement and include Onion Weed (*Asphodelus fistulosus*), Wild Sage (*Salvia verbenaca*) and Camel Melon (*Citrullus lanatus*). Large and small tree hollows were sparsely present in Red Mallee trees. Preliminary vegetation condition was considered to be medium, however this has not been compared to benchmarks at this stage.

Plate 6-33: Site 40, *Eucalyptus oleosa* (Red Mallee) / *Casuarina pauper* (Blackoak) over and Chenopods on sand plains

Site 41 - *Eucalyptus socialis* (Summer Red Mallee) / *E. leptophylla* (Narrow-leaved Mallee) mallee over *Triodia scariosa* (Spinifex) on low dunes.

Site 41 is comprised of remnant native vegetation approximately 4.8 km north west of Buronga substation and the vegetation community is likely to be consistent with PCT 171 - Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. This site is approximately 30 years post fire.

Low sand dunes and sandy swales with *Eucalyptus socialis* (Summer Red Mallee) and *E. leptophylla* (Narrow-leaved Mallee) with scattered *Pittosporum angustifolium* (Native Apricot). *Triodia scariosa* (Spinifex) hummock grassland dominates the understorey with scattered *Lomandra effusa* (Scented Mat-rush) and *Enchylaena tomentosa* (Ruby Saltbush) also recorded (Plate 6-34).

No threatened flora or fauna were observed within this community and no weed species were recorded. No tree hollows were recorded at this site. There was evidence of rabbits at the site. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium to high.

Plate 6-34: Site 41, *Eucalyptus socialis* (Summer Red Mallee) and *E. leptophylla* (Narrow-leaved Mallee) over *Triodia scariosa* (Spinifex) hummock grassland (facing west)

Site 42 - *Casuarina pauper* (Black Oak) low open woodland over and Chenopods on sand plains

Site 42 is comprised of remnant native vegetation approximately 7 km north west of Buronga substation and the vegetation community is consistent with PCT 221 - Black Oak - Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones.

Sand plains with *Casuarina pauper* (Black Oak) low open woodland over Chenopod shrubs and low shrubs understorey including *Enchylaena tomentosa* (Ruby Saltbush), *Rhagodia spinescens* (Thorny Saltbush) and *M. pyramidata* (Blackbush) recorded (Plate 6-35). *Maireana sedifolia* (Pearl Bluebush) was sparsely present in this community.

No threatened flora or fauna were observed within this community and scattered small tree hollows were recorded at this site. The introduced herb Match-head Plant (*Psilocaulon tenue*) was common in the understorey. There was also evidence of rabbits at the site. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-35: Site 42, *Casuarina pauper* (Black Oak) low open woodland over Chenopod shrubs and low shrubs (facing west)

Site 43 - *Eucalyptus gracilis* (Yorrell) / *E. socialis* (Summer Red-mallee) over Chenopod low open shrubland on sandy plains.

Site 43 is comprised of remnant native vegetation approximately 12.5 km north west of Buronga substation and the vegetation community is consistent with PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones.

Sand plains with *Eucalyptus gracilis* (Yorrell) and *E. socialis* (Summer Red-mallee) dominating the overstorey with scattered medium height shrubs including *Dodonaea viscosa* ssp. *angustissima* (Sticky Hopbush) and *Senna artemisioides* ssp. *platypoda* (Desert Cassia) with *Maireana pentatropis* (Erect Mallee Bluebush), *Zygophyllum apiculatum* (Common Twin-leaf) and *Chenopodium desertorum* (Desert Goosefoot) common in the understorey.

No threatened flora or fauna were observed within this community and no weed species were recorded. Small tree hollows were sparsely present in mallee trees. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium to high.

Plate 6-36: Site 43, *Eucalyptus gracilis* (Yorrell) / *E. socialis* (Summer Red-mallee) over Chenopd low open shrubland on sandy plains

Site 44 - *Eucalyptus socialis* (Summer Red Mallee) +/- *Codonocarpus cotinifolius* (Desert Poplar) over *Triodia scariosa* (Spinifex) on low dunes.

Site 44 is comprised of remnant native vegetation approximately 16 km north west of Buronga substation and the vegetation community is consistent with PCT 171 - Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion.

Low sand dunes and sandy swales with *Eucalyptus socialis* (Summer Red Mallee) with emergent *Codonocarpus cotinifolia* (Desert Poplar) with scattered *Dodonaea viscosa ssp angustissima* (Sticky Hopbush) (see Plate 6-37). *Triodia scariosa* (Spinifex) hummock grassland dominates the understorey with scattered *Lomandra leucocephala* (Woolly headed Mat-rush) and *Halgania cyanea* (Blue Mallee-flower) also recorded.

This community is prone to regular burning from wildfires and it was estimated that the site was burnt approximately 15 years ago. No threatened flora or fauna were observed within this community and no tree hollows were present. The introduced herb Match-head Plant (*Psilocaulon tenue*) was common in the understorey. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-37: Site 44, *Eucalyptus socialis* (Summer Red Mallee) +/- *Codonocarpus cotinifolius* (Desert Poplar) over *Triodia scariosa* (Spinifex) on low dunes (facing west)

Site 45 - *Eucalyptus oleosa* (Red Mallee) very low open woodland over *Maireana pyramidata* (Blackbush) low open shrubland on sand plains.

Site 45 is located in remnant native vegetation approximately 20 km north west of Buronga substation and the vegetation community is consistent with PCT 170 - Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones.

Sand plains with *Eucalyptus oleosa* (Red Mallee) and *Maireana pyramidata* (Blackbush) low open shrubland dominating the understorey (see Plate 6-38). Other understorey shrubs include *M. brevifolia* (Yanga Bush) and *Dissocarpus paradoxus* (Cannonball) with the woody forb *Sclerolaena obliquicuspis* (Limestone Copperburr) also common.

No threatened flora or fauna were observed within this community. Large and small tree hollows were sparsely present within Red Mallee. The introduced herb Match-head Plant (*Psilocaulon tenue*) was common in the understorey.

This vegetation community (old growth mallee) is similar to site 40 however Blackbush is more dominant and widespread in the understorey in Site 45, compared to Site 40. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-38: Site 45, *Eucalyptus oleosa* (Red Mallee) over *Maireana pyramidata* (Blackbush) low open shrubland on sand plains

Site 46 – *Maireana pyramidata* (Blackbush) low open shrubland on loamy plains

Site 46 is located in remnant native vegetation approximately 22 km north west of Buronga substation and the vegetation community is consistent with PCT155 - Bluebush shrubland on stony rises and downs in the arid and semi-arid zones

Plains with sandy clay loam soils supporting *Maireana pyramidata* low open shrubland with scattered *M. brevifolia* (Yanga Bush), *Dissocarpus paradoxus* (Cannonball), *Enneapogon avenaceus* (Oatgrass) and *Sida fibulifera* (Pin Sida) (Plate 6-39).

No threatened flora or fauna were observed within this community and as a treeless association, no hollows were present. No weed species were recorded. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-39: Site 46, *Maireana pyramidata* (Blackbush) low open shrubland on sandy clay loam plains (facing north west)

Site 47 – *Eucalyptus largiflorens* (Black Box) low open woodland over *Maireana pyramidata* (Blackbush, Black Bluebush) low open shrubland on alluvial plains

Site 47 is located in remnant native vegetation approximately 29 km north west of Buronga substation and the vegetation community is consistent with PCT 15 - Black Box open woodland wetland with Chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).

Infrequently flooded alluvial plains with sandy clay loam soils supporting *Eucalyptus largiflorens* (Black Box) over *Maireana pyramidata* (Blackbush/Black Bluebush) low open shrubland (see Plate 6-40). Scattered *M. brevifolia* (Yanga Bush) and *Enchylaena tomentosa* (Ruby Saltbush) were also recorded.

No threatened flora or fauna were observed within this community, however the Black Box overstorey is predominantly old growth and large and small tree hollows are common. The introduced herb Match-head Plant (*Psilocaulon tenue*) was common in the understorey. Preliminary estimate of vegetation condition is medium to high (not compared to benchmark).

Plate 6-40: Site 47, *Eucalyptus largiflorens* (Black Box) over *Maireana pyramidata* (Blackbush/Black Bluebush) low open shrubland on infrequently flooded alluvial plains (facing south east)

Site 48 – *Eucalyptus camaldulensis* (River Red Gum) +/- *E largiflorens* (Black Box) open forest on banks of the Darling River

Site 48 is located in remnant native vegetation approximately 36 km north west of Buronga substation on the eastern bank of the Darling River. This vegetation community is likely consistent with PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) and transition to PCT 13 - Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).

River bank and adjacent floodplain with *Eucalyptus camaldulensis* (River Red Gum) +/- *E largiflorens* (Black Box) open forest with scattered *Acacia stenophylla* (River Cooba) and *Duma florulenta* (Lignum) in the midstorey (see Plate 6-41). Understorey species include *Rhagodia spinescens* (Thorny Saltbush) *Stemodia floribunda* (Blue Rod) and *Ficinia nodosa* (Knotty Club Rush).

No threatened flora or fauna were observed within this community however the River Red Gum and Black Box overstorey is predominantly old growth and large and small tree hollows are common. The introduced herb Match-head Plant (*Psilocaulon tenue*) was common in the understorey. Scattered *Opuntia spp* (Wheel Cactus) were recorded in this community but off the site. Preliminary vegetation condition score is high (not compared against benchmark).

Plate 6-41: Site 48, *Eucalyptus camaldulensis* (River Red Gum) +/- *E. largiflorens* (Black Box) over *Duma florulenta* (Lignum) on the banks of the Darling River (facing south).

Site 52 – *Eucalyptus largiflorens* (Black Box) woodland on the banks of the Murray River

Site 52 is located in remnant native vegetation approximately 20 km south of the Buronga substation on private land, within an existing Transgrid easement on the north-eastern bank of the River Murray (refer Plate 6-42 below). This vegetation community is consistent with PCT 13 Black-box Lignum Woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).

*E. largiflorens* (Black Box) is the dominant overstorey, with *Eucalyptus camaldulensis* (River Red Gum) present along the banks only. *Acacia stenophylla* (River Cooba) is present in the mid-storey, more dominant near the river bank and *Duma florulenta* (Lignum) is dominant in the mid-storey across the floodplain. Other shrubs present include *Rhagodia spinescens* (Hedge or Thorny Saltbush), *Enchylaena tomentosa* (Ruby Saltbush), *Maireana brevifolia* (Short-leaf Bluebush), and *Disphyma crassifolium subsp. Clavellatum* (Rounded Noon-flower). Minor stands of *Phragmites* were present along the edge of the bank.

No threatened flora or fauna were observed within this community. Common species observed included Yellow Rosella (*Platycercus elegans flaveolus*), Crested Pigeon (*Platycercus elegans flaveolus*), Red-rumped Parrots (*Psephotus haematonotus*) and Mulga Parrots *(Psephotus varius*). Small hollows were present in the Black Box trees and medium hollows in the few River Red Gum that were present at the river bank. River bank habitat would provide habitat for the EPBC listed Growling Grass Frog / Southern Bell Frog (*Litoria raniformis*), if present, however the extent of this habitat is less than the habitat on the opposite bank in the Victorian Kings Billabong Wildlife Reserve. Sparse litter was present in the understory and Black box trees presented greater than 25% dieback. Two eagle nests were observed within separate lattice towers of the existing transmission line. Whilst no eagles were present, anecdotal evidence (Transgrid) suggests these are Wedge-tailed Eagle nests. A pair of Wedge-tailed Eagles were also observed further north of the site (across the highway), sitting within a lattice tower with no nest in an area of the easement that is grazed / ploughed and only contains exotic vegetation (e.g. Onion Weed).

Scattered *Opuntia* sp. (Prickly Pear) and sparse *Lycium ferocissimum* (African Boxthorn) both Weeds of National Significance (WONs) were also present in this community. There was evidence of moderate grazing and presence of Rabbits. Preliminary vegetation score is moderate (not compared against benchmark).

Plate 6-42: Site 52, *Eucalyptus largiflorens* (Black Box) woodland on the banks of the Murray River (facing south / river)

Plate 6-43: Site 52, *Eucalyptus largiflorens* (Black Box) woodland on the banks of the Murray River (facing west)

Site 53 - Patch of *Disphyma crassifolium* subsp*. clavellatum* (Rounded Noon-flower)

This site was an open area within the Transgrid easement. Rounded Noon-flower was the dominant species in the groundstorey, and the area was surrounded by moderate condition Black Box Woodland (Plate 6-44).

Plate 6-44: Patch of *Disphyma crassifolium subsp. Clavellatum (Rounded Non-flower)*

Site 54 – *Eucalyptus largiflorens* (Black Box) very open woodland over Chenopods

Site 54 comprises heavily grazed Black Box Woodland over Chenopods (refer Plate 6-45), consistent with PCT 13. Mid-storey species present at this site included Duma florulenta (Lignum) and *Nitraria billardieri* (Nitre Bush) and or *Chenopodium nitrariacea* (Nitre-Goosefoot). Species present in the heavily grazed understorey included *Rhagodia spinescens* (Thorny Saltbush), *Eremophila divaricata* ssp*. divaricate* (Spreading Emu Bush), *Enchylaena tomentosa* (Ruby Saltbush), *Atriplex lindleyi* (Flat-top Saltbush), *Maireana radiata* (Grey Bluebush), and *Disphyma crassifolium* ssp*. clavellatum* (Rounded Noon-flower).

No threatened flora or fauna observed at this site. Common species recorded included Psephotus haematonotus (Red-rumped Parrot) and Manorina sp. (Miner birds). Black Box trees exhibited die back and there was a large number of dead trees.

Scattered *Opuntia sp*. (Prickly Pear, a WONs) was present. There was evidence of heavy grazing and Rabbit activity. Preliminary vegetation score is poor (not compared against benchmark).

Plate 6-45: Site 54, Heavily grazed *Eucalyptus largiflorens* (Black Box) very open woodland over Chenopods

Site 55 – Patch of *Dodonaea angustissima (Narrow-leaf Hopbush) +/- Callitris gracilis ssp. murrayensis* (Slender Cypress-pine) on sandy ridge

Site 55 comprised a remnant patch of *Dodonaea angustissima* (Narrow-leaf Hopbush) +/- *Callitris gracilis ssp. murrayensis* (Slender Cypress-Pine) on a sandy ridge to the west of the Transgrid easement (refer Plate 6-46). This vegetation association is consistent with PCT 21 – Slender Cypress Pine – Sugarwood – Western Rosewood Open Woodland on sandy rises mainly in the Riverina Bioregion and Murray Darling Depression Bioregion. East of this site is a quarry / borrow pit, north is grazed / fallowed land and south is very open Black Box Woodland. The midstorey also comprises *Acacia nyssophylla* or *Acacia colletioides* (Wait-a-while / Spine Bush), *Santalum lanceolatum* (Native Plum), *Pittosporum angustifolium* (Native Apricot) and *Exocarpus aphylla* (Leafless Cherry) was sparsely present. *Rhagodia spinescens* and *Enchylaena tomentosa* were present but heavily grazed. Preliminary vegetation score is poor to moderate (not compared against benchmark).

No threatened flora or fauna observed. Extensive rabbit burrows and heavy grazing present. No leaf litter or hollows in the trees that are present and bare earth is extensive. Common weeds present include *Heliotrope europaeum* (Common Heliotrope).

Note, between this site and the highway, vegetation is heavily grazed Chenopod shrubland with emergent (Sweet Quandong) over red sand. The dominant Chenopod that is present is *Enchylaena tomentosa* (refer Plate 6-47).

A mix of native and exotic flora species were also present in the roadside vegetation, including a common mistletoe species, Harlequin Mistletoe (*Lysiana exocarpi*) (refer Plate 6-48) and *Pittosporum angustifolium* (Native Apricot).

Plate 6-46: Site 55, patch of *Dodonaea angustissima* (Narrow-leaf Hopbush) +/- *Callitris gracilis ssp. murrayensis* (Slender Cypress-pine) on sandy ridge (facing west)

Plate 6-47: North of site 55, Heavily grazed Chenopod Shrubland with emergent Sweet Quandong

Plate 6-48: Roadside (north of site 55), *Lysiana exocarpi* (Harlequin Mistletoe), common species

Site 56 - *Eucalyptus socialis* (Summer Red Mallee) / *E. leptophylla* (Narrow-leaved Mallee) open mallee over *Triodia scariosa* (Spinifex) on low dunes

Site 56 comprised remnant mallee (*Eucalyptus socialis* (Summer Red Mallee) / *E. leptophylla* (Narrow-leaved Mallee) over *Triodia scariosa* (Spinifex) on sandy soils (Plate 6-49). This vegetation community is consistent with PCT 171 – Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. *Heterodendrum oleifolium* (Bullock Bush / Rosewood) and scattered *Santalum lanceolatum* (Native Plum) were also present in the midstorey. Other species present in the groundstorey included *Enchylaena tomentosa* (Ruby Saltbush), *Sclerolaena sp. Maireana pentatropis* (Erect Mallee Bluebush) and *Eragrostis sp.* (Love-grass).

This vegetation is extensive along the section of the transmission line easement, alternating between dunes and plains and intersected by cleared / fallowed areas.

No threatened flora or fauna observed, however large connected patches of this habitat would suit several threatened species (e.g. Malleefowl, Red-lored Whistler, Bats). A juvenile Grey Butcher Bird (*Cracticus torquatus*) and Miner birds (*Manorina* sp.) were observed. Sparse leaf litter and small hollows were present. Little or no weeds or evidence of grazing / rabbits. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium to high.

Plate 6-49: Sit 56, *Eucalyptus socialis* (Summer Red Mallee) / *E. leptophylla* (Narrow-leaved Mallee) open mallee over *Triodia scariosa* (Spinifex) on low dunes (facing west)

Site 57 – *Eucalyptus oleosa* (Oil Mallee) / *E. dumosa* (White Mallee) very open mallee

Site 57 was located south of the Buronga Substation and comprised remnant vegetation with dominant mallee species such as *Eucalyptus oleosa* (Oil Mallee) and *E. dumosa* (White Mallee) with *Callitris gracilis murrayensis* (Slender Cypress-Pine), *Casuarina pauper* (Black Oak) and *Alectryon oleifolium* (Bullock Bush / Rosewood) also present in the overstorey (refer Plate 6-50). Midstorey species sparsely present include *Santalum acuminatum* (Sweet Quandong), *Acacia nyssophylla* (Wait-a-while) and *Dodonaea angustissima.* Heavily grazed groundstorey species included *Dissocarpus paradoxus* (Cannonball Burr), *Sida* spp., *Rhagodia* sp. and *Zygophilum apiculatum* (Pointed Twin-leaf).

No threatened flora or fauna were observed. Common fauna present included *Barnardius zonarius* (Mallee Ring-neck Parrot), *Pardalotus* sp. and *Manorina* sp. (Miner Birds). Small hollows and very sparse leaf litter is present. The site has been historically cleared for grazing and there is current grazing activity. Common weeds that were present included *Asphodelus fistulosa* (Onion Weed) and *Heliotrope europaeum* (Common Heliotrope). Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be poor to medium.

Plate 6-50: Site 57, *Eucalyptus oleosa* (Oil Mallee) / *E. dumosa* (White Mallee) very open mallee (facing west)

### 6.2.1 NSW Summary

A summary of the Vegetation Types encountered in the NSW portion of the Study Area, and associated PCTS and potential for threatened species is provided in Table 6-2.

Table 6-2: Summary of Vegetation Types along the alignment in NSW

| Site | Vegetation Type | High level PCT | Value provided / Habitat for threatened Sp. |
|---|---|---|---|
| 21 | *Eucalyptus oleosa* (Red Mallee) mallee over *Maireana pyramidata* (Black Bluebush) | 170: Chenopod Sandplain mallee woodland / shrubland of the arid and semi-arid (warm) zones. | Medium to High vegetation condition<br>Heavily grazed, old-growth mallee would provide habitat for threatened species. |
| 22 | *Maireana sedifolia* (Pearl Bluebush) low shrubland | 154: Pearl Bluebush low open shrubland of the arid and semi-arid plains. | Low to medium vegetation condition (representative site away from alignment)<br>Moderate fauna habitat. |
| 23 | *Eucalyptus largiflorens* (Black Box) open woodland over Chenopods | 16: Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion). | Low to medium vegetation condition<br>Drought impacts / long term grazing, but good habitat for Regent Parrot and other hollow dwelling threatened fauna. |

| Site | Vegetation Type | High level PCT | Value provided / Habitat for threatened Sp. |
|---|---|---|---|
| 24 | *Eucalyptus largiflorens* (Black Box) open woodland with *Eucalyptus calmaldulensis* (River Red Gum) | 13: Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone. | Medium vegetation condition Riparian. Good habitat for Regent Parrot and other hollow dwelling threatened fauna. |
| Site 25 | *Eucalyptus largiflorens* (Black Box) open woodland over Chenopod low shrubland | 15: Black Box open woodland wetland with Chenopod understorey | Medium vegetation condition Long-term grazing pressure, but good habitat for Regent Parrot and other hollow dwelling fauna. |
| Site 26 | Low open Chenopod shrubland with emergent *Casuarina pauper* (Black Oak) | 154: Pearl Bluebush low open shrubland of the arid and semi-arid plains. | Low to medium vegetation condition Chenopod habitat. |
| Site 27 | Cleared Paddock with emergent *Casuarina pauper* (Black Oak) / *Alectryon oleifolius* (Bullock Bush) | 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones | Low vegetation condition Cleared paddock / Chenopod habitat. |
| Site 28 | *Eucalyptus largiflorens* (Black Box) open woodland over Chenopod low shrubland | 15: Black Box open woodland wetland with Chenopod understorey | Medium vegetation condition Floodplain habitat for Regent Parrot and other hollow dwelling threatened fauna. |
| Site 29 | *Eucalyptus largiflorens* (Black Box), *Casuarina pauper* (Black Oak) + *Eucalyptus dumosa* (White Mallee) open woodland with a grassy understorey | 16: Black Box grassy open woodland wetland of rarely flooded depressions. | Low to medium vegetation condition Grassy. Grazed, but good habitat for Regent Parrot and hollow dwelling fauna. |
| Site 30 | *Alectryon oleifolius* (Bullock Bush) / *Casuarina pauper* (Black Oak) very low open woodland over tussock grassland | 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones. | Medium vegetation condition Habitat for species that prefer Casuarina / tussock grass |
| Site 31 | *Eucalyptus oleosa* (Red Mallee) / *Eucalyptus dumosa* (White Mallee) mallee over Chenopod / *Triodia* | 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. | Medium to high vegetation condition excellent Mallee, spinifex, malleefowl habitat |
| Site 40 | *Eucalyptus oleosa* (Red Mallee) / *Casuarina pauper* (Blackoak) over and Chenopods on sand plains. | 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones, and transition with 21: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones | Medium vegetation condition Remnant vegetation with large and small hollows. Good habitat. |
| Site 41 | *Eucalyptus socialis* (Summer Red Mallee) / *E. leptophylla* (Narrow-leaved Mallee) mallee over *Triodia scariosa* (Spinifex) on low dunes | 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. | Medium to high vegetation condition Old growth, 30 year post fire, potential habitat for malleefowl, black-eared miner, red-lored whistler |
| Site 42 | *Casuarina pauper* (Blackoak) low open woodland over and Chenopods on sand plains | 221: Black Oak - Pearl Bluebush open woodland of the sandplains of the semi-arid warm and arid climate zones | Medium condition vegetation Remnant, good habitat for threatened species. |
| Site 43 | *Eucalyptus gracilis (*Yorrell*) / E. socialis (Summer Red-mallee) over Chenopod low open shrubland on sandy plains.* | 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones | Medium to high vegetation condition Good habitat for fauna |
| Site 44 | *Eucalyptus socialis* (Summer Red Mallee) +/- *Codonocarpus cotinifolius* (Desert Poplar) over *Triodia scariosa* (Spinifex) on low dunes. | 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. | Medium vegetation condition Spinifex dunes, no hollows, unburnt 15 years, Malleefowl habitat and other fauna |
| Site 45 | *Eucalyptus oleosa* (Red Mallee) very low open woodland over *Maireana pyramidata* (Blackbush) low open shrubland on sand plains. | 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones. | Medium vegetation condition Remnant, old growth mallee Habitat for threatened birds and bats |
| Site 46 | *Maireana pyramidata* (Blackbush) low open shrubland on loamy plains | 155: Bluebush shrubland on stony rises and downs in the arid and semi-arid zones | Medium vegetation condition No hollows, Chenopod habitat |
| Site 47 | *Eucalyptus largiflorens* (Black Box) low open woodland over *Maireana pyramidata* | 15: Black Box open woodland wetland with Chenopod understorey mainly on the outer floodplains in south-western NSW | Medium to High vegetation condition Old growth, large and small |

| Site | Vegetation Type | High level PCT | Value provided / Habitat for threatened Sp. |
|---|---|---|---|
| | (Blackbush, Black Bluebush) low open shrubland on alluvial plains | | hollows, high veg condition, Regent Parrot habitat and other hollow dwelling fauna (e.g. bats). |
| Site 48 | *Eucalyptus camaldulensis* (River Red Gum) +/- *E largiflorens* (Black Box) open forest on banks of the Darling River | 11: River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone, and transition to<br>13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion). | High vegetation condition Riverbank, old growth, lots of hollows. Potential for threatened bats / Regent Parrot in trees and frogs in reeds / sedges, slow moving areas. |
| 52 | *Eucalyptus largiflorens (*Black Box) woodland on the banks of the Murray River | 13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion). | Moderate vegetation condition. Riverbank / floodplain vegetation, small hollows present. Prickly Pear WoNS. Moderate grazing. |
| 53 | Patch of *Disphyma crassifolium subsp. Clavellatum* (Rounded Noon-flower) | Part of the above community, vegetation is dominant in cleared area within easement. | Homogenous patch of native vegetation within easement. |
| 54 | *Eucalyptus largiflorens* (Black Box) very open woodland over Chenopods | 15: Black Box open woodland wetland with Chenopod understorey mainly on the outer floodplains in south-western NSW | Poor vegetation condition. Dead trees / die back, heavily grazed plus rabbit activity. |
| 55 | *Patch of Dodonaea angustissima* (Narrow-leaf Hopbush) +/- *Callitris gracilis ssp. murrayensis (*Slender Cypress-pine) on sandy ridge | PCT 21 – Slender Cypress Pine – Sugarwood – Western Rosewood Open Woodland on sandy rises mainly in the Riverina Bioregion and Murray Darling Depression Bioregion. | Moderate vegetation condition. Extensive rabbit burrows and heavy grazing. |
| 56 | *Eucalyptus socialis* (Summer Red Mallee) / *E. leptophylla* (Narrow-leaved Mallee) open mallee over *Triodia scariosa* (Spinifex) on low dunes. | 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion. | Moderate to high vegetation condition. Habitat would suit threatened species, where there are extensive patches or patches have connectivity. |

## 6.3 VIC Ecological Vegetation Classes

Site 50 - *Eucalyptus largiflorens* (Black Box) low open forest

Site 50 was located within the easement adjacent the Red Cliffs Substation with the Kings Billabong Wildlife Reserve of Victoria. The vegetation comprised *Eucalyptus largiflorens* (Black Box) low open forest over Chenopods (refer Plate 6-51). This community is classified as EVC Riverine Chenopod Woodland. Species dominant in the midstorey included *Senna artemisioides spp. Coriacea* (Silver Cassia), *Dodonaea angustissima* (Narrow-leaf Hopbush), *Acacia oswaldii* (Umbrella Wattle), *Atriplex nummularia* (Old-Man Saltbush), *Chenopodium nitrariaceum* (Nitre Goosefoot) and *Duma florulenta* (Lignum). Understory species included *Eremophila divaricata* (Spreading Emu Bush), *Rhagodia spinescens* (Spiny Saltbush), *Maireana brevifolia* (Short-leaved Bluebush) and *Disphyma crassifolium* (Rounded Noon-flower). *Lysiana exocarpi* (Harleqluin Mistletoe) was also present amongst the Black Box Trees.

No threatened flora, fauna or communities (TEC) were observed at this site. The site provided moderate habitat for fauna in general with sparse leaf litter and small hollows present. There was evidence of fox and rabbit presence, and numerous tracks as the reserve is used for recreational fishing and camping. WONs Prickly Pear and Boxthorn were sparsely present at the site. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-51: Site 50, *Eucalyptus largiflorens* (Black Box) low open forest (facing east)

Site 51 – Semi-arid Chenopod Woodland Patch

Site 51 occurs within the existing easement on a sandy rise, surrounded by Black-box Woodland. Similar species to those that occur within the adjacent Black Box Woodland are present, however *Acacia stenophylla* (River Cooba) is dominant, along with *Hakea leucoptera* (Silver Needwood). This community is consistent with EVC Semi-arid Woodland to Semi-arid Chenopod Woodland. Other species present include *Eucalyptus calmaldulensis* (River Red Gum) in a minor drainage line at the base of the rise, and midstorey species such as *Dodonaea angustissima* (Narrow-leaf Hopbush), *Olearia pimeloides* (Pimelea Daisy-bush), *Rhagodia*

*spinescens, Chenopodium nitrariaceum* (Nitre Goosefoot), *Enchylaena tomentosa* (Ruby Saltbush) and *Maireana brevifolia* (Short-leaved Bluebush) are also present.

No threatened fauna or flora were observed. Common fauna species recorded including *Dacelo novaeguineae* (Kookaburra), *Corcorax melanorhamphos* (White Wing Chough), *Ocyphaps lophotes* (Crested Pigeon) and *Coracina novaehollandiae* (Black-faced Cuckoo Shrike). Similar to the adjacent habitat, WoNS Prickly Pear is sparsely present and there is evidence of rabbit activity. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium.

Plate 6-52: Site 51, Semi-arid Chenopod Woodland Patch (facing west)

Site 58 – Lignum (*Duma florulenta*) Shrubland

Site 58 occurs within the Kings Billabong Wildlife Reserve adjacent the southern bank of the Murray River, where the existing Victorian section of the transmission line runs to the Red Cliffs substation. The vegetation at this site is Lignum Shrubland (*Duma florulenta*) and includes live River Red Gum (*Eucalyptus calmaldulensis*) and *Phragmites australis* (Common Reed) along the river bank and dead River Red Gum on the floodplain amongst the Lignum (refer Plate 6-53 and Plate 6-54). Large hollows suitable for Regent Parrot occur in both the dead and live River Red Gum. Other species present amongst the Lignum include very sparse *Acacia stenophylla* (River Cooba) and *Eucalyptus largiflorens* (Black Box), a number of Chenopod species (*Atriplex semibaccata* (Berry Saltbush)*, Atriplex holocarpa* (Pop Saltbush)*, Enchylaena tomentosa* (Ruby Saltbush), *Nitraria billardieria* (Nitre-bush), *Maireana pentatropis* (Erect Bluebush) and *Sclerolaena diacantha* (Grey Copperburr). Other species that were present included *Disphyma crassifolium ssp. clavellatum* (Rounded Noon-flower), *Zygopyhllum apiculatum* (Pointed Twin-leaf), *Eragrostis setifolia* (Bristly Love-grass) and *Tetragonia eremaea* (Annual Spinach). On the lower areas of the floodplain there is also a large patch of sparse *Samphire sp.* that is traversed by the existing transmission line.

No threatened flora or fauna were observed, however the community provides good habitat for the Regent Parrot (e.g. large hollows in live and dead River Red Gum) and the floodplain would provide habitat for the Southern Bell Frog. Impacts from weeds are minimal, with common weeds such as *Heliotrope europaeum*

(Common Heliotrope) present. There are existing tracks and impacts such as rubbish from recreational users of the Kings Wildlife Reserve. Preliminary condition of this site (not benchmarked against BAM assessment) is considered to be medium to high.

Plate 6-53: Site 58, Lignum Shrubland (facing south)

Plate 6-54: Site 58, River Red Gum (east of existing transmission line) with large hollow that should be avoided

### 6.3.1 Victorian Summary

A summary of the Vegetation Types encountered in the Victorian portion of the Study Area, and associated EVCS and potential for threatened species is provided in Table 6-3.

Table 6-3: Summary of Vegetation Types along the alignment in VIC

| Site | Vegetation Type | High level EVC | Value provided / Habitat for Threatened Sp. |
|---|---|---|---|
| 50 | *Eucalyptus largiflorens* (Black Box) low open forest | Riverine Chenopod Woodland | Medium vegetation condition<br>Existing impacts from recreational activities and existing transmission line towers / tracks. |
| 51 | *Acacia stenophylla* (River Cooba) / *Hakea leucoptera* (Silver Needlewood) | Semi-arid Chenopod Woodland Patch | Medium vegetation condition<br>Existing impacts from recreational activities and existing transmission line towers / tracks. |
| 58 | Lignum *(Duma florulenta)* Shrubland | Lignum Shrubland | Medium to high vegetation condition. Good habitat for threatened fauna.<br>Existing impacts from recreational activities and existing transmission line towers / tracks. |

## 6.4 Vegetation Condition Summary

A summary of the high level vegetation conditions recorded at assessment sites along the alignment is provided in Table 6-1, Table 6-2 and Table 6-3 is presented on Figure 6-2. It is noted that the condition rating applied for SA utilises the Bushland Assessment score and is therefore cross-checked against representative benchmark sites. For NSW and Victoria, the condition scores are in-field assessments only at this stage, and are not compared to benchmark sites.

The high level vegetation scores should be used as indicative only at this stage, and are from point locations along the alignment, rather than linear assessments of vegetation type and conditions. Further extrapolation against aerial imagery could be undertaken to provide more coverage along the alignment, using the data collected to date, but the result from this would also need to be used with a degree of caution.

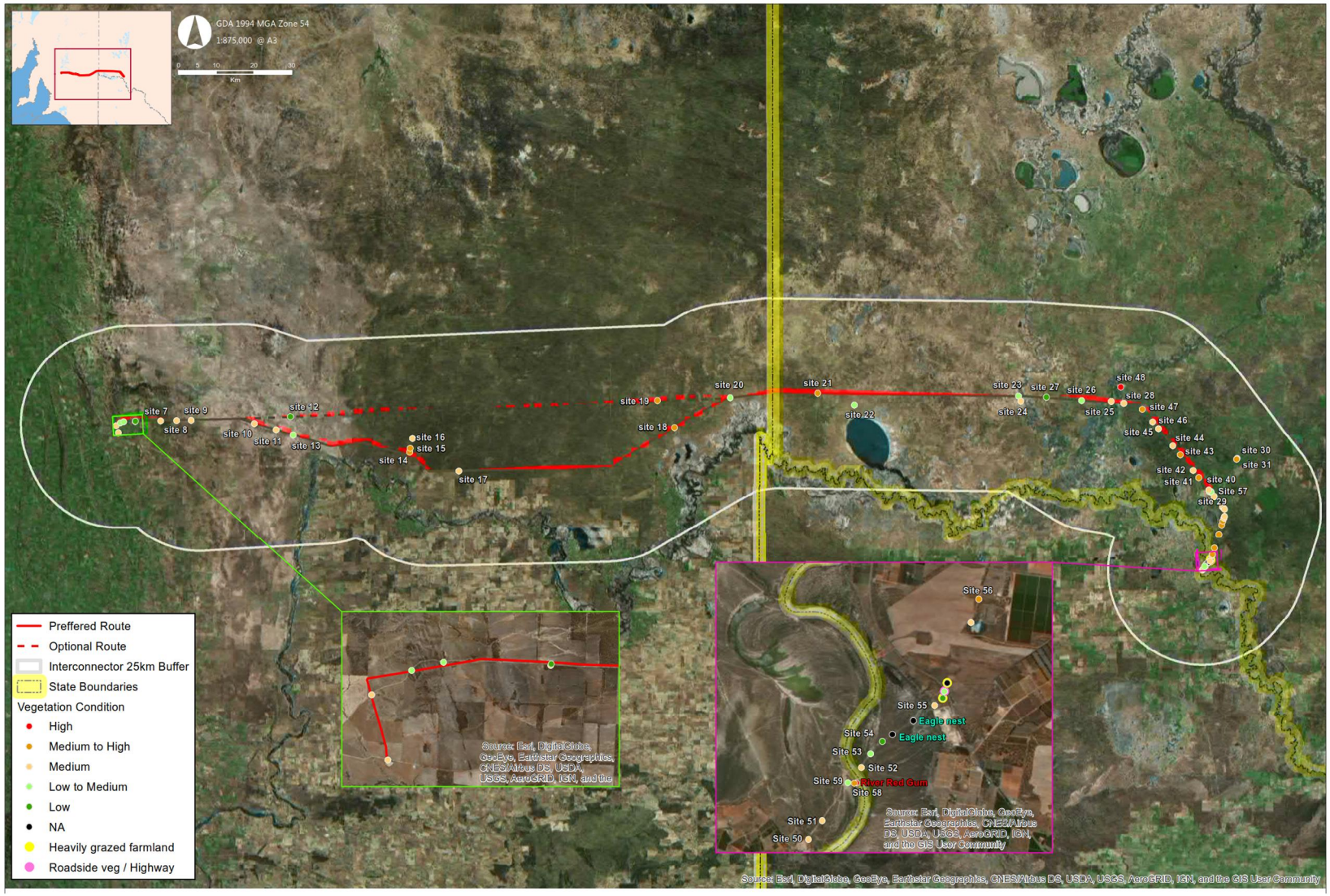


Figure 6-2: Summary of vegetation condition at survey sites along the alignment

# 7. Key Constraints and Recommendations

## 7.1 SA Summary

The alignment from Robertstown to Morgan largely traverses open and cleared paddocks, or heavily grazed low open Chenopod shrubland with element of the vegetation association absent or reduced as a result. Several patches of intact remnant (old regrowth) low mallee over Chenopod shrubland (*Eucalyptus oleosa* over *Maireana sedifolia*) are present, particularly along the southern side of Powerline Road. A Heritage Agreement protects a portion of this high value vegetation community near the intersection of the alignment with Salford Road.

From Morgan to Taylorville Station, the alignment(s) traverses two broad habitat types, initially open low Chenopod shubland of Blackbush and Bluebush (with mixed grazing pressure), before crossing an ecotonal transition into mixed old growth and regrowth mallee communities over Chenopod and/or Spinifex hummock grassland in dune country. Historic fires and clearance within this broad dune country have influenced the age and current ecological value of these mallee communities. The alternate (northern) alignment broadly does not follow any existing tracks, extending directly east from the previous section. The preferred (southern) alignment roughly follows existing tracks and / or existing transmission line easements from the Morgan substation to the border of Taylorville Station, north-east of the Morgan Road near Waikerie.

The Taylorville Station forms part of the Riverland Biosphere Reserve (formerly known as the Bookmark Biosphere). The Taylorville Station portion of the alignment(s) traverses almost exclusively mixed old growth and regrowth mallee communities over Chenopod and/or Spinifex hummock grassland in dune country. Historic fires and clearance within this broad dune country have influenced the age and current ecological value of these mallee communities. The alternate (northern) alignment through this section broadly does not follow any existing tracks, extending directly east from the previous section. The preferred (southern) alignment continues to follow an existing track (The 'Pooginook Track') and existing transmission line easement along the northern boundary of Pooginook Conservation Park which continues to approximately in line with the extent of Taylorville Station.

In the final section of the SA alignment, the preferred (southern) alignment leaves the existing 'Pooginook Track' to traverse across broadly mixed old growth and regrowth dune mallee country to the south of the Calperum Station boundary before veering north east to cut diagonally across Calperum station through intact remnant mallee. Once north of the Riverina region, the alignment veers eastwards again, crosses the Calerum Station border into the Chowilla Game Reserve to run north of the Wentworth-Renmark Road to the SA-NSW border, broadly through Bullock Bush and Black Oak open woodland. The alternate (northern) alignment continues to extend directly east running entirely through Calperum Station through intact mallee with no existing tracks to merge with the preferred (southern) alignment at the Calerum Station / Chowilla Game Reserve border.

## 7.2 SA Key Constraints

### 7.2.1 Conservation Significant Species and Communities

A number of threatened species have the potential to occur in the SA portion of the Study Area. Key areas of habitat include dense old growth mallee, large tracts of mallee, large old trees with hollows and riverine / wetlands habitats in close proximity to the alignment.

Section 5.3.4 of this report highlighted 35 nationally conservation significant flora 19 fauna (14 birds, 1 frog, 2 mammals, 2 reptiles) identified as potentially present in the combined SA/ NSW wider Study Area. Sixteen migratory bird species were also highlighted as potentially occurring within the Study Area (of which a number were also highlighted as threatened species). In addition, there were recent (within 20 years) records for 82 SA state listed flora and fauna within the Study Area.

The desktop study suggests that two EPBC listed TECs occur in the SA section of the alignment, within the Robertstown to Morgan section. Vegetation that meets the criteria of the two TECs - Peppermint Box Grassy Woodland and Iron-Grass (*Lomandra*) Natural Temperate Grassland, has not been identified during field work to date.

It is noted that the PMST prediction of occurrence of nationally listed species is based on high level, automated data output that includes buffers and historical data which may be conservative. Whilst a number of the conservation species detected have recent (within 20 years) records in the area (refer Table 5-8, Table 5-9, Table 5-10), a more thorough likelihood assessment is required based on preferred habitat requirements and presence / condition in the Study Area to determine real likelihood of occurrence and potential for impact within the project construction and operation footprint. Jacobs (2019a) provide a more comprehensive assessment of the potential impacts of the project on Protected Matters.

### 7.2.2 Conservation Parks and Reserves

Several conservation areas (including Conservation Parks, Reserves, Riverland Biosphere) and numerous Heritage Agreement Areas occur in the SA portion of the Study Area; including White Dam Conservation Park, Pooginook Conservation Park, Hogwash Bend Conservation Park, Riverland Biosphere (e.g. Calperum and Taylorville Stations), Chowilla Game Reserve / Regional Reserve. These areas are summarised in Section 5.2 of this report, and they generally contain better quality vegetation and therefore have a higher likelihood of supporting conservation significant species, as evidenced by the higher number of records for threatened species in these areas. As a result, these areas should be avoided where practicable to reduce impacts to ecological values, and constraints to the project associated with project approvals and environmental offset requirements.

### 7.2.3 Important Habitat Features

Other important habitat values and notable features along the SA portion of the alignment include:

- Old growth mallee, and intact mallee habitats, which are largely traversed by the alternate optional alignment route through the Riverland Biosphere region, and to a lesser degree the preferred alignment to the south of this area. These habitats take many years to develop to a point where mallee trees support hollows and deep litter cover, and are characterised by a mosaic of fire history. In general, they representing important habitat for native fauna species, including a number of conservation significant species discussed above.
- Critical habitat for the Black-eared Miner (*Manorina melanotis*) is located within the Riverland Biosphere region, within Gluepot Reserve, Taylorville Station and Calperum Station. This habitat is identified as a Protected Matter under the EPBC Act and is discussed further in the significant impact assessment undertaken for the SA alignment (Jacobs 2019a)
- Calperum and Taylorville Stations are pastoral stations that were transferred by deed of assignment to the Director of National Parks to hold in trust, and are hence under the control of the Australian Government. They are listed as Commonwealth Land and hence the impacts of the project require assessment for the whole environment (in addition to matters of national environmental significance). Further details are provided in Jacobs (2019a).

## 7.3 NSW Summary

The alignment between the SA – NSW border and the Darling Anabranch extends directly east-west along a straight alignment, and runs to the north of the Wentworth-Renmark Road for the first 35 kms (approximately) from the SA border before this road veers to the southeast. The preferred alignment does not follow an existing track or easement in this location, and would require clearance of a new maintenance/access track for this entire length (approximately 60 km). This section of the alignment traverses initially mixed age mallee over Chenopod shrubland (with likely Spinifex hummock grassland restricted to dune crests) for approximately 12 kms, before transitioning into a variety of low open Chenopod shrubland with or without emergent species. Open Chenopod country is generally grazed, in some instances very heavily with historic impacts evident by

reduced species composition and degraded soil surface characteristics. Drought impacts are also evident in parts.

The alignment between the Darling Anabranch and the Darling River traverses the riparian and river channel zones of the Darling Anabranch and the Darling River, with a stretch of agricultural land in between which is primarily used for grazing, though some cleared areas for cropping are located in the region. On the western side of the Darling Anabranch, the current preferred alignment traverses a small ephemeral lake system which is likely only inundated during flood events. Similarly, on the western side of the Darling River, the current preferred alignment traverses a floodplain lake and spillway. This portion of the alignment crosses and area identified as potentially containing two EPBC listed TECs, the Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions, and the Coolibah – Black Oak Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions. Neither TECs were identified in the field assessments undertaken to date.

The alignment between the Darling River and Buronga substation veers to the south east in a direct line from the Darling River crossing point to the Buronga substation, nominally following an existing transmission line easement with existing maintenance / access track. This portion of the alignment largely crosses a mix of predominantly Black-Oak woodland and Mallee over Chenopod communities, with large patches of Bullock Bush over open Grass Plains interspersed. Triodia (Spinifex) hummock grassland is likely present restricted to dune crests within mallee. The alignment ends at the Buronga substation. There are limited historic records of EPBC listed Malleefowl from within the vicinity of this portion of the alignment, presumably within the mallee / Chenopod communities.

The Red Cliffs Spur (in NSW) between the Buronga substation and the NSW / VIC border continues in a south east direction within private land following an existing TranGgrid transmission line easement that runs to the Red Cliffs Substation in Victoria. This portion of the alignment largely crosses Chenopod Sandplain Communities and patches of Black Oak Woodland. Similar to the section above there are also good patches of Mallee / Chenopod over Spinifex on low dunes crests, with diversity of species changing between crests and plains (e.g. the Spinifex is absent on the plains). These areas are interspersed with heavily grazed / fallowed / cleared areas and there is an existing dam on the alignment. This dam is well established and would support a number of waterbirds that may also visit Gol Gol Lakes to the west of the alignment. Towards the southern end of this portion of the alignment, it veers south where it approaches the Murray River. Vegetation closer to the Murray River comprises Black Box Woodland which ranges from poor to moderate condition depending on the level of grazing activity.

No EPBC listed TECs were identified in the NSW section of the alignment during the field assessments undertaken to date.

## 7.4 NSW Key Constraints

### 7.4.1 Conservation Significant Species and Communities

As with the SA portion of the alignment, a number of conservation significant species and ecological communities were identified as potentially present within the Study Area. Section 5.3.4 highlighted 35 nationally conservation significant flora species and 19 fauna species (14 birds, 1 frog, 2 mammals, 2 reptiles) identified as potentially present within the combined NSW / SA Study Area. Sixteen migratory bird species were also highlighted as potentially occurring within the Study Area (of which a number were also highlighted as threatened species). In addition, there were records for 52 NSW state listed fauna/flora (some of which also have a national rating) in the NSW portion of the Study Area.

It is noted that although there were fewer records of EPBC listed fauna within the intact mallee vegetation immediately east of the SA-NSW border, it is considered that presence of these species within NSW is just as likely as within SA, given the largely continuous nature of the intact mallee habitat. The reduced number of historic records in NSW is likely attributed to the fact that the SA side is predominantly within conservation reserve where tourists including bird watchers are more frequent visitors. In addition, there are sections of Mallee in NSW south of Buronga substation that occur within a TransGrid easement and on private grazing property in areas where ecological surveys are not regularly undertaken. In SA, the intact mallee habitat is

considered 'critical habitat' for the Black-eared Miner. NSW should also consider this habitat with high importance.

Desktop study suggests two TECs may occur in the NSW Study Area, the Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions, and the Coolibah – Black Oak Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions. However, examples of vegetation that meet the TEC criteria were not been identified during field work to date.

It is noted that the PMST prediction of occurrence of protected matters is based on high level automatic data output that includes buffers and includes historical data which can be less accurate. Whilst a number of these species have recent records (within 20 years) in the area (refer Table 5-8, Table 5-11, Table 5-12), a more detailed likelihood assessment is required based on preferred habitat requirements and presence / condition in the Study Area to determine more accurately a likelihood of occurrence and potential for impact within the project construction footprint. Jacobs (2019b) provide a more comprehensive assessment of the potential impacts of the project on protected matters.

### 7.4.2 Conservation Parks and Reserves

Several conservation areas occur in the NSW portion of the Study Area, however the preferred alignment avoids directly intersecting all of these (see Figure 3 above). Conservation areas and important habitat to the south of the alignment include; Lake Victoria, Murray Sunset National Park, Lindsay Island wetland, Wallpolla Island wetland, Wargan-Mallee Bushland Reserve, Lake Gol Gol and Mallee Cliffs National Park. These areas generally have better quality vegetation and are more likely to support higher biodiversity and conservation significant species. As a result, these areas should be avoided where practicable to reduce impacts to ecological values, and constraints to the project associated with project approvals and environmental offset requirements.

### 7.4.3 Important Habitats Features

Other important habitat values and notable features along the NSW portion of the alignment include:

- Old growth mallee and intact mallee habitats, predominantly along the western portion of the NSW alignment, near the SA border. Although there was evidence of some grazing within the understorey at sites assessed within NSW, these habitats take many years to develop, and within adjacent habitat in SA they are characterised as critical habitat for the EPBC listed Black-eared Miner. Old growth continuous mallee also represents important habitat for a number of other conservation significant species.
- The Darling River and Darling Anabranch, Murray River crossings, and associated riparian habitat, represent important habitat features in the context of the NSW portion of the Study Area. Parts of the riparian floodplain have been subjected to heavy grazing impacts and were suffering from impacts as a result of drought conditions following the time of the survey, but these areas still reflect ecotonal transitions in habitat across the landscape, and therefore are likely to support elevated biodiversity. Spanning of such environments is recommended where practicable.

## 7.5 Victoria Summary

The alignment along the Red Cliffs spur between the NSW / Victorian border and the Red Cliffs substation runs south to south west along an existing transmission line corridor within the Kings Billabong Wildlife Reserve. The park is accessible to the public and has numerous existing tracks and existing impacts as a result of recreational activities, weed incursion and rabbits. There are also impacts of drought in the floodplain areas closer to the Murray River. Vegetation in this section of the spur alignment primarily includes Black Box Woodland and Lignum Shrubland, and closer to the river includes live and dead River Red Gums with large hollows. There is also a small patch of semi-arid Chenopod Woodland that includes *Hakea leucoptera* (Silver Needwood) that is mentioned as a species to protect in the Parks Management Plan north (Parks Victoria 2008). The Management Plan mitigation strategies suggested reducing public access in this area and closing some tracks for emergency use only to avoid impacts to vegetation.

No EPBC listed TECs were identified in the Victoria section of the alignment during the field assessments undertaken to date.

## 7.6 Victoria Key Constraints

### 7.6.1 Conservation Significant Species and Communities

Similar to NSW and SA, a number of threatened species have the potential to occur in the Victorian portion of the Study Area. Key areas of habitat include large old trees with large hollows (suitable for threatened species such as Regent Parrot) and riverine / wetlands habitats in close proximity to the alignment which may support migratory species and waterbirds.

Section 5.3.4 of this report highlighted 35 nationally conservation significant flora 19 fauna (14 birds, 1 frog, 2 mammals, 2 reptiles) identified as potentially present in the combined SA / NSW / Vic wider Study Area. Sixteen migratory bird species were also highlighted as potentially occurring within the wider Study Area (of which a number were also highlighted as threatened species). In addition, there were recent (within 20 years) records for 42 state listed flora and fauna and over 100 flora listed by the Victoria Advisory board within the Study Area.

### 7.6.2 Conservation Parks and Reserves

The Victorian portion of the Red Cliffs spur alignment traverses through Kings Billabong Wildlife Reserve Park where there is an existing transmission line, and a network of cleared maintenance tracks and recreational tracks that connects to the Red Cliffs Substation.

Kings Billabong Wildlife Reserve is considered as one of the highest-value conservation reserves in the Sunraysia area, providing habitat for a diverse range of fauna and flora including threatened species. A management plan (Parks Victoria 2008) assists with protecting the important habitat values and balancing the recreational activities that occur within the park. Threatened flora that are a focus of the plan include Silver Needlewood and protection of habitat suitable for the Carpet Python (*Morelia spilota*), Regent Parrot (*Polytelis anthopeplus*) and Lesser Long-eared Bat (*Nyctophilus geoffroyi*), as well as a range of other threatened flora and fauna.

### 7.6.3 Important Habitats Features

Other important habitat values and notable features along the Victorian portion of the overall project alignment include:

- The Murray River crossing, and associated riparian habitat, represent important habitat features in the context of the Victorian portion of the Study Area. Parts of the riparian floodplain are subject to existing moderate impacts (e.g. weeds, rabbits, recreational tracks, existing transmission line presence) and were suffering from impacts as a result of drought conditions following the time of the survey, but these areas still reflect ecotonal transitions in habitat across the landscape, and therefore are likely to support elevated biodiversity (e.g. Black Box Woodland, Lignum Shrubland, Red Gum woodland supporting large hollows, and Samphire Habitats). Spanning and / or avoiding additional vegetation clearance, utilising existing tracks in such environments is recommended where practicable. Avoiding clearance of live or dead River Red Gums with large hollows suitable for Regent Parrot and other fauna would also be recommended.

## 7.7 Recommendations

### 7.7.1 Impact Mitigation Strategies

A number of mitigation strategies are relevant across the length of the alignment as mechanisms to reduce potential and predicted ecological impacts resulting from the project. These include:

- Minimise the requirement for vegetation clearance wherever practicable, by locating the alignment within previously cleared paddocks and road reserves, and by utilising existing tracks for access, construction and maintenance wherever practicable.

- If vegetation clearance cannot be avoided, preferentially position the alignment within lower quality vegetation rather than high habitat value (including old growth) vegetation where practicable.
- Where new tracks are required to be clearer, consider aligning requirements of existing landowners where practicable to avoid duplication of track clearance. For example, land owners may be planning station access tracks, fence line tracks, or fire breaks within their properties.
- Consider a program of ecological micro-siting of pole and new track locations, prior to construction, to avoid high value micro habitat features, such as old or significant trees, individual trees bearing hollows, for conservation significant or native fauna, dense large tracts of mallee, existing mounds of the EPBC listed Malleefowl, river crossings, wetland, slow moving water habitats of Southern Bell Frog.
- Consider installation of 'bird diverters' along conductors in areas where the alignment runs within close proximity to large or migratory bird habitats, such as temporary wetlands, riparian channels, or floodplain environments.
- Span river crossings and riparian areas as far as practicable, to avoid ground disturbance in these areas.
- Implement effective weed management practices during early site works and construction, to avoid the spread of weed species into new areas.
- State based assessments for state and commonwealth aspecies (e.g. Vegetation Clearance, Offsetting and assessment of impacts to threatened species would be needed to support applications for project approval.

### 7.7.2 Optional Alignments for Consideration (Robertstown to SA/NSW border)

Aligned with the project impact mitigation strategies outlined above, a number of alternate options to the study alignment are presented below (Figure 7-1). These alternate options are presented to demonstrate the types of changes which could reduce the ecological impact of the project, rather than as definitive changes, as it is noted that the final alignment option needs to consider factors beyond just ecological constraints, such as heritage values, landholder preferences, financial implications, constructability and operational considerations, visual impacts, and other stakeholder interests.

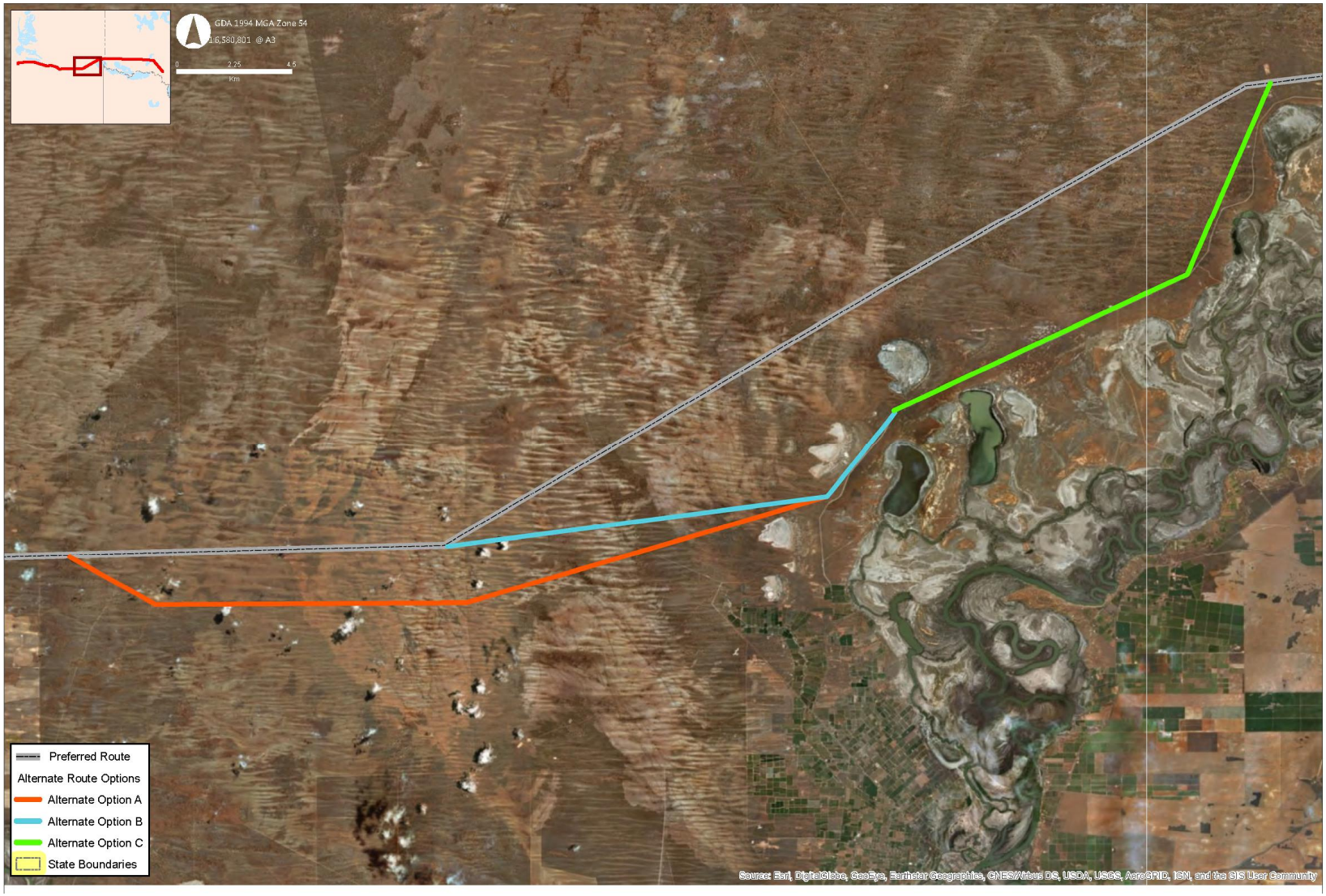


Figure 7-1: Optional Alignments to Reduce Ecological Impacts (SA)

**Optional Alignment A:** This alignment diverges from the current preferred (southern) alignment at the point where the 'Pooginook Track' ends. The Optional Alignment A veers south east following a small track to a water point, before veering east along an existing small track (possibly fence line track) to the north-south running boundary of Calperum Station. From this point, the Optional Alignment must diagonally traverse across intact vegetation in Calperum Station to the Wentworth-Renmark Road, however, the crossing distance is substantially shorter (approximately 14.5 km) than required by the current preferred (southern) alignment.

By utilising the existing track around the water point, vegetation impacts are minimised. Using the area around the stock watering point results in traversing already heavily impacts vegetation in the biosphere around this point.

**Optional Alignment B:** This alignment represents an alternate option to Optional Alignment A extending from the existing preferred (southern) alignment at boundary of Calperum Station to the Wentworth-Renmark Road if Optional Alignment A is not preferred. Optional Alignment B minimizes the length of impact from new tracks through old growth mallee in Calperum Station, but has the disadvantage over Optional Alignment A in that is still requires new tracks to be cleared from the end of the Pooginook Track to Wentworth-Renmark Road, a distance of approximately 30 km, compared with the 14.5 km (approximately) for Optional Alignment A.

**Optional Alignment C:** This Optional Alignment would likely be required if either Optional Alignment A or B are selected. This option runs to the north-west of the Wentworth-Renmark Road within a broad area of generally cleared or low lying vegetation. This option avoids clearance of old growth mallee within Calperum Station and removes the need for creation of an access or maintenance track given the existing road could be used.

It is recognized that Optional Alignment C would present some visual amenity challenges, and potential concerns could be raised about bird strike as migratory birds use the adjacent Riverina region wetlands and floodplain, however these areas are generally more than 1 km away, and the full floodplain extent would very rarely be flooded and utilised by birds. Mitigation measures such as visual markers on the alignment have proven to be effective at reducing bird strike in other locations, and this potential risk needs to be weighed up against the impacts and potential impacts of a new access track (and transmission line) directly traversing Calperum Station old growth mallee habitat with EPBC listed species present.

**Optional Alignment D:** This Optional Alignment diverges south from the preferred alignment at approximately 20 km west of Lake Victoria to utilise an existing track for approximately 12 km before rejoining the preferred alignment prior to the Darling River crossing. This alignment reduces the requirement for native vegetation clearance by utilising an existing track, and also avoids traversing ephemeral lake and floodplain habitat immediately west of the Darling River floodplain.

**Optional Alignment E:** This optional alignment could be used instead of Optional Alignment D. This alignment diverges from the preferred alignment at approximately 18 km west of Lake Victoria, again to utilise an existing track for approximately 13 km before re-joining the preferred alignment prior to the Darling River crossing. This alignment requires around 3.7 km of vegetation clearance rather than around 16.5km along the preferred alignment. As per Optional Alignment D, this alternate alignment avoids traversing the ephemeral lake and floodplain habitat to the west of the Darling River floodplain.

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# Appendix A. Protected Matters Search Reports

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.

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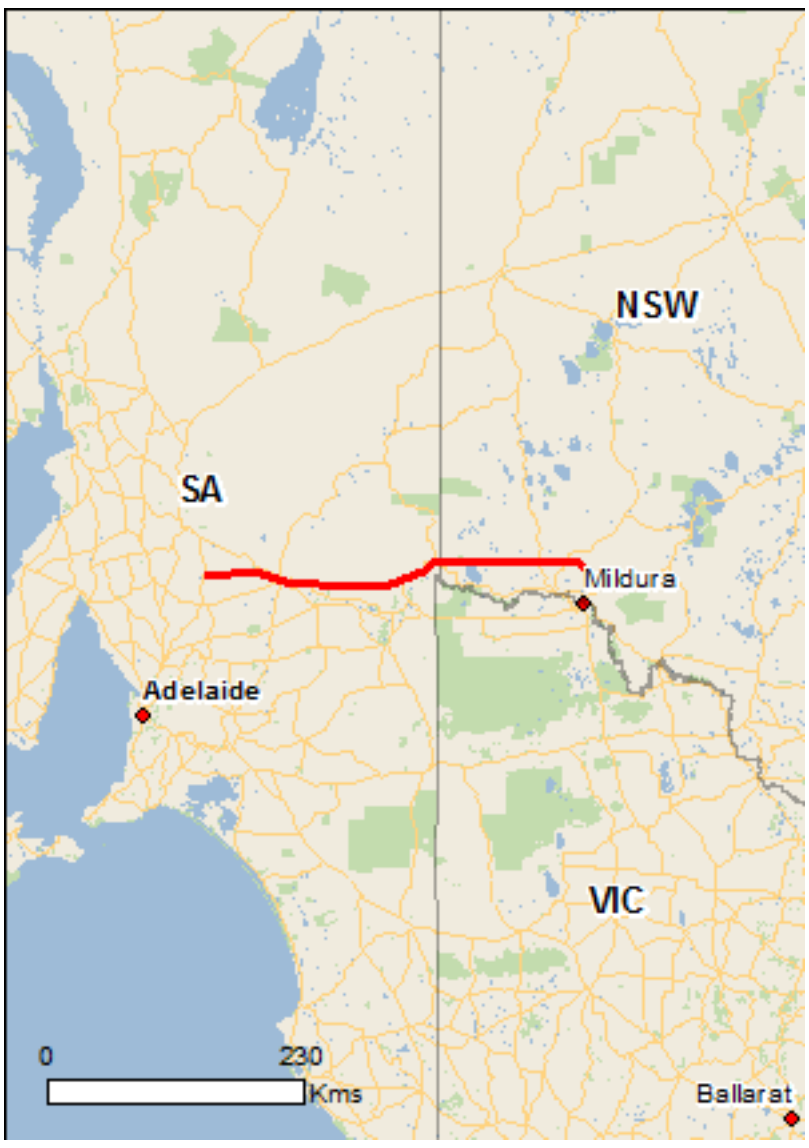




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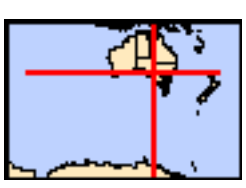

# Summary

## 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: | 3 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 5 |
| Listed Threatened Species: | 39 |
| Listed Migratory Species: | 16 |

## Other Matters Protected by the EPBC Act

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

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

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

| | |
|---|---|
| Commonwealth Land: | 2 |
| Commonwealth Heritage Places: | 1 |
| Listed Marine Species: | 25 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | 1 |
| 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: | 49 |
| Regional Forest Agreements: | None |
| Invasive Species: | 41 |
| Nationally Important Wetlands: | 3 |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar) [ Resource Information ]

| Name | Proximity |
|---|---|
| Banrock station wetland complex | Within Ramsar site |
| Riverland | Within Ramsar site |
| The coorong, and lakes alexandrina and albert wetland | 100 - 150km upstream |

### Listed Threatened Ecological Communities [ Resource Information ]

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

| Name | Status | Type of Presence |
|---|---|---|
| Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions | Endangered | Community may occur within area |
| Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions | Endangered | Community may occur within area |
| Iron-grass Natural Temperate Grassland of South Australia | Critically Endangered | Community likely to occur within area |
| Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia | Critically Endangered | Community likely to occur within area |
| River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea | Approval Disallowed | Community likely to occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Botaurus poiciloptilus<br>Australasian Bittern [1001] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat may occur within area |
| Leipoa ocellata<br>Malleefowl [934] | Vulnerable | Species or species habitat known to occur within area |
| Manorina melanotis<br>Black-eared Miner [449] | Endangered | Species or species habitat known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pachycephala rufogularis<br>Red-lored Whistler [601] | Vulnerable | Species or species habitat known to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| [Pedionomus torquatus](#) | | |
| Plains-wanderer [906] | Critically Endangered | Species or species habitat likely to occur within area |
| [Pezoporus occidentalis](#) | | |
| Night Parrot [59350] | Endangered | Extinct within area |
| [Polytelis anthopeplus  monarchoides](#) | | |
| Regent Parrot (eastern) [59612] | Vulnerable | Breeding likely to occur within area |
| [Rostratula australis](#) | | |
| Australian Painted-snipe, Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| Fish | | |
| [Bidyanus bidyanus](#) | | |
| Silver Perch, Bidyan [76155] | Critically Endangered | Species or species habitat known to occur within area |
| [Craterocephalus fluviatilis](#) | | |
| Murray Hardyhead [56791] | Endangered | Species or species habitat known to occur within area |
| [Galaxias rostratus](#) | | |
| Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745] | Critically Endangered | Species or species habitat 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 may occur within area |
| Frogs | | |
| [Litoria raniformis](#) | | |
| Growling Grass Frog, Southern Bell Frog,  Green and Golden Frog, Warty Swamp Frog [1828] | Vulnerable | Species or species habitat known to occur within area |
| Mammals | | |
| [Nyctophilus corbeni](#) | | |
| Corben's Long-eared Bat, South-eastern Long-eared Bat [83395] | Vulnerable | Species or species habitat likely to occur within area |
| [Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#) | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Vulnerable | Species or species habitat may occur within area |
| Plants | | |
| [Acacia glandulicarpa](#) | | |
| Hairy-pod Wattle [8838] | Vulnerable | Species or species habitat likely to occur within area |
| [Acacia menzelii](#) | | |
| Menzel's Wattle [9218] | Vulnerable | Species or species habitat may occur within area |
| [Acacia spilleriana](#) | | |
| Spiller's Wattle [34123] | Endangered | Species or species habitat known to occur within area |
| [Acanthocladium dockeri](#) | | |
| Spiny Everlasting, Spiny Daisy [17632] | Critically Endangered | Translocated population known to occur within area |
| [Atriplex infrequens](#) | | |
| [4143] | Vulnerable | Species or species habitat likely to occur within area |
| [Brachyscome papillosa](#) | | |
| Mossgiel Daisy [6625] | Vulnerable | Species or species habitat may occur within |

| Name | Status | Type of Presence |
|---|---|---|
| | | area |
| [Caladenia tensa](#)<br>Greencomb Spider-orchid, Rigid Spider-orchid [24390] | Endangered | Species or species habitat known to occur within area |
| [Caladenia xantholeuca](#)<br>White Rabbits, Flinders Ranges White Caladenia [55025] | Endangered | Species or species habitat may occur within area |
| [Codonocarpus pyramidalis](#)<br>Slender Bell-fruit, Camel Poison [19507] | Vulnerable | Species or species habitat known to occur within area |
| [Dodonaea procumbens](#)<br>Trailing Hop-bush [12149] | Vulnerable | Species or species habitat likely to occur within area |
| [Dodonaea subglandulifera](#)<br>Peep Hill Hop-bush [11956] | Endangered | Species or species habitat likely to occur within area |
| [Lepidium monoplocoides](#)<br>Winged Pepper-cress [9190] | Endangered | Species or species habitat likely to occur within area |
| [Olearia pannosa subsp. pannosa](#)<br>Silver Daisy-bush, Silver-leaved Daisy, Velvet Daisy-bush [12348] | Vulnerable | Species or species habitat known to occur within area |
| [Prasophyllum pallidum](#)<br>Pale Leek-orchid [20351] | Vulnerable | Species or species habitat may occur within area |
| [Senecio megaglossus](#)<br>Superb Groundsel [13374] | Vulnerable | Species or species habitat likely to occur within area |
| [Solanum karsense](#)<br>Menindee Nightshade [7776] | Vulnerable | Species or species habitat known to occur within area |
| [Swainsona murrayana](#)<br>Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765] | Vulnerable | Species or species habitat likely to occur within area |
| [Swainsona pyrophila](#)<br>Yellow Swainson-pea [56344] | Vulnerable | Species or species habitat likely to occur within area |
| Reptiles | | |
| [Aprasia pseudopulchella](#)<br>Flinders Ranges Worm-lizard [1666] | Vulnerable | Species or species habitat likely to occur within area |
| [Tiliqua adelaidensis](#)<br>Pygmy Blue-tongue Lizard, Adelaide Blue-tongue Lizard [1270] | Endangered | Species or species habitat likely 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](#)<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |
| [Motacilla cinerea](#)<br>Grey Wagtail [642] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| **Migratory Wetlands Species** | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat known to occur within area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Species or species habitat known to occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat known to occur within area |
| Pluvialis fulva<br>Pacific Golden Plover [25545] | | Species or species habitat known to occur within area |
| Tringa glareola<br>Wood Sandpiper [829] | | Species or species habitat known to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat known to occur within area |
| Tringa stagnatilis<br>Marsh Sandpiper, Little Greenshank [833] | | Species or species habitat known 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 - Calperum Station |
| Commonwealth Land - Taylorville Station |

## Commonwealth Heritage Places [ Resource Information ]

| Name | State | Status |
|---|---|---|
| Natural | | |
| Murray Mallee - Calperum Station and Taylorville Station | SA | Listed place |

## 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<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba<br>Great Egret, White Egret [59541] | | Breeding known to occur within area |
| Ardea ibis<br>Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat known to occur within area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Species or species habitat known to occur within area |
| Charadrius ruficapillus<br>Red-capped Plover [881] | | Species or species habitat known to occur within area |
| Chrysococcyx osculans<br>Black-eared Cuckoo [705] | | Species or species habitat known to occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area |
| Himantopus himantopus<br>Pied Stilt, Black-winged Stilt [870] | | Species or species habitat known to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat known to occur within area |
| Pluvialis fulva<br>Pacific Golden Plover [25545] | | Species or species habitat known to occur within area |
| Recurvirostra novaehollandiae<br>Red-necked Avocet [871] | | Species or species habitat known to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |
| Tringa glareola<br>Wood Sandpiper [829] | | Species or species habitat known to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat known to occur within area |
| Tringa stagnatilis<br>Marsh Sandpiper, Little Greenshank [833] | | Species or species habitat known to occur within area |

| Critical Habitats | [ Resource Information ] |
|---|---|
| Name | Type of Presence |
| Manorina melanotis (Black-eared Miner) - Gluepot Reserve, Taylorville Station and Calperum Station, excluding the area of Calperum Station south and east of Main Wentworth Road. | Listed Critical Habitat |

# Extra Information

## State and Territory Reserves [ Resource Information ]

| Name | State |
|---|---|
| Calperum Station | SA |
| Chowilla | SA |
| Chowilla | SA |
| Cooltong | SA |
| Hogwash Bend | SA |
| Loch Luna | SA |
| Maize Island Lagoon | SA |
| Mallee Cliffs | NSW |
| Mimbara | SA |
| Morgan | SA |
| Murray - Sunset National Park | VIC |
| Murray River | SA |
| Pooginook | SA |
| Ramco Point | SA |
| Southern Mallee | NSW |
| Taylorville Station | SA |
| Unnamed (No.HA1028) | SA |
| Unnamed (No.HA1060) | SA |
| Unnamed (No.HA1081) | SA |
| Unnamed (No.HA1120) | SA |
| Unnamed (No.HA1123) | SA |
| Unnamed (No.HA1126) | SA |
| Unnamed (No.HA1165) | SA |
| Unnamed (No.HA1198) | SA |
| Unnamed (No.HA1271) | SA |
| Unnamed (No.HA1294) | SA |
| Unnamed (No.HA1337) | SA |
| Unnamed (No.HA1340) | SA |
| Unnamed (No.HA1386) | SA |
| Unnamed (No.HA1443) | SA |
| Unnamed (No.HA1448) | SA |
| Unnamed (No.HA1495) | SA |
| Unnamed (No.HA1511) | SA |
| Unnamed (No.HA1519) | SA |
| Unnamed (No.HA1520) | SA |
| Unnamed (No.HA266) | SA |
| Unnamed (No.HA280) | SA |
| Unnamed (No.HA314) | SA |
| Unnamed (No.HA423) | SA |
| Unnamed (No.HA448) | SA |
| Unnamed (No.HA476) | SA |
| Unnamed (No.HA655) | SA |
| Unnamed (No.HA669) | SA |
| Unnamed (No.HA727) | SA |
| Unnamed (No.HA862) | SA |
| Unnamed (No.HA886) | SA |
| Unnamed (No.HA958) | SA |
| Unnamed (No.HA979) | SA |
| White Dam | SA |

## 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 |

| Name | Status | Type of Presence within area |
|---|---|---|
| Alauda arvensis<br>Skylark [656] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis<br>European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis<br>Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |
| Turdus merula<br>Common Blackbird, Eurasian Blackbird [596] | | Species or species habitat likely to occur within area |
| Mammals | | |
| Bos taurus<br>Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Capra hircus<br>Goat [2] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Lepus capensis<br>Brown Hare [127] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Sus scrofa<br>Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur |

| Name | Status | Type of Presence within area |
|---|---|---|
| **Plants** | | |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Austrocylindropuntia spp.<br>Prickly Pears [85132] | | Species or species habitat likely to occur within area |
| Cabomba caroliniana<br>Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] | | Species or species habitat may occur within area |
| Carrichtera annua<br>Ward's Weed [9511] | | Species or species habitat may occur within area |
| Cenchrus ciliaris<br>Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |
| Cylindropuntia spp.<br>Prickly Pears [85131] | | Species or species habitat likely to occur within area |
| Cytisus scoparius<br>Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934] | | Species or species habitat likely to occur within area |
| Eichhornia crassipes<br>Water Hyacinth, Water Orchid, Nile Lily [13466] | | Species or species habitat likely to occur within area |
| Genista linifolia<br>Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800] | | Species or species habitat likely to occur within area |
| Genista sp. X Genista monspessulana<br>Broom [67538] | | Species or species habitat likely to occur within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Olea europaea<br>Olive, Common Olive [9160] | | Species or species habitat likely to occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| Parkinsonia aculeata<br>Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301] | | Species or species habitat likely to occur within area |
| Pinus radiata<br>Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] | | Species or species habitat may occur within area |
| Rubus fruticosus aggregate<br>Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur |

| Name | Status | Type of Presence 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 |
| 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 |
| Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018] | | 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 |
| Banrock Swamp Wetland Complex | SA |
| Loch Luna Wetland Complex | SA |
| Riverland Wetland Complex | SA |

# 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

-33.981643 139.09772,-33.974035 139.537173,-34.046117 139.78898,-34.046117 139.935427,-34.065095 140.113955,-34.057495 140.558023,-33.947473 140.882998,-33.91329 140.924197,-33.898062 140.942544,-33.894278 142.128134,-34.080247 142.334128,-34.080247 142.334128

# 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.


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# EPBC Act Protected Matters Report

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

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

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

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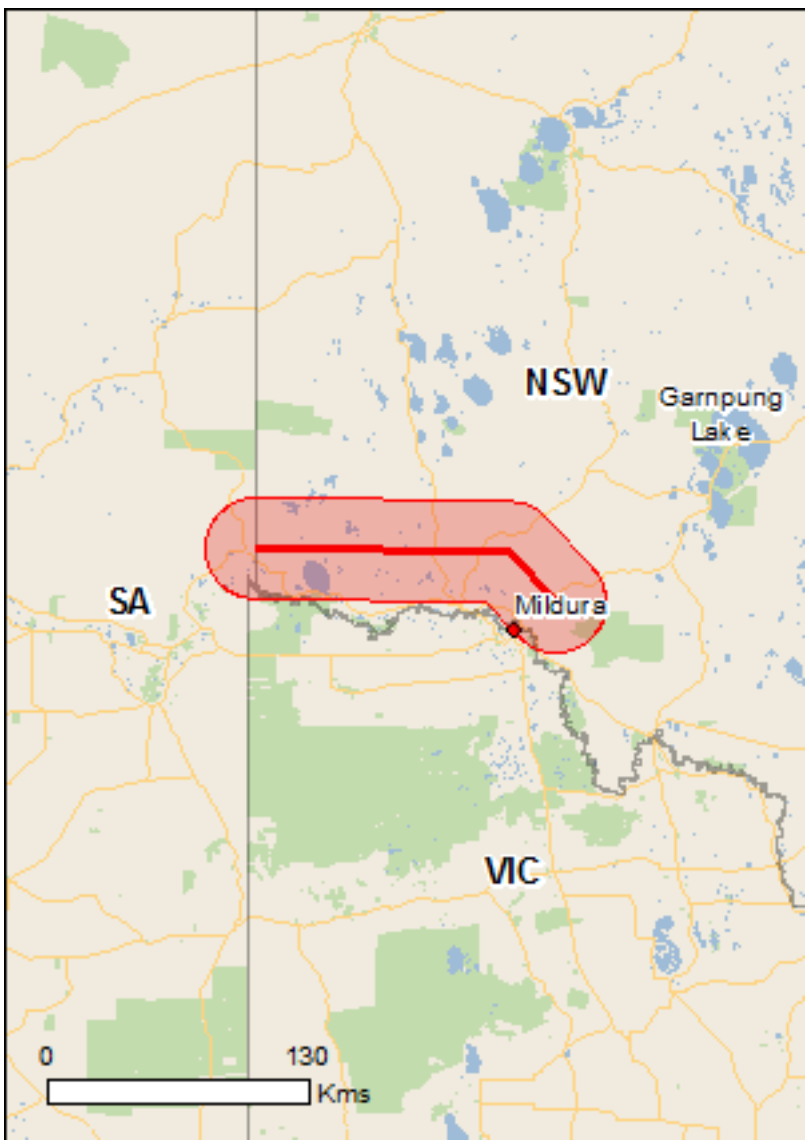
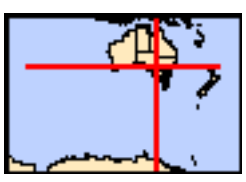





Coordinates
Buffer: 25.0Km



# Summary

## Matters of National Environmental Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | 3 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 3 |
| Listed Threatened Species: | 28 |
| Listed Migratory Species: | 18 |

## 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: | 6 |
| Commonwealth Heritage Places: | 1 |
| Listed Marine Species: | 28 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | 1 |
| 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: | 11 |
| Regional Forest Agreements: | None |
| Invasive Species: | 33 |
| Nationally Important Wetlands: | 5 |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Wetlands of International Importance (Ramsar) [ Resource Information ]

| Name | Proximity |
|---|---|
| Banrock station wetland complex | 40 - 50km upstream |
| Riverland | Within Ramsar site |
| The coorong, and lakes alexandrina and albert wetland | 150 - 200km 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 |
| Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions | Endangered | Community may occur within area |
| River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea | Approval Disallowed | Community likely to occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Botaurus poiciloptilus<br>Australasian Bittern [1001] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat known to occur within area |
| Leipoa ocellata<br>Malleefowl [934] | Vulnerable | Species or species habitat known to occur within area |
| Limosa lapponica  baueri<br>Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380] | Vulnerable | Species or species habitat may occur within area |
| Limosa lapponica  menzbieri<br>Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432] | Critically Endangered | Species or species habitat may occur within area |
| Manorina melanotis<br>Black-eared Miner [449] | Endangered | Species or species habitat known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Pachycephala rufogularis | | |
| Red-lored Whistler [601] | Vulnerable | Species or species habitat may occur within area |
| Pedionomus torquatus | | |
| Plains-wanderer [906] | Critically Endangered | Species or species habitat may occur within area |
| Pezoporus occidentalis | | |
| Night Parrot [59350] | Endangered | Extinct within area |
| Polytelis anthopeplus monarchoides | | |
| Regent Parrot (eastern) [59612] | Vulnerable | Breeding likely to occur within area |
| Rostratula australis | | |
| Australian Painted-snipe, Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| Fish | | |
| Bidyanus bidyanus | | |
| Silver Perch, Bidyan [76155] | Critically Endangered | Species or species habitat known to occur within area |
| Craterocephalus fluviatilis | | |
| Murray Hardyhead [56791] | Endangered | Species or species habitat known to occur within area |
| Galaxias rostratus | | |
| Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745] | Critically Endangered | Species or species habitat 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 may occur within area |
| Frogs | | |
| Litoria raniformis | | |
| Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828] | Vulnerable | Species or species habitat known to occur within area |
| Mammals | | |
| Nyctophilus corbeni | | |
| Corben's Long-eared Bat, South-eastern Long-eared Bat [83395] | Vulnerable | Species or species habitat known to occur within area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Vulnerable | Species or species habitat may occur within area |
| Plants | | |
| Atriplex infrequens | | |
| [4143] | Vulnerable | Species or species habitat known to occur within area |
| Brachyscome papillosa | | |
| Mossgiel Daisy [6625] | Vulnerable | Species or species habitat may occur within area |
| Caladenia tensa | | |
| Greencomb Spider-orchid, Rigid Spider-orchid [24390] | Endangered | Species or species habitat likely to occur within area |
| Lepidium monoplocoides | | |
| Winged Pepper-cress [9190] | Endangered | Species or species habitat likely to occur within area |
| Solanum karsense | | |
| Menindee Nightshade [7776] | Vulnerable | Species or species habitat known to occur |

| Name | Status | Type of Presence |
|---|---|---|
| | | within area |
| Swainsona murrayana | | |
| Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765] | Vulnerable | Species or species habitat likely to occur within area |
| Swainsona pyrophila | | |
| Yellow Swainson-pea [56344] | Vulnerable | Species or species habitat likely 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** | | |
| Motacilla cinerea | | |
| Grey Wagtail [642] | | Species or species habitat may occur within area |
| Motacilla flava | | |
| Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca | | |
| Satin Flycatcher [612] | | Species or species habitat 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 known to occur within area |
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Calidris ruficollis | | |
| Red-necked Stint [860] | | Species or species habitat known to occur within area |
| Charadrius bicinctus | | |
| Double-banded Plover [895] | | Species or species habitat known to occur within area |
| Gallinago hardwickii | | |
| Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Limosa lapponica | | |
| Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Limosa limosa | | |
| Black-tailed Godwit [845] | | Species or species habitat known to occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Pandion haliaetus | | |
| Osprey [952] | | Species or species habitat known to occur within area |
| Tringa glareola | | |
| Wood Sandpiper [829] | | Species or species habitat known to occur within area |
| Tringa nebularia | | |
| Common Greenshank, Greenshank [832] | | Species or species habitat known to occur within area |
| Tringa stagnatilis | | |
| Marsh Sandpiper, Little Greenshank [833] | | Species or species habitat known to occur within area |

## Other Matters Protected by the EPBC Act

### Commonwealth Land [ Resource Information ]

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

| Name |
|---|
| Commonwealth Land - Australian Telecommunications Commission |
| Commonwealth Land - Australian Telecommunications Corporation |
| Commonwealth Land - Calperum Station |
| Commonwealth Land - Commonwealth Trading Bank of Australia |
| Commonwealth Land - Commonwealth Trading Bank of Australia & Moya Grace Murphy |
| Defence - KAIRIVU BARRACKS - MILDURA |

### Commonwealth Heritage Places [ Resource Information ]

| Name | State | Status |
|---|---|---|
| Natural | | |
| Murray Mallee - Calperum Station and Taylorville Station | SA | Listed place |

### 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] | | Breeding 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 known to occur within area |
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | area |
| Calidris ruficollis<br>Red-necked Stint [860] | | Species or species habitat known to occur within area |
| Charadrius bicinctus<br>Double-banded Plover [895] | | Species or species habitat known to occur within area |
| Charadrius ruficapillus<br>Red-capped Plover [881] | | Species or species habitat known to occur within area |
| Chrysococcyx osculans<br>Black-eared Cuckoo [705] | | Species or species habitat known to occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area |
| Himantopus himantopus<br>Pied Stilt, Black-winged Stilt [870] | | Species or species habitat known to occur within area |
| Limosa lapponica<br>Bar-tailed Godwit [844] | | Species or species habitat known to occur within area |
| Limosa limosa<br>Black-tailed Godwit [845] | | Species or species habitat known to occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat known to occur within area |
| Recurvirostra novaehollandiae<br>Red-necked Avocet [871] | | Species or species habitat known to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |
| Stiltia isabella<br>Australian Pratincole [818] | | Species or species habitat known to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Tringa glareola<br>Wood Sandpiper [829] | | Species or species habitat known to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat known to occur within area |
| Tringa stagnatilis<br>Marsh Sandpiper, Little Greenshank [833] | | Species or species habitat known to occur within area |

## Critical Habitats [ Resource Information ]

| Name | Type of Presence |
|---|---|
| Manorina melanotis (Black-eared Miner) - Gluepot Reserve, Taylorville Station and Calperum Station, excluding the area of Calperum Station south and east of Main Wentworth Road. | Listed Critical Habitat |

# Extra Information

## State and Territory Reserves [ Resource Information ]

| Name | State |
|---|---|
| Calperum Station | SA |
| Chowilla | SA |
| Chowilla | SA |
| Kings Billabong Park | VIC |
| Mallee Cliffs | NSW |
| Murray - Sunset National Park | VIC |
| River Murray Reserve | VIC |
| River Murray Reserve (non-PV) | VIC |
| Southern Mallee | NSW |
| Toupnein Creek | VIC |
| Unnamed (No.HA1165) | SA |

## 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<br>Common Myna, Indian Myna [387] | | Species or species habitat likely to occur within area |
| Alauda arvensis<br>Skylark [656] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis<br>European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species |

| Name | Status | Type of Presence |
|---|---|---|
| | | habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis<br>Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |
| Turdus merula<br>Common Blackbird, Eurasian Blackbird [596] | | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Bos taurus<br>Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Capra hircus<br>Goat [2] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Lepus capensis<br>Brown Hare [127] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Sus scrofa<br>Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Cabomba caroliniana<br>Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] | | Species or species habitat may occur within area |
| Carrichtera annua<br>Ward's Weed [9511] | | Species or species habitat may occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |
| Cylindropuntia spp.<br>Prickly Pears [85131] | | Species or species habitat likely to occur within area |
| Eichhornia crassipes<br>Water Hyacinth, Water Orchid, Nile Lily [13466] | | Species or species habitat likely to occur within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Olea europaea<br>Olive, Common Olive [9160] | | Species or species habitat may occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| Rubus fruticosus aggregate<br>Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur within area |
| Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii<br>Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497] | | Species or species habitat likely to occur within area |
| Solanum elaeagnifolium<br>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 |
| Tamarix aphylla<br>Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018] | | Species or species habitat likely to occur within area |

## Nationally Important Wetlands

[ Resource Information ]

| Name | State |
|---|---|
| Kings  Billabong Wetlands | VIC |
| Lake Ranfurly | VIC |
| Lindsay Island | VIC |
| Riverland Wetland Complex | SA |
| Wallpolla Island | 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

-33.88 141.0,-33.894278 142.128134,-34.080247 142.334128,-34.080247 142.334128

# 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.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Canberra ACT 2601 Australia
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Australian Government
Department of the Environment and Energy

# EPBC Act Protected Matters Report

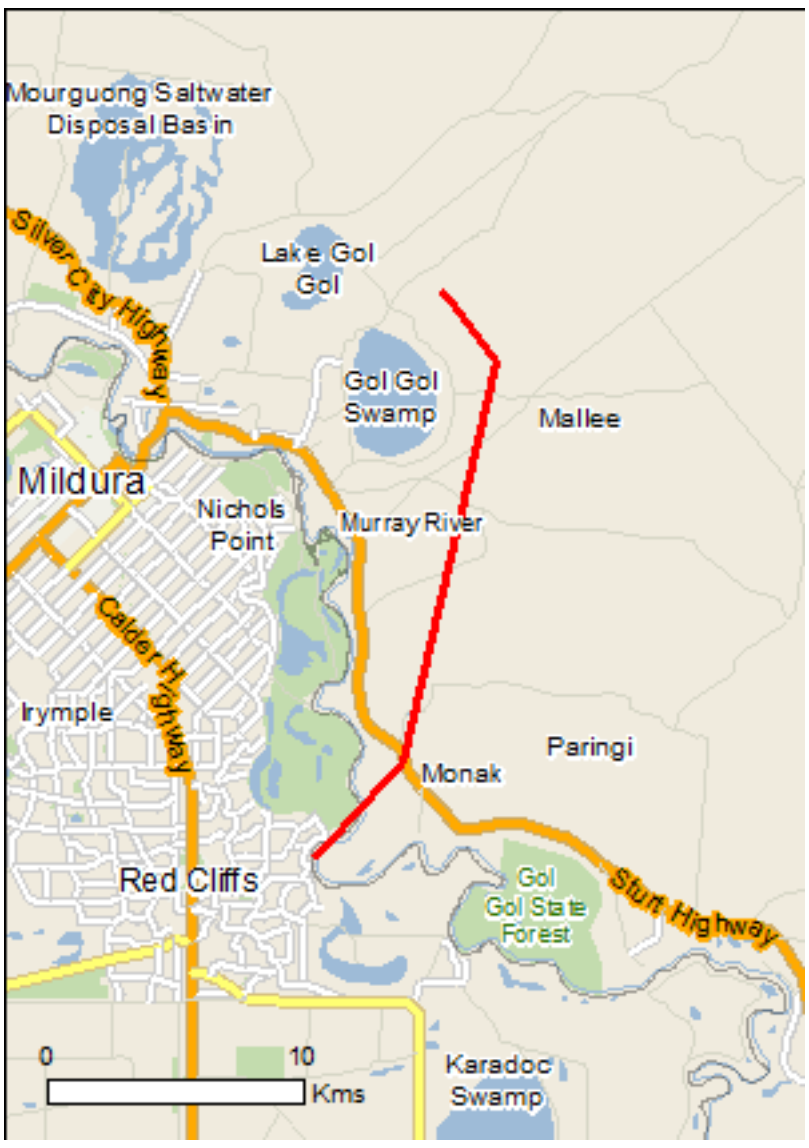
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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.

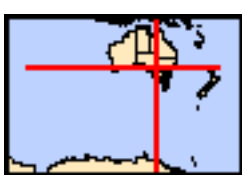
Report created: 18/02/19 11:57:32






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

Coordinates
Buffer: 15.0Km



# Summary

## Matters of National Environmental Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | 3 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 2 |
| Listed Threatened Species: | 24 |
| Listed Migratory Species: | 10 |

## 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: | 16 |
| 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: | 22 |
| Regional Forest Agreements: | None |
| Invasive Species: | 28 |
| 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 | 150 - 200km upstream |
| Riverland | 100 - 150km upstream |
| The coorong, and lakes alexandrina and albert wetland | 200 - 300km 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 |
| River Murray and associated wetlands, floodplains and groundwater systems, from the junction with the Darling River to the sea | Approval Disallowed | Community may occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Botaurus poiciloptilus<br>Australasian Bittern [1001] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat known to occur within area |
| Leipoa ocellata<br>Malleefowl [934] | Vulnerable | Species or species habitat known to occur within area |
| Manorina melanotis<br>Black-eared Miner [449] | Endangered | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pedionomus torquatus<br>Plains-wanderer [906] | Critically Endangered | Species or species habitat may occur within area |
| Pezoporus occidentalis<br>Night Parrot [59350] | Endangered | Extinct within area |
| Polytelis anthopeplus  monarchoides<br>Regent Parrot (eastern) [59612] | Vulnerable | Breeding likely to occur within area |
| Rostratula australis<br>Australian Painted-snipe, Australian Painted Snipe | Endangered | Species or species |

| Name | Status | Type of Presence |
|---|---|---|
| [77037] | | habitat likely to occur within area |
| **Fish** | | |
| Bidyanus bidyanus | | |
| Silver Perch, Bidyan [76155] | Critically Endangered | Species or species habitat known to occur within area |
| Craterocephalus fluviatilis | | |
| Murray Hardyhead [56791] | Endangered | Species or species habitat known to occur within area |
| Galaxias rostratus | | |
| Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745] | Critically Endangered | Species or species habitat 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 may occur within area |
| **Frogs** | | |
| Litoria raniformis | | |
| Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828] | Vulnerable | Species or species habitat known to occur within area |
| **Mammals** | | |
| Nyctophilus corbeni | | |
| Corben's Long-eared Bat, South-eastern Long-eared Bat [83395] | Vulnerable | Species or species habitat likely to occur within area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Vulnerable | Species or species habitat may occur within area |
| **Plants** | | |
| Caladenia tensa | | |
| Greencomb Spider-orchid, Rigid Spider-orchid [24390] | Endangered | Species or species habitat likely to occur within area |
| Lepidium monoplocoides | | |
| Winged Pepper-cress [9190] | Endangered | Species or species habitat likely to occur within area |
| Pterostylis cheraphila | | |
| Floodplain Rustyhood [56508] | Vulnerable | Species or species habitat may occur within area |
| Solanum karsense | | |
| Menindee Nightshade [7776] | Vulnerable | Species or species habitat known to occur within area |
| Swainsona murrayana | | |
| Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765] | Vulnerable | Species or species habitat likely to occur within area |
| Swainsona pyrophila | | |
| Yellow Swainson-pea [56344] | Vulnerable | Species or species habitat likely 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** | | |

| Name | Threatened | Type of Presence |
|---|---|---|
| [Motacilla flava](#) | | |
| Yellow Wagtail [644] | | Species or species habitat may occur within area |
| [Myiagra cyanoleuca](#) | | |
| Satin Flycatcher [612] | | Species or species habitat may 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 known to occur within area |
| [Calidris melanotos](#) | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| [Gallinago hardwickii](#) | | |
| Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| [Numenius madagascariensis](#) | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| [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.

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| Commonwealth Land - Australian Telecommunications Commission |
| Commonwealth Land - Australian Telecommunications Corporation |
| Commonwealth Land - Commonwealth Trading Bank of Australia |
| Commonwealth Land - Commonwealth Trading Bank of Australia & Moya Grace Murphy |
| Defence - KAIRIVU BARRACKS - MILDURA |

### 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 |

| Name | Threatened | Type of Presence |
|---|---|---|
| Ardea ibis<br>Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat known to occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Chrysococcyx osculans<br>Black-eared Cuckoo [705] | | Species or species habitat known to occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Extra Information

| State and Territory Reserves | [ Resource Information ] |
|---|---|
| Name | State |
| Cardross N.C.R. | VIC |
| Kings Billabong Park | VIC |
| Lambert Island N.C.R. | VIC |
| Mallee Cliffs | NSW |
| Mildura F.F.R | VIC |
| Mildura I13 B.R | VIC |

| Name | State |
|---|---|
| Mildura I14 B.R | VIC |
| Mildura I15 B.R. | VIC |
| Mildura I221 B.R. | VIC |
| Mildura I222 B.R | VIC |
| Mildura I223 B.R | VIC |
| Morkalla - Red Cliffs Railway B.R. | VIC |
| Red Cliffs (Ovens Av) N.F.R. | VIC |
| Red Cliffs (Richardson St) N.F.R. | VIC |
| Red Cliffs N.F.R | VIC |
| Red Cliffs S.R. | VIC |
| River Murray Reserve | VIC |
| Southern Mallee | NSW |
| Yatpool F.R. | VIC |
| Yatpool I10 B.R | VIC |
| Yatpool I6 B.R | VIC |
| Yatpool Tank B.R. | VIC |

## Invasive Species

[ Resource Information ]

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

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Acridotheres tristis<br>Common Myna, Indian Myna [387] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis<br>European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |
| Turdus merula<br>Common Blackbird, Eurasian Blackbird [596] | | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Canis lupus  familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Capra hircus<br>Goat [2] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Lepus capensis<br>Brown Hare [127] | | Species or species habitat likely to occur |

| Name | Status | Type of Presence within area |
|---|---|---|
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Sus scrofa<br>Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Cabomba caroliniana<br>Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] | | Species or species habitat may occur within area |
| Carrichtera annua<br>Ward's Weed [9511] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |
| Cylindropuntia spp.<br>Prickly Pears [85131] | | Species or species habitat likely to occur within area |
| Eichhornia crassipes<br>Water Hyacinth, Water Orchid, Nile Lily [13466] | | Species or species habitat likely to occur within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Olea europaea<br>Olive, Common Olive [9160] | | Species or species habitat may occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii<br>Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497] | | Species or species habitat likely to occur within area |
| Solanum elaeagnifolium<br>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 |

| Nationally Important Wetlands | [ Resource Information ] |
| --- | --- |
| Name | State |
| Cardross Lakes | VIC |
| Kings  Billabong Wetlands | 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

-34.299191 142.233302,-34.271777 142.264201,-34.155374 142.296254,-34.136428 142.279088,-34.135485 142.276795,-34.135485 142.276795

# 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.


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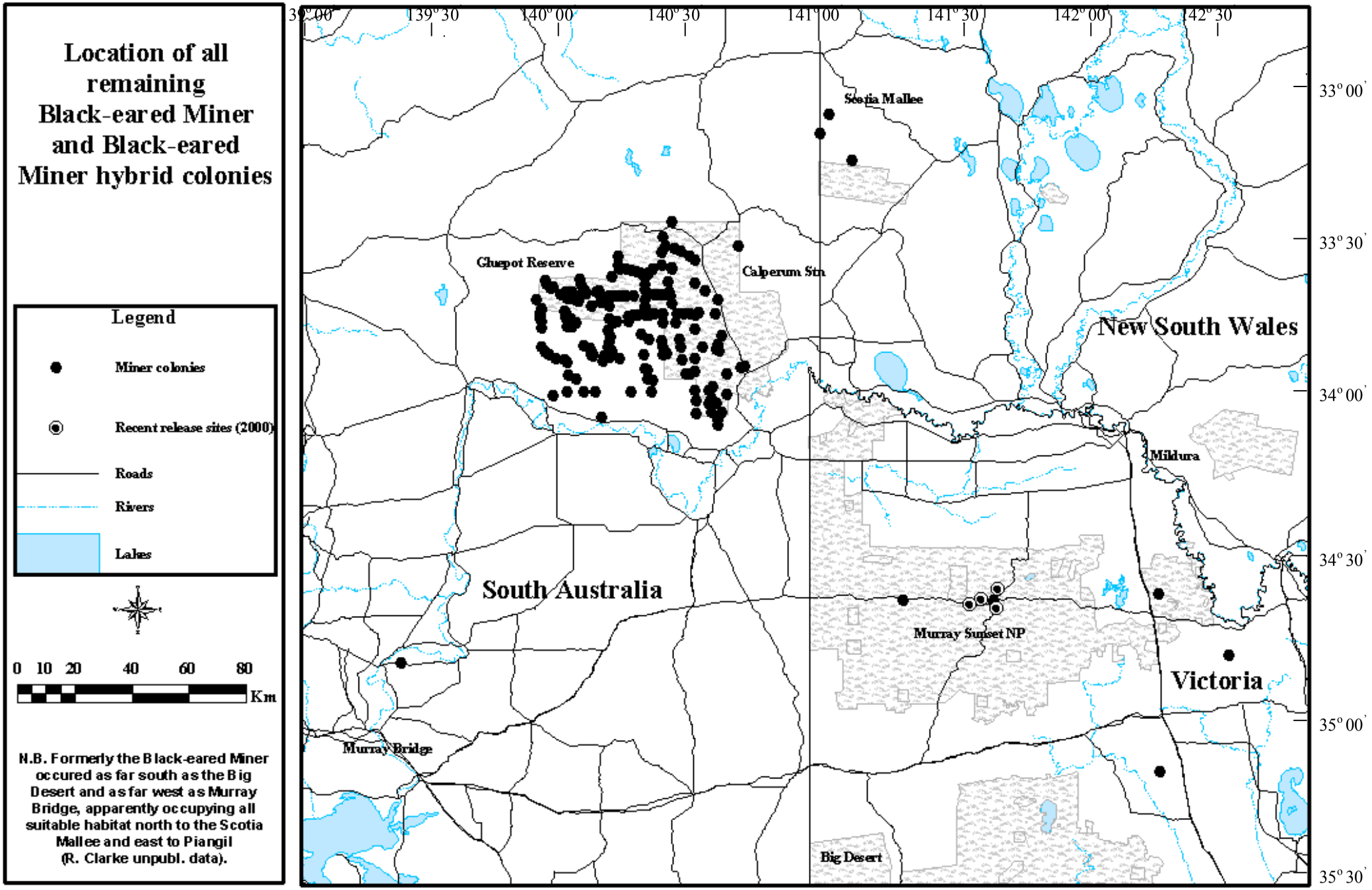
# Appendix B. Black-eared Miner Records

# Location of all remaining Black-eared Miner and Black-eared Miner hybrid colonies




N.B. Formerly the Black-eared Miner occured as far south as the Big Desert and as far west as Murray Bridge, apparently occupying all suitable habitat north to the Scotia Mallee and east to Piangil (R. Clarke unpubl. data).