APPENDIX F3

Assessment of SA Government water supply pipeline ancillary infrastructure

Preliminary Assessment of SA Government Water Supply Pipeline Ancillary Infrastructure

18 November 2008

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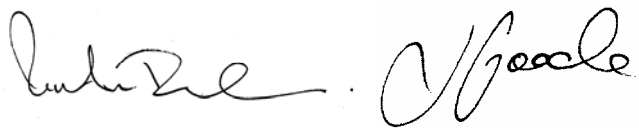
Signed: 

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1. Introduction

1.1 Background

BHP Billiton Olympic Dam Corporation Pty Ltd (BHPB) and the Government of South Australia (SA) propose to construct and operate a desalination plant, under a Memorandum of Understanding. The proposed desalination plant would support the Olympic Dam mine expansion and replace the water currently supplied to the Upper Spencer Gulf and the Northern Eyre Peninsula communities. The Murray River is the existing water source for these areas and is connected via the Morgan-Whyalla No.1 and No.2 pipeline systems.

The South Australian Government estimates that by 2050 water demand in the area will reach 65 megalitres per day average daily flow and 80 megalitres per day peak flow. Water from the proposed desalination plant would be supplied through additional water infrastructure (see Figure 1.1) and partial utilisation of the existing Morgan-Whyalla No.1 and No.2 pipeline systems to meet this demand.

The additional infrastructure that is proposed to support the desalination plant is illustrated in Figure 1.1 and includes:

- 684 ML storage at Whyalla
- pumping station at Lincoln Gap
- 540 ML storage and pumping station at Baroota
- pumping station at Hughes Gap
- pumping station at Winninowie.

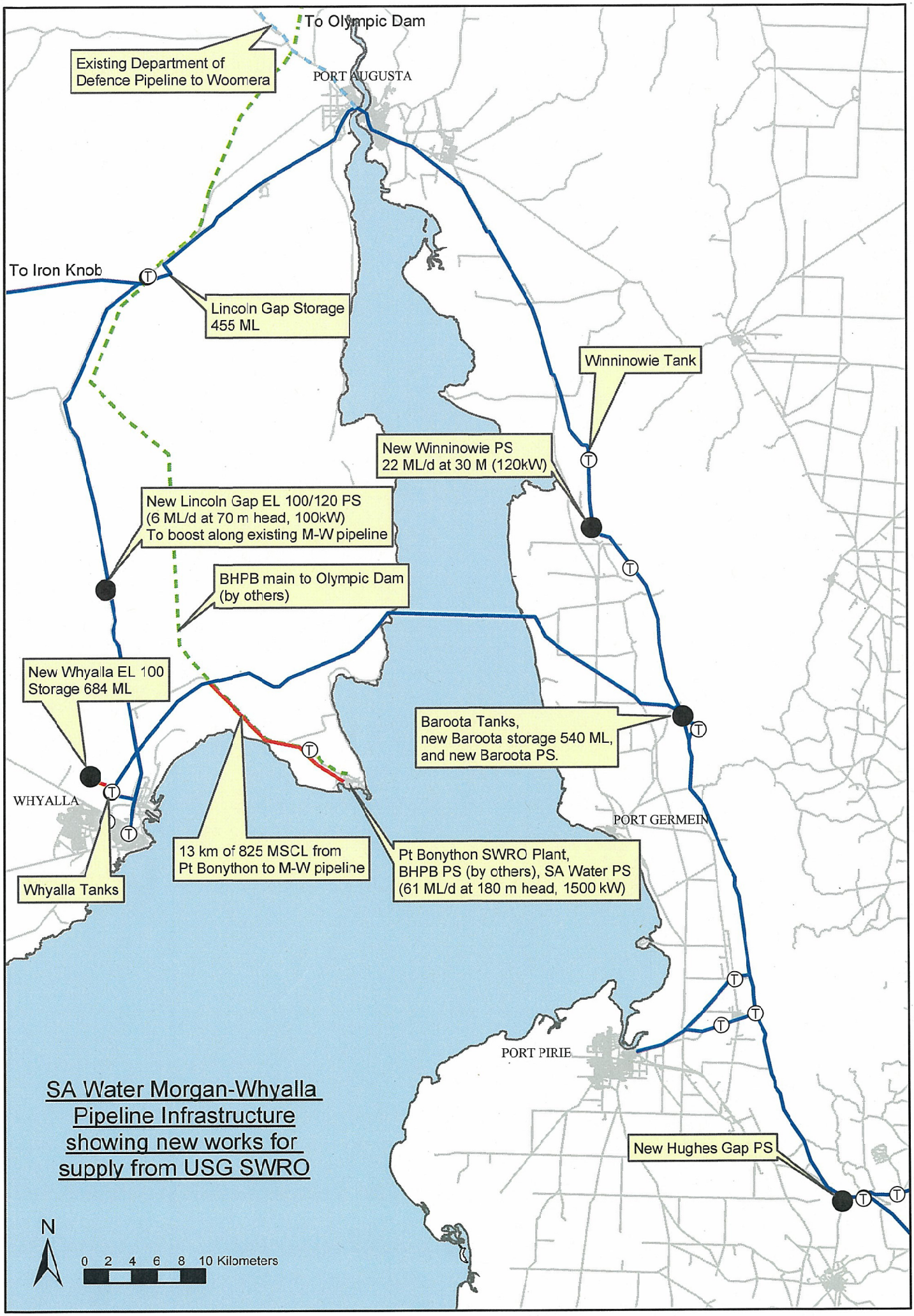
This report assesses the environmental risks associated with a trigger of the *Environment Protection and Biodiversity Conservation Act 1999* as well as a preliminary desktop assessment of environmental impacts associated with the project. The assessment covers only the two additional water storage dams and three pumping stations listed above. The desalination plant and associated pipelines are not subject to this assessment, but are fully assessed in the EIS.

1.2 Structure of this report

This report is written in six separate chapters:

- Chapter 1 Introduction – Provides a brief description of the background and location of the proposed works.
- Chapter 2 Methods – Describes the methods used to complete this assessment.
- Chapter 3 Existing environment – Describes the existing environment at the five proposed infrastructure locations.
- Chapter 4 Matters of National Environmental Significance – Outlines the Matters of National environmental Significance (MNES) potentially present in the area of the proposed infrastructure.

- Chapter 5 Likely Impacts – Describes the potential impacts that the proposed works would have during construction and operation with regard to MNES and environmental impacts in general.


To Olympic Dam
Existing Department of Defence Pipeline to Woomera
PORT AUGUSTA
To Iron Knob
Lincoln Gap Storage 455 ML
Winninowie Tank
New Winninowie PS 22 ML/d at 30 M (120kW)
New Lincoln Gap EL 100/120 PS (6 ML/d at 70 m head, 100kW) To boost along existing M-W pipeline
BHPB main to Olympic Dam (by others)
New Whyalla EL 100 Storage 684 ML
Baroota Tanks, new Baroota storage 540 ML, and new Baroota PS.
WHYALLA
PORT GERMEIN
13 km of 825 MSCL from Pt Bonython to M-W pipeline
Pt Bonython SWRO Plant, BHPB PS (by others), SA Water PS (61 ML/d at 180 m head, 1500 kW)
Whyalla Tanks
PORT PIRIE
New Hughes Gap PS
SA Water Morgan-Whyalla Pipeline Infrastructure showing new works for supply from USG SWRO
N
0 2 4 6 8 10 Kilometers

2. Methods

This preliminary *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) assessment was undertaken as a desk-top study and preliminary field assessment. The existing environment was determined using the South Australian Department for Environment and Heritage online NatureMaps search tool (Department for Environment and Heritage, accessed 17 July 2008). These searches included determining broadscale vegetation types at the infrastructure locations as well as results of any biodiversity surveys completed near those locations. Results from the biodiversity survey site closest to the proposed infrastructure were used to determine the flora and fauna species present in the general area. The results of these searches are summarised in Chapter 3.

The Matters of National Environmental Significance (MNES) present around the proposed infrastructure and downstream of Morgan were identified using the Australian Government Department of the Environment, Water, Heritage and the Arts online protected matters search tool (Department of the Environment, Water, Heritage and the Arts, accessed 18 July 2008). An area of approximately 6 km^2 was searched. The results of these searches are summarised in Chapter 3.

Further, consideration was given to the environmental impacts associated with the construction and operation of the proposed infrastructure. Construction impacts included assessing terrestrial ecology, air quality, topography, surface water, hydrology, noise and visual amenity. Operation impacts consisted of the effects of no longer extracting water to supply the Upper Spencer Gulf and Northern Eyre Peninsula communities. The conclusions drawn are described in Section 5.2.

A brief field inspection was undertaken on the 30 September 2008 at three of the proposed infrastructure sites: Hughes Gap, Baroota and Winninowie. The aim of the field assessments was to determine if the critically endangered *Eucalyptus odorata* Woodland was present at or near any of the potential sites.

2.1 Limitations

This assessment is largely desk-based and is limited by the availability of publically available data. The exact location of the infrastructure is not at this stage known and so determination of the likely presence of threatened biodiversity, matters of national environmental significance and other environmentally sensitive areas is predictive only.

3. Existing environment

This chapter described the general biological environment at each of the proposed infrastructure sites based on the desk-based searches.

3.1 Whyalla storage

3.1.1 Vegetation communities and general landform

Three broadscale vegetation communities have been mapped in the general area of the proposed Whyalla storage site.

Chenopod shrubland

This community consist of a *Maireana sedifolia* mid sparse shrubland over *Enchylaena tomentosa* var. *tomentosa*, *Rhagodia spinescens*, and *Austrostipa* sp. Shrubs.

Acacia woodland

This community consists of Acacia papyrocarpa low woodland over Atriplex vesicaria ssp., *Maireana sedifolia, Enchylaena tomentosa* var*. tomentosa* and *Rhagodia ulicina* low shrubs.

Shrubland >1m

This community consists of *Senna artemisioides* ssp., +/- *Acacia calamifolia*, +/- *Eremophila longifolia* mid shrubland.

The landform in the area comprises of plains and the soil is composed of sandy loam to clay loam (refer Figure 3.1).

3.1.2 Specific flora survey sites

A survey of the coastal dune and cliff top was undertaken on 8 August 1996 (Department for Environment and Heritage 2008) at a site approximately 13 km to the north east of the proposed Whyalla site.

The landform at the survey site is consolidated dunefield and the surface soil texture is composed of sand. Results from the survey included 16 plant species in the area; 15 native and one introduced species (refer Table 3.1).

3.1.3 Specific fauna survey sites

No fauna surveys have been undertaken in the area around the proposed Whyalla storage tank (Department for Environment and Heritage 2008). The nearest fauna survey was undertaken approximately 43 km south of the proposed site.

FIGURE 3.1
General landscape and location of the Whyalla storage tank site

Table 3.1 Species of plant recorded near the Whyalla storage site

Scientific name	Common name	Cover/abundance
Trees		
Myoporum platycarpum.	False Sandalwood	5-25%
Mallees		
'Eucalyptus oleosa (NC)'	Red Mallee	25-50%
Eucalyptus gracilis	Yorrell	5-25%
Shrubs		
Alectryon oleifolius ssp. canescens	Bullock Bush	5-25%
Atriplex vesicaria ssp.	Bladder Saltbush	5-25%
Geijera linearifolia	Sheep Bush	5-25%
Rhagodia parabolica	Mealy Saltbush	5-25%
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	sparsely present
Tetragonia implexicoma	Bower Spinach	sparsely present
Acacia oswaldii	Umbrella Wattle	1-10 individuals
Grasses		
Austrostipa elegantissima	Feather Spear-grass	sparsely present
Mat Plants		
Carpobrotus sp.	Pigface	<5%
Herbaceous Species		
Calandrinia sp.	Purslane/Parakeelya	<5%

Scientific name	Common name	Cover/abundance
'Crassula sieberiana ssp. tetramera (NC)'	Australian Stonecrop	<5%
'Senecio glossanthus (NC)'	Annual Groundsel	<5%
**Sisymbrium erysimoides*	Smooth Mustard	<5%

* introduced species; NC – Indicates that the plant species is a non valid name which has been superseded by taxonomic changes

3.2 Lincoln Gap pumping station

3.2.1 Vegetation communities and general landform

No broadscale vegetation mapping is available in the area of the proposed Lincoln Gap pumping station. Nearby Roadside vegetation mapping (North Eastern Eyre Peninsula TSA (Subset 1 – Nov 2002)) indicates that nearby vegetation consist of:

Atriplex vesicaria Low Shrubland

This vegetation association has dominant species consisting of *Atriplex vesicaria* and *Maireana pyramidata*.

An aerial view of the area is provided in Figure 3.2.

FIGURE 3.2
General location of the proposed Lincoln Gap pumping station site

3.2.2 Specific flora survey sites

No vegetation surveys have been undertaken in the area around the proposed Lincoln Gap pumping station (Department for Environment and Heritage 2008). The nearest vegetation survey is approximately 20 km away.

3.2.3 Specific fauna survey sites

No fauna surveys have been undertaken in the area around the proposed Lincoln Gap pumping station (Department for Environment and Heritage 2008). The nearest fauna survey was undertaken approximately 60 km south of the proposed site.

3.3 Baroota storage

3.3.1 Vegetation communities and general landform

No broadscale vegetation has been mapped at the site of the proposed Baroota storage tank. The nearest mapped vegetation consists of:

Acacia shrubland

This community is listed as *Acacia victoriae* ssp., +/- *Lycium ferocissimum* tall shrubland over *Avena* sp., *Enchylaena tomentosa* var. *tomentosa*, *Critesion murinum*, *Echium plantagineum* tussock grasses.

The general landform of the site is shown in Figure 3.3.

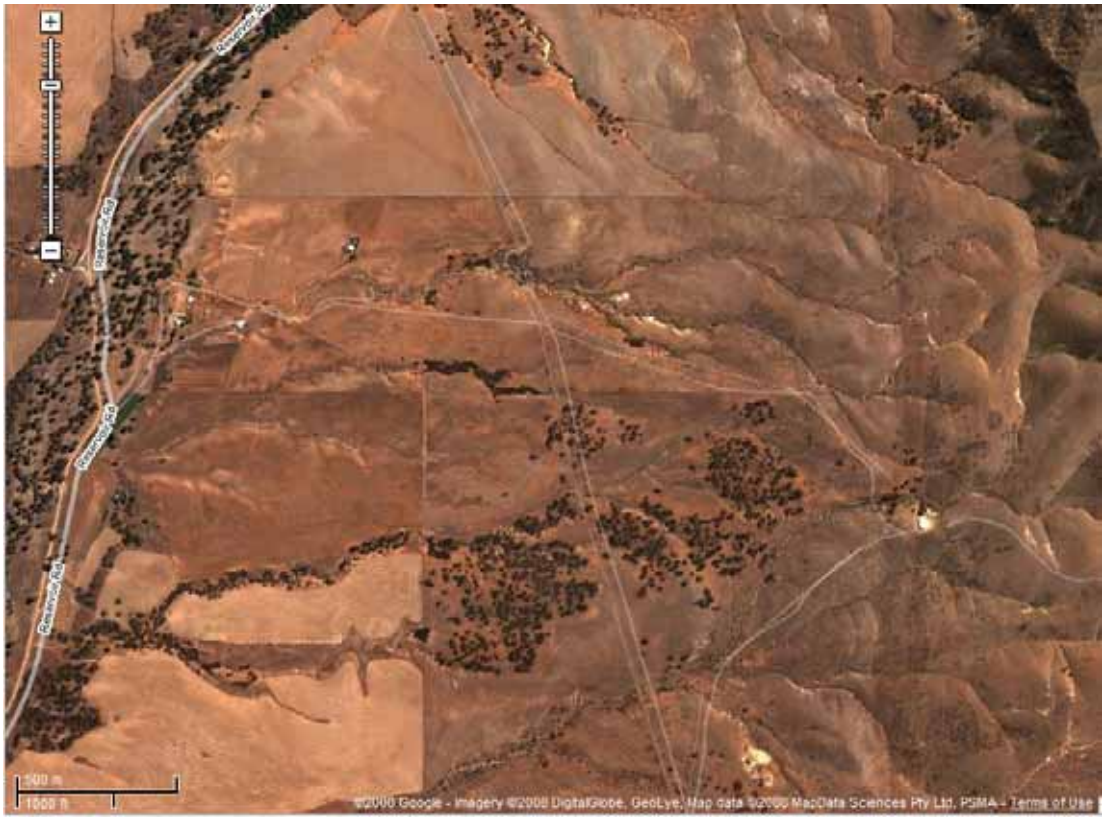


FIGURE 3.3
General location of the proposed Baroota storage site

3.3.2 Specific flora survey sites

A survey of the Northern Spencer Gulf was undertaken on 14 October 1996 (Department for Environment and Heritage 2008). This site is approximately 2 km to the south-west of the proposed Baroota storage site.

The landform at the survey site is plain and the surface soil texture is composed of sandy loam. Results from the survey included 32 species of plant in the area: 19 native and 13 introduced species (Table 3.2).

Table 3.2 Species of plant near the Baroota storage site

Scientific name	Common name	Cover/abundance
Trees		
Myoporum platycarpum.	False Sandalwood	1-10 individuals
Shrubs		
Atriplex stipitata	Bitter Saltbush	5-25%
Atriplex vesicaria.	Bladder Saltbush	5-25%
Maireana turbinata	Top-fruit Bluebush	5-25%
Nitraria billardierei	Nitre-bush	5-25%
Rhagodia spinescens	Spiny Saltbush	5-25%
Sclerolaena diacantha	Grey Bindyi	<5%
Chenopodium desertorum ssp. desertorum	Frosted Goosefoot	sparsely present
Dissocarpus paradoxus	Ball Bindyi	sparsely present
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	sparsely present
Sclerolaena obliquicuspis	Oblique-spined Bindyi	sparsely present
Grasses		
**Hordeum glaucum*	Blue Barley-grass	25-50%
Austrostipa elegantissima	Feather Spear-grass	5-25%
**Bromus rubens*	Red Brome	5-25%
Austrodanthonia caespitosa	Common Wallaby-grass	<5%
Austrostipa nitida	Balcarra Spear-grass	sparsely present
**Lamarckia aurea*	Toothbrush Grass	sparsely present
**Schismus barbatus*	Arabian Grass	sparsely present
**Vulpia muralis*	Wall Fescue	sparsely present
Mat Plants		
**Galenia pubescens var. pubescens*	Coastal Galenia	sparsely present
Herbaceous Species		
**Carrichtera annua*	Ward's Weed	25-50%
**Medicago polymorpha var. polymorpha*	Burr-medic	25-50%
**Medicago minima var. minima*	Little Medic	<5%
Calotis hispidula	Hairy Burr-daisy	sparsely present
'Crassula sieberiana ssp. tetramera (NC	Australian Stonecrop	sparsely present
Daucus glochidiatus	Native Carrot	sparsely present
**Hypochaeris glabra*	Smooth Cat's Ear	sparsely present
**Sisymbrium erysimoides*	Smooth Mustard	sparsely present

Scientific name	Common name	Cover/abundance
*'Sonchus oleraceus (NC)'	Common Sow-thistle	sparsely present
Tetragonia eremaea	Desert Spinach	sparsely present
**Malva parviflora*	Small-flower Marshmallow	1-10 individuals
Mosses and Lichens etc.		
Moss sp.		sparsely present

* introduced species; NC - indicates that the plant species is a non valid name which has been superseded by taxonomic changes

3.3.3 Specific fauna survey sites

A fauna survey of Flinders Range was undertaken on 23 November 1999 at a location approximately 10 km away from the proposed Baroota site (Department for Environment and Heritage 2008).

The landform at the survey site is a gorge and the surface soil texture is composed of sandy clay loam. The dominant overstorey is *Eucalyptus camldulensis var. camaldunensis* open forest and the dominant understorey species are *Eremophila santalina* and *Acacia iteaphylla*.

Results from the survey suggest that there are 54 species of animal in the area: 51 native and three introduced species (Table 3.3).

Table 3.3 Species of animal recorded near the Baroota storage site

Scientific name	Common name	No. of observations
Amphibians		
Crinia riparia	Flinders Ranges Froglet	2
Limnodynastes tasmaniensis	Spotted Marsh Frog	2
Birds		
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	11
Acanthiza apicalis	Inland Thornbill	2
Artamus cyanopterus	Dusky Woodswallow	2
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)	5
Cacatua roseicapilla	Galah	4
Calamanthus pyrrhopygia	Chestnut-rumped Heathwren	5
Colluricincla harmonica	Grey Shrike-thrush	4
Corvus mellori	Little Raven	1
Cracticus torquatus	Grey Butcherbird	1
Drymodes brunneopygia	Southern Scrub-robin	2
Geopelia placida	Peaceful Dove	3
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	5
Hirundo neoxena	Welcome Swallow	8
Lichenostomus chrysops	Yellow-faced Honeyeater	1
Lichenostomus plumulus	Grey-fronted Honeyeater)	12
Lichenostomus virescens	Singing Honeyeater	4

Scientific name	Common name	No. of observations
Malurus lamberti	Variegated Fairy-wren	7
Melopsittacus undulatus	Budgerigar	1
Pachycephala inornata	Gilbert's Whistler	3
Pachycephala rufiventris	Rufous Whistler	5
Pardalotus striatus	Striated Pardalote	1
Petrochelidon nigricans	Tree Martin	8
Phaps elegans	Brush Bronzewing	5
Platycercus elegans	Crimson Rosella	3
Pomatostomus superciliosus	White-browed Babbler	4
Rhipidura albiscapa	Grey Fantail	2
Rhipidura leucophrys	Willie Wagtail	1
Smicrornis brevirostris	Weebill	6
Stagonopleura guttata	Diamond Firetail	1
**Turdus merula*	Eurasian Blackbird	3
Zosterops lateralis	Silvereye	3
Mammals		
**Felis catus*	Cat	1
Macropus fuliginosus	Western Grey Kangaroo	6
Macropus robustus	Euro	11
**Mus musculus*	House Mouse	10
Petrogale xanthopus	Yellow-footed Rock-wallaby	8
Tachyglossus aculeatus	Short-beaked Echidna	1
Reptiles		
Christinus marmoratus	Marbled Gecko	1
Cryptoblepharus cf plagiocephalus (NC)	Desert Wall skink	6
Ctenophorus decresii	Tawny Dragon	12
Ctenotus robustus	Eastern Striped Skink	3
Egernia margaretae	Masked Rock Skink	34
Egernia stokesii	Gidgee Skink	1
Egernia striolata	Eastern Tree Skink	32
Gehyra 2n=44	Southern Rock Dtella	2
Heteronotia binoei	Bynoe's Gecko	4
Lerista bougainvillii	Bougainville's Skink	4
Lerista muelleri	Dwarf Three-toed Slider	1
Morethia boulengeri	Common Snake-eye	8
Pogona vitticeps	Central Bearded Dragon	1
Pygopus lepidopodus	Common Scaly-foot	1
Tiliqua rugosa	Sleepy Lizard	2

* introduced species

3.3.4 Site inspection

A field inspection was undertaken on 30 September 2008 at the proposed location of the new Baroota infrastructure, cropping paddocks were located either side of the existing pipeline and dominated the landscape. A *Eucalyptus camaldulensis* Woodland was located in the main drainage line through the area and an Acacia Shrubland was found close to some sections of the existing pipe. Several scattered trees appeared to be *Eucalyptus odorata* (could not be confirmed due to lack of access), however, these were scattered within the cropped areas.

Photograph 3.1 is a general photo showing a typical view of the vegetation in the area (photo looking north along existing pipeline location, taken from location point 54H 224682; 6353234).

PHOTOGRAPH 3.1
General photo of the general location of the new Baroota infrastructure

3.4 Hughes Gap pumping station

3.4.1 Vegetation communities and general landform

No broadscale vegetation is mapped at in the area of the proposed Hughes Gap pumping station. Nearby mapped vegetation includes:

***Eucalyptus* forest and woodland**

This community consist of *Eucalyptus odorata*, *+/-Allocasuarina verticillata* low woodland over *Bursaria spinosa* ssp. *spinosa*, *Acacia pycnantha* shrubs over *Dianella revoluta*,

Lepidosperma viscidum, Maireana enchylaenoides, Lomandra multiflora ssp. *dura*, *Austrostipa elegantissima, Triodia scariosa*, *Austrodanthonia caespitosa* tussock grasses.

An aerial view of the general area is provided in Figure 3.4.

FIGURE 3.4
General location of the proposed Hughes Gap pumping station

3.4.2 Specific flora survey sites

A survey of the Midnorth was undertaken on 20 October 1992 at a location approximately 2 km from the proposed Hughes gap site.

The landform at the survey site is hill slopes and the surface soil texture is composed of sandy loam. Results from the survey recorded 37 species of plant in the area: 22 native and 15 introduced species (Table 3.4).

Table 3.4 Species of plant recorded near the Hughes Gap pumping station

Scientific name	Common name	Cover/abundance
Mallees		
Eucalyptus odorata	Peppermint Box	<5%
'Eucalyptus socialis (NC)'	Beaked Red Mallee	<5%

Scientific name	Common name	Cover/abundance
Shrubs		
'Acacia calamifolia (NC)'	Wallowa	5-25%
Bursaria spinosa ssp. spinosa	Sweet Bursaria	5-25%
Daviesia genistifolia	Broom Bitter-pea	<5%
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris	<5%
**Lycium ferocissimum*	African Boxthorn	sparsely present
Pittosporum angustifolium	Native Apricot	1-10 individuals
Grasses		
**Aira cupaniana*	Small Hair-grass	<5%
Austrostipa scabra ssp. scabra	Rough Spear-grass	<5%
**Avena barbata*	Bearded Oat	<5%
Gramineae sp.	Grass Family	<5%
**Brachypodium distachyon*	False Brome	sparsely present
**Bromus diandrus*	Great Brome	sparsely present
**Bromus rubens*	Red Brome	sparsely present
Hummock Grasses		
'Triodia sp. (NC)'	Spinifex	5-25%
Sedges, Rushes and Related Life Forms		
Dianella revoluta var. revoluta	Black-anther Flax-lily	<5%
Lepidosperma viscidum	Sticky Sword-sedge	<5%
Lomandra effusa	Scented Mat-rush	<5%
Herbaceous Species		
**Anagallis arvensis*	Pimpernel	<5%
**'Hedypnois rhagadioloides (NC)'*	Cretan Weed	sparsely present
**Hypochaeris glabra*	Smooth Cat's Ear	sparsely present
Maireana enchylaenoides	Wingless Fissure-plant	sparsely present
**Moraea setifolia*	Thread Iris	sparsely present
'Oxalis perennans (NC)'	Native Sorrel	sparsely present
**Petrorhagia dubia*	Velvet Pink	sparsely present
Schenkia australis	Spike Centaury	sparsely present
Stackhousia monogyna	Creamy Candles	sparsely present
**Trifolium campestre*	Hop Clover	sparsely present
Wahlenbergia stricta ssp. stricta	Tall Bluebell	sparsely present
**Carduus tenuiflorus*	Slender Thistle	1-10 individuals
Chenopodium desertorum ssp. microphyllum	Small-leaf Goosefoot	1-10 individuals
Convolvulus remotus	Grassy Bindweed	1-10 individuals
**Erodium cicutarium*	Cut-leaf Heron's-bill	1-10 individuals
Galium migrans	Loose Bedstraw	1-10 individuals
**Marrubium vulgare*	Horehound	1-10 individuals
Veronica plebeia	Trailing Speedwell	1-10 individuals

* introduced species; NC – indicates that the plant species is a non valid name which has been superseded by taxonomic changes

3.4.3 Specific fauna survey sites

A fauna survey of Beetaloo Valley was undertaken on 1 October 2001. This site is located approximately 8 km from the proposed Hughes Gap site.

The landform at the survey site is a hill slope and the surface soil texture is composed of clay loam. The dominant overstorey is *Eucalyptus leucoxylon* and *Allocasuarina verticillata* open woodland and the dominant understorey species are *Avena barbata, Triodia scariosa ssp.* and *Austrostipa elegantissima*.

Results from the survey recorded 30 species of animal: 29 native and one introduced species (Table 3.5).

Table 3.5 Fauna species near the Hughes Gap pumping station site

Scientific name	Common name	No. of observations
Birds		
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	1
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	2
Anthochaera carunculata	Red Wattlebird	11
Artamus cyanopterus	Dusky Woodswallow	3
Cacatua roseicapilla	Galah	4
Cincloramphus mathewsi	Rufous Songlark	6
Colluricincla harmonica	Grey Shrike-thrush	1
Corvus mellori	Little Raven	2
Coturnix sp.	Quail	2
Dacelo novaeguineae	Laughing Kookaburra	1
Elanus axillaris	Black-shouldered Kite	1
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	1
Grallina cyanoleuca	Magpie-lark	2
Gymnorhina tibicen	Australian Magpie	2
Hirundo neoxena	Welcome Swallow	2
Lalage tricolor	White-winged Triller	1
Lichenostomus penicillatus	White-plumed Honeyeater	4
Lichenostomus virescens	Singing Honeyeater	3
Ocyphaps lophotes	Crested Pigeon	1
Pardalotus striatus	Striated Pardalote	1
Petrochelidon nigricans	Tree Martin	1
Phaps chalcoptera	Common Bronzewing	2
Platycercus elegans	Crimson Rosella	10
Rhipidura albiscapa	Grey Fantail	1
Rhipidura leucophrys	Willie Wagtail	2
Smicrornis brevirostris	Weebill	1
**Sturnus vulgaris*	Common Starling	1

Scientific name	Common name	No. of observations
Reptiles		
Cryptoblepharus pannosus	Desert Wall skink	8
Morethia boulengeri	Common Snake-eye	2
Tiliqua rugosa	Sleepy Lizard	1

* introduced species

3.4.4 Site inspection

A site assessment was undertaken on 30 September 2008 at the New Hughes Gap PS site. The Hughes Gap location consisted primarily of cleared cropping land adjacent to the existing pipelines. *Eucalyptus odorata* was located within the area but the trees were growing as scattered trees in the cropping areas or in exotic grasslands. A number of trees (varying local and non-local species) have also been planted in the area and adjacent to the existing SA Water tanks. What appeared to be *Eucalyptus odorata* Woodland (could not get close enough to confirm tree species) was observed in the surrounding landscape, primarily on the tops of hills (at least 350 m from existing pipeline). Several *Eucalyptus odorata* trees were growing just west of the Hughes Gap Road and Gladstone – Pt Pirie Road intersection adjacent to a drainage line. Photograph 3.2 is a general photo showing a typical view of the vegetation in the area (photo looking west along existing pipeline, taken from location point 54H 24606; 6313289).

PHOTOGRAPH 3.2
General photo of the general location for the new Hughes Gap PS

3.5 Winninowie pumping station

3.5.1 Vegetation communities and general landform

Broadscale vegetation mapping indicated one community near the area of the Winninowie pumping station.

Chenopod shrubland

This community consist of a *Maireana pyramidata* dominated mid sparse shrubland over *Austrostipa* sp., *Rhagodia spinescens, Enchylaena tomentosa* var*. tomentosa* tussock grasses.

An aerial view of the general location is provided in Figure 3.5.

FIGURE 3.5
General location of the proposed Winninowie pumping station

3.5.2 Specific flora survey sites

A survey of the Northern Spencer Gulf was undertaken on 16 October 1996 at a location approximately 1 km to the south east of the proposed pumping station.

The landform at the survey site is plain and the surface soil texture is composed of loam. Results from the survey recorded 34 species of plant in the area: 23 native and 11 introduced species (Table 3.6).

Table 3.6 Species of plant near the Winninowie storage site

Scientific name	Common name	Cover/abundance
Trees		
Casuarina pauper	Black Oak	5-25%
Alectryon oleifolius ssp. *canescens*	Bullock Bush	sparsely present
Shrubs		
Maireana pyramidata	Black Bluebush	25-50%
Atriplex vesicaria	Bladder Saltbush	<5%
Atriplex lindleyi ssp. *inflata*	Corky Saltbush	sparsely present
Atriplex spongiosa	Pop Saltbush	sparsely present
Chenopodium desertorum ssp. *anidiophyllum*	Mallee Goosefoot	sparsely present
Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush	sparsely present
Rhagodia spinescens	Spiny Saltbush	sparsely present
Zygophyllum crenatum	Notched Twinleaf	sparsely present
Dissocarpus biflorus	Two-horn Saltbush	1-10 individuals
Maireana sedifolia	Bluebush	1-10 individuals
Grasses		
**Hordeum glaucum*	Blue Barley-grass	<5%
**Lamarckia aurea*	Toothbrush Grass	<5%
**Aira cupaniana*	Small Hair-grass	sparsely present
Austrodanthonia setacea	Small-flower Wallaby-grass	sparsely present
Austrostipa sp.	Spear-grass	sparsely present
**Schismus barbatus*	Arabian Grass	sparsely present
**Vulpia muralis*	Wall Fescue	sparsely present
Herbaceous Species		
**Carrichtera annua*	Ward's Weed	<5%
**Medicago minima* var. *minima*	Little Medic	<5%
**Mesembryanthemum nodiflorum*	Slender Iceplant	<5%
Tetragonia eremaea	Desert Spinach	<5%
Brachyscome lineariloba	Hard-head Daisy	sparsely present
Calotis hispidula	Hairy Burr-daisy	sparsely present
Chenopodium cristatum	Crested Goosefoot	sparsely present
Crassula colorata var.	Dense Crassula	sparsely present
**Herniaria cinerea*	Rupturewort	sparsely present
Lepidium papillosum	Warty Peppercress	sparsely present
**Sisymbrium erysimoides*	Smooth Mustard	sparsely present
**'Sonchus oleraceus (NC)'*	Common Sow-thistle	sparsely present
'Zygophyllum ammophilum (NC)'	Sand Twinleaf	1-10 individuals
Mosses and Lichens etc.		
Lichen sp.		sparsely present
Moss sp.		sparsely present

* introduced species; NC - indicates that the plant species is a non valid name which has been superseded by taxonomic changes

3.5.3 Specific fauna survey sites

A fauna survey of Mount Remarkable National Park was undertaken on 15 May 1988 at a site approximately 9 km away from the proposed pumping station.

The survey site is on hill footslopes and the surface soil texture is composed of sandy clay loam. No vegetation association information is available for this site.

Only two species of animal were recorded during these surveys (Table 3.7).

Table 3.7 Species of animal recorded near the Winninowie storage site

Scientific name	Common name	No. of observations
Amphibians		
Limnodynastes tasmaniensis	Spotted marsh frog	1
Mammals		
**Mus musculus*	House mouse	2

* introduced species

3.5.4 Site inspection

At the proposed location of the new Winnonowie Pump Station, Chenopod Shrublands, *Eucalyptus camalduensis* Woodland (in creek line) and cropping land was observed. Access was an issue at this site, however, a visual assessment was undertaken from approximately 300 m away. Scattered Acacias were observed along fence lines and adjacent to the existing pipeline, however not trees resembling *Eucalyptus odorata* were observed.

PHOTOGRAPH 3.3
General photo of general location of the new Winninowie PS

Photo 3 is a general photo showing a typical view of the vegetation in the area, this photo was taken approximately 300 m away from the existing pipeline (due to limited access), but as can be seen in the photo, the area is dominated by a chenopod shrubland and not a woodland of any type (photo looking north east, taken from location point 54H 779051; 6366512). It is considered that no *Eycalyptus odorata* Woodland or scattered *Eucalyptus odorata* occur at the Winninowie site.

4. Matters of national environmental significance

This chapter describes the Matters of National Environmental Significance predicted to occur at each of the five proposed infrastructure sites as well as downstream of the water extraction site at Morgan.

Matters of National Environmental Significance (MNES) include:

- listed threatened species and ecological communities
- migratory species protected under international agreements
- Ramsar wetlands
- the Commonwealth marine environment
- World Heritage properties
- National heritage places
- nuclear actions.

Any action that would have, or is likely to have, a significant impact on a matter of national environmental significance must be referred to the Minister for a decision on whether assessment and approval is required under the EPBC Act.

The results of the EPBC Act protected matters searches for the study areas are listed in the section below.

4.1 Whyalla storage

Results of the searches of the EPBC Act Protected matters search tool for the Whyalla Storage site are presented in Table 4.1.

Table 4.1 MNES predicted to occur at the Whyalla storage site area

MNES	Present in study area	Details
World heritage properties	There are no World Heritage properties within the area.	
National heritage places	There are no National Heritage places within the area.	
Wetlands of international significance	There are no wetlands of international significance within the area.	
Commonwealth marine areas	The site is not within a Commonwealth marine environment	
Threatened ecological communities	No EPBC Act listed threatened ecological communities occur within the area.	

MNES	Present in study area	Details
Threatened species	Eleven threatened species or species habitat are likely to occur within the area.	Birds ■ *Acanthiza iredalei iredalei* - Slender-billed Thornbill (western) - **V** ■ *Amytornis textilis myall* - Thick-billed Grasswren (Gawler Ranges) - **V** ■ *Diomedea gibsoni* -Gibson's Albatross - **V** ■ *Leipoa ocellata* – Malleefowl - **V** ■ *Macronectes giganteus* - Southern Giant-Petrel - **E** ■ *Macronectes halli* - Northern Giant-Petrel - **V** ■ *Thalassarche bulleri* - Buller's Albatross - **V** ■ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **V** ■ *Thalassarche impavida* - Campbell Albatross - **V** ■ Plants ■ *Halosarcia flabelliformis* - Bead Glasswort - **V** ■ *Pterostylis sp. Eyre Peninsula* - **V**
Migratory species	Migratory species or species habitat may occur within the area.	Terrestrial species ■ *Haliaeetus leucogaster* - White-bellied Sea-Eagle - **M** ■ *Hirundapus caudacutus* - White-throated Needletail - **M** ■ *Leipoa ocellata* - Malleefowl - **M** ■ *Merops ornatus* - Rainbow Bee-eater - **M** Wetland species ■ *Ardea alba* - Great Egret, White Egret - **M** ■ *Ardea ibis* - Cattle Egret - **M** ■ *Arenaria interpres* - Ruddy Turnstone - **M** ■ *Calidris acuminate* - Sharp-tailed Sandpiper - **M** ■ *Calidris alba* - Sanderling - **M** ■ *Calidris canutus* -Red Knot, Knot - **M** ■ *Calidris ferruginea* - Curlew Sandpiper - **M** ■ *Calidris ruficollis* - Red-necked Stint - **M** ■ *Charadrius veredus* - Oriental Plover, Oriental Dotterel - **M** ■ *Gallinago hardwickii* - Latham's Snipe, Japanese Snipe - **M** ■ *Pluvialis squatarola* - Grey Plover - **M** ■ *Tringa nebularia* - Common Greenshank, Greenshank - **M** Marine Species ■ *Apus pacificus* - Fork-tailed Swift - **M** ■ *Ardea alba* - Great Egret, White Egret - **M** ■ *Ardea ibis* - Cattle Egret - **M** ■ *Diomedea gibsoni* -Gibson's Albatross - **M** ■ *Macronectes giganteus* - Southern Giant-Petrel - **M** ■ *Macronectes halli* - Northern Giant-Petrel - **M** ■ *Thalassarche bulleri* - Buller's Albatross- **M** ■ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **M** ■ *Thalassarche impavida* - Campbell Albatross - **M**

CE – critically endangered; E – Endangered, V – Vulnerable; M - Migratory

4.2 Lincoln Gap pumping station

Results of the searches of the EPBC Act Protected matters search tool for the Lincoln Gap pumping station site are presented in Table 4.2.

Table 4.2 MNES predicted to occur at the Lincoln Gap pumping station site area

MNES	Present in study area	Details
World heritage properties	There are no World Heritage properties within the area.	
National heritage places	There are no National Heritage places within the area.	
Wetlands of international significance	There are no wetlands of international significance within the area.	
Commonwealth marine areas	The site is not within a Commonwealth marine environment	
Threatened ecological communities	No EPBC Act listed threatened ecological communities occur on site.	
Threatened species	Three threatened species or species habitat are likely to occur within the area.	Birds ▪ *Acanthiza iredalei iredalei* – Slender-billed Thornbill (western) - **V** ▪ *Amytornis textilis myall* – Thick-billed Grasswren (Gawler ranges) - **V** Plants ▪ *Pterostylis sp. Eyre Peninsula (R.Bates 19474)* - **V**
Migratory species	Ten migratory species or species habitat may occur within the area.	Wetland species ▪ *Haliaeetus leucogaster* – White-Bellied Sea Eagle - **M** ▪ *Hirundapus caudacutus* – White-Throated Needletail - **M** ▪ *Merops ornatus* – Rainbow Bee-Eater- **M** ▪ *Ardea alba* – Great Egret - **M** ▪ *Ardea ibis* – Cattle Egret - **M** ▪ *Charadrius veredus* – Oriental Plover- **M** ▪ *Gallinago hardwickii* – Latham's Snipe - **M** Marine birds ▪ *Apus pacificus* - Fork-tailed Swift - **M** ▪ *Ardea alba* – Great Egret - **M** ▪ *Ardea ibis* – Cattle Egret - **M**

CE – critically endangered; E – Endangered, V – Vulnerable; M - Migratory

4.3 Baroota storage

Results of the searches of the EPBC Act Protected matters search tool for the Baroota Storage site are presented in Table 4.3.

Table 4.3 MNES predicted to occur at the Baroota storage site

MNES	Present in study area	Details
World heritage properties	There are no World Heritage properties within the area.	
National heritage places	There are no National Heritage places within the area.	
Wetlands of international significance	There are no wetlands of international significance within the area.	
Commonwealth marine areas	The site is not within a Commonwealth marine environment	
Threatened ecological communities	There is one threatened ecological community within the area.	Peppermint box (*Eucalyptus odorata*) grassy woodland of South Australia - **CE**
Threatened species	Fifteen threatened species or species habitat are likely to occur within the area.	Birds ▪ *Acanthiza iredalei iredalei* - Slender-billed Thornbill (western) - **V** ▪ *Diomedea gibsoni* - Gibson's Albatross - **V** ▪ *Macronectes giganteus* - Southern Giant-Petrel - **E** ▪ *Macronectes halli* - Northern Giant-Petrel - **V** ▪ *Neophema chrysogaster* - Orange-bellied Parrot - **CE** ▪ *Pedionomus torquatus* - Plains-wanderer - **V** ▪ *Rostratula australis* - Australian Painted Snipe - **V** ▪ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **V** ▪ *Thalassarche impavida* - Campbell Albatross - **V** Plants ▪ *Caladenia tensa* - Greencomb Spider-orchid, Rigid Spider-orchid - **E** ▪ *Halosarcia flabelliformis* - Bead Glasswort - **V** ▪ *Olearia pannosa subsp. Pannosa* - Silver Daisy-bush - **V** ▪ *Prasophyllum pallidum* - Pale Leek-orchid - **V** ▪ *Senecio megaglossus* - Superb Groundsel - **V** ▪ *Swainsona pyrophila* - Yellow Swainson-pea - **V**

MNES	Present in study area	Details
Migratory species	Twenty-four migratory species or species habitat may occur within the area.	Terrestrial species ▪ *Haliaeetus leucogaster* - White-bellied Sea-Eagle - **M** ▪ *Hirundapus caudacutus* - White-throated Needletail - **M** ▪ *Merops ornatus* - Rainbow Bee-eater - **M** ▪ *Neophema chrysogaster* - Orange-bellied Parrot - **M** Wetland species ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M** ▪ *Arenaria interpres* - Ruddy Turnstone - **M** ▪ *Calidris acuminate* - Sharp-tailed Sandpiper - **M** ▪ *Calidris alba* – Sanderling - **M** ▪ *Calidris canutus* - Red Knot, Knot - **M** ▪ *Calidris ferruginea* - Curlew Sandpiper - **M** ▪ *Calidris ruficollis* - Red-necked Stint - **M** ▪ *Gallinago hardwickii* - Latham's Snipe, Japanese Snipe - **M** ▪ *Pluvialis squatarola* - Grey Plover - **M** ▪ *Rostratula benghalensis s. lat.* - Painted Snipe - **M** ▪ *Tringa nebularia* - Common Greenshank, Greenshank - **M** Marine birds ▪ *Apus pacificus* - Fork-tailed Swift - **M** ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M** ▪ *Diomedea gibsoni* - Gibson's Albatross - **M** ▪ *Macronectes giganteus* - Southern Giant-Petrel - **M** ▪ *Macronectes halli* - Northern Giant-Petrel - **M** ▪ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **M** ▪ *Thalassarche impavida* - Campbell Albatross - **M**

CE – critically endangered; E – Endangered, V – Vulnerable; M - Migratory

4.4 Hughes Gap pumping station

Results of the searches of the EPBC Act Protected matters search tool for the Hughes Gap pumping station site are presented in Table 4.4.

Table 4.4 MNES predicted to occur at the Hughes Gap pumping station site area

MNES	Present in study area	Details
World heritage properties	There are no World Heritage properties within the area.	

MNES	Present in study area	Details
National heritage places	There are no National Heritage places within the area.	
Wetlands of international significance	There are no wetlands of international significance within the area.	
Commonwealth marine areas	The site is not within a Commonwealth marine environment	
Threatened ecological communities	Two threatened ecological communities are likely to occur within the area.	▪ Iron-grass Natural Temperate Grassland of South Australia - **CE** ▪ Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia - **CE**
Threatened species	Ten threatened species or habitat are likely to occur within the area.	Birds ▪ *Acanthiza iredalei iredalei* - Slender-billed Thornbill (western) - **V** ▪ *Pedionomus torquatus* - Plains-wanderer - **V** ▪ Rostratula australis - Australian Painted Snipe - **V** Reptiles ▪ *Aprasia pseudopulchella* - Flinders Ranges Worm-lizard - **V** ▪ *Notechis ater ater* - Krefft's Tiger Snake (Flinders Ranges) - **V** Plants ▪ *Caladenia tensa* - Greencomb Spider-orchid, Rigid Spider-orchid -**E** ▪ *Glycine latrobeana* - Purple Clover, Clover Glycine - **V** ▪ *Prasophyllum pallidum* - Pale Leek-orchid - **V** ▪ *Senecio megaglossus* - Superb Groundsel - **V** ▪ *Swainsona pyrophila* - Yellow Swainson-pea - **V**
Migratory species	Ten migratory species or species habitat may occur within the area.	Terrestrial species ▪ *Haliaeetus leucogaster* - White-bellied Sea-Eagle - **M** ▪ *Hirundapus caudacutus* - White-throated Needletail - **M** ▪ *Merops ornatus* - Rainbow Bee-eater - **M** Wetland species ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M** ▪ *Gallinago hardwickii* - Latham's Snipe, Japanese Snipe - **M** ▪ *Rostratula benghalensis s. lat.* - Painted Snipe - **M** Migratory Marine Birds ▪ *Apus pacificus* - Fork-tailed Swift - **M** ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M**

CE – critically endangered; E – Endangered, V – Vulnerable; M - Migratory

4.5 Winninowie pumping station

Results of the searches of the EPBC Act Protected matters search tool for the Winninowie pumping station site are presented in Table 4.5.

Table 4.5 MNES predicted to occur at the Winninowie pumping station site area

MNES	Present in study area	Details
World heritage properties	There are no World Heritage properties within the area.	
National heritage places	There are no National Heritage places within the area.	
Wetlands of international significance	There are no wetlands of international significance within the area.	
Commonwealth marine areas	The site is not within a Commonwealth marine environment	
Threatened ecological communities	One threatened ecological community is likely to occur within the area.	Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia - **CE**
Threatened species	Seventeen threatened species or species habitat are likely to occur within the area.	Birds ▪ *Acanthiza iredalei iredalei* - Slender-billed Thornbill (western) - **V** ▪ *Diomedea gibsoni* - Gibson's Albatross - **V** ▪ *Macronectes giganteus* - Southern Giant-Petrel - **E** ▪ *Macronectes halli* - Northern Giant-Petrel - **V** ▪ *Neophema chrysogaster* - Orange-bellied Parrot - **CE** ▪ *Rostratula australis* - Australian Painted Snipe - **V** ▪ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **V** ▪ *Thalassarche impavida* - Campbell Albatross - **V** Reptiles ▪ *Aprasia pseudopulchella* - Flinders Ranges Worm-lizard - **V** ▪ *Notechis ater ater* - Krefft's Tiger Snake (Flinders Ranges) - **V** Plants ▪ *Caladenia gladiolata* - Bayonet Spider-orchid, Clubbed Spider-orchid - **E** ▪ *Caladenia tensa* - Greencomb Spider-orchid, Rigid Spider-orchid - **E** ▪ *Caladenia woolcockiorum* - Woolcock's Spider-orchid - **V** ▪ *Halosarcia flabelliformis* - Bead Glasswort - **V** ▪ *Olearia pannosa subsp. Pannosa* - Silver Daisy-bush - **V** ▪ *Prasophyllum pallidum* - Pale Leek-orchid - **V** ▪ *Senecio megaglossus* - Superb Groundsel - **V**

MNES	Present in study area	Details
Migratory species	Twenty four migratory species or species habitat may occur within the area.	Terrestrial species ▪ *Haliaeetus leucogaster* - White-bellied Sea-Eagle - **M** ▪ *Hirundapus caudacutus* - White-throated Needletail - **M** ▪ *Merops ornatus* - Rainbow Bee-eater - **M** ▪ *Neophema chrysogaster* - Orange-bellied Parrot - **M** Wetland species ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M** ▪ *Arenaria interpres* - Ruddy Turnstone - **M** ▪ *Calidris acuminate* - Sharp-tailed Sandpiper - **M** ▪ *Calidris alba* – Sanderling - **M** ▪ *Calidris canutus* - Red Knot, Knot - **M** ▪ *Calidris ferruginea* - Curlew Sandpiper - **M** ▪ *Calidris ruficollis* - Red-necked Stint - **M** ▪ *Gallinago hardwickii* - Latham's Snipe, Japanese Snipe - **M** ▪ *Pluvialis squatarola* - Grey Plover - **M** ▪ *Rostratula benghalensis s. lat.* - Painted Snipe - **M** ▪ *Tringa nebularia* - Common Greenshank, Greenshank - **M** Marine species ▪ *Apus pacificus* - Fork-tailed Swift - **M** ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M** ▪ *Diomedea gibsoni* - Gibson's Albatross - **M** ▪ *Macronectes giganteus* - Southern Giant-Petrel - **M** ▪ *Macronectes halli* - Northern Giant-Petrel - **M** ▪ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **M** ▪ *Thalassarche impavida* - Campbell Albatross - **M**

CE – critically endangered; E – Endangered, V – Vulnerable; M - Migratory

4.6 Murray River Catchment of Morgan

Results of the searches of the EPBC Act Protected matters search tool for the Murray River catchment of Morgan are presented in Table 4.6. The catchment searched includes a very large area across South Australia and Victoria.

Table 4.6 MNES predicted to occur at the downstream of the water extraction site at Morgan

MNES	Present in study area	Details
World heritage properties	There are no World Heritage properties downstream of Morgan.	

MNES	Present in study area	Details
National heritage places	There are no National Heritage places downstream of Morgan.	
Wetlands of international significance	There are four wetlands of international significance located within the same broadscale catchment.	▪ Banrock station wetland complex ▪ Coorong and Lakes Alexandrina and Albert ▪ Hattah-Kulkyne lakes ▪ Riverland
Commonwealth marine areas	There is one relevant Commonwealth marine area downstream of Morgan.	Australian Exclusive Economic Zone (EEZ) and Territorial Sea
Threatened ecological communities	Four threatened ecological communities are likely to occur downstream of Morgan.	▪ Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions - **E** ▪ Iron-grass Natural Temperate Grassland of South Australia - **CE** ▪ Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia - CE ▪ Swamps of the Fleurieu Peninsula - **CE**
Threatened species	Sixty-two threatened species or species habitat are likely to occur within the area.	▪ *Calyptorhynchus lathami halmaturinus* - Glossy Black-Cockatoo (South Australian), Glossy Black-Cockatoo (Kangaroo Island) - **E** ▪ *Cinclosoma punctatum anachoreta* - Spotted Quail-thrush (Mt Lofty Ranges) – **CE community** ▪ *Diomedea amsterdamensis* - Amsterdam Albatross -**E** ▪ *Diomedea dabbenena* - Tristan Albatross – **E (foraging)** ▪ *Diomedea exulans (sensu lato)* - Wandering Albatross - **V** ▪ *Diomedea gibsoni* - Gibson's Albatross - **V** ▪ *Halobaena caerulea* - Blue Petrel - **V** ▪ *Hylacola pyrrhopygia parkeri* - Chestnut-rumped Heathwren (Mt Lofty Ranges) - **E** ▪ *Lathamus discolour* - Swift Parrot -**E** ▪ *Leipoa ocellata* – Malleefowl - **V** ▪ *Macronectes giganteus* - Southern Giant-Petrel - **E** ▪ *Macronectes halli* - Northern Giant-Petrel - **V** ▪ *Manorina melanotis* - Black-eared Miner -**E** ▪ *Neophema chrysogaster* - Orange-bellied Parrot - **CE** ▪ *Pachycephala rufogularis* - Red-lored Whistler - **V** ▪ *Polytelis anthopeplus monarchoides* - Regent Parrot (eastern) – **V (breeding)** ▪ *Pterodroma mollis* - Soft-plumaged Petrel - **V** ▪ *Rostratula australis* - Australian Painted Snipe - **V** ▪ *Stipiturus malachurus intermedius* - Southern Emu-wren (Fleurieu Peninsula), Mount Lofty Southern Emu-wren - **E** ▪ *Stipiturus mallee* - Mallee Emu-wren - **V** ▪ *Thalassarche bulleri* - Buller's Albatross - **V** ▪ *Thalassarche cauta (sensu stricto)* - Shy Albatross, Tasmanian Shy Albatross - **V**

MNES	Present in study area	Details
		▪ *Thalassarche chrysostoma* - Grey-headed Albatross - **V** ▪ *Thalassarche impavida* - Campbell Albatross - **V** ▪ *Thalassarche melanophris* - Black-browed Albatross - **V** ▪ *Thalassarche salvini* - Salvin's Albatross - **V** Frogs ▪ *Litoria raniformis* - Growling Grass Frog, Southern Bell Frog, Warty Bell Frog, Green and Golden Frog - **V** Mammals ▪ *Balaenoptera musculus* - Blue Whale - **E** ▪ *Eubalaena australis* - Southern Right Whale – **E (breeding)** ▪ *Isoodon obesulus obesulus* - Southern Brown Bandicoot - **E** ▪ *Megaptera novaeangliae* - Humpback Whale - **V** ▪ *Neophoca cinerea* - Australian Sea-lion - **V** ▪ *Nyctophilus timoriensis* (South-eastern form) - Eastern Long-eared Bat - **V** Ray-finned fishes ▪ *Craterocephalus fluviatilis* - Murray Hardyhead - **V** ▪ *Maccullochella peelii peelii* - Murray Cod, Cod, Goodoo - **V** ▪ *Nannoperca obscura* - Yarra Pygmy Perch - **V** Sharks ▪ *Carcharodon carcharias* - Great White Shark - **V** Plants ▪ *Acacia menzelii* - Menzel's Wattle - **V** ▪ *Acacia pinguifolia* - Fat-leaved Wattle - **E** ▪ *Acacia rhetinocarpa* - Neat Wattle, Resin Wattle (SA) - **V** ▪ *Caladenia colorata* - Small Western Spider-orchid, Coloured Spider-orchid - **E** ▪ *Caladenia conferta* - Coast Spider-orchid - **E** ▪ *Caladenia tensa* - Greencomb Spider-orchid, Rigid Spider-orchid - **E** ▪ *Correa calycina Vulnerable Corybas* sp. Finniss (R.Bates 28794) - Finniss Helmet-orchid - **E** ▪ *Dodonaea subglandulifera* - **E** ▪ *Eucalyptus paludicola* - Mount Compass Swamp Gum - **E** ▪ *Euphrasia collina subsp. Osbornii* - Osborn's Eyebright - **E** ▪ *Glycine latrobeana* - Purple Clover, Clover Glycine - **V** ▪ *Halosarcia flabelliformis* - Bead Glasswort - **V** ▪ *Olearia pannosa subsp. Pannosa* - Silver Daisy-bush – **V**

MNES	Present in study area	Details
		▪ *Prasophyllum frenchii* - Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid -**E** ▪ *Prasophyllum murfetii* - Fleurieu Leek Orchid - **CE** ▪ *Prasophyllum pallidum* - Pale Leek-orchid - **V** ▪ *Prostanthera eurybioides* - Monarto Mintbush - **E** ▪ *Pterostylis arenicola* - Sandhill Greenhood Orchid - **V** ▪ *Pterostylis bryophila* - Hindmarsh Valley Greenhood -**CE** ▪ *Pterostylis cucullata* - Leafy Greenhood - **V** ▪ *Pterostylis* sp. Hale (R.Bates 21725) - Hale Dwarf Greenhood - **E** ▪ *Senecio macrocarpus* - Large-fruit Fireweed, Large-fruit Groundsel - **V** ▪ *Swainsona pyrophila* - Yellow Swainson-pea - **V** ▪ Thelymitra epipactoides - Metallic Sun-orchid – **E**
Migratory species	Forty-three migratory species or species habitat may occur within the area.	Migratory Terrestrial Species Birds ▪ *Haliaeetus leucogaster* - White-bellied Sea-Eagle - **M** ▪ *Hirundapus caudacutus* - White-throated Needletail - **M** ▪ *Leipoa ocellata* – Malleefowl - **M** ▪ *Manorina melanotis* - Black-eared Miner - **M** ▪ *Merops ornatus* - Rainbow Bee-eater - **M** ▪ *Neophema chrysogaster* - Orange-bellied Parrot - **M** ▪ *Stipiturus malachurus intermedius* - Southern Emu-wren (Fleurieu Peninsula), Mount Lofty Southern Emu-wren- **M** Migratory Wetland Species Birds ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret- **M** ▪ *Calidris acuminate* - Sharp-tailed Sandpiper - **M** ▪ *Calidris alba* – Sanderling - **M** ▪ *Calidris ferruginea* - Curlew Sandpiper - **M** ▪ *Calidris ruficollis* - Red-necked Stint - **M** ▪ *Gallinago hardwickii* - Latham's Snipe, Japanese Snipe - **M** ▪ *Pluvialis fulva* - Pacific Golden Plover - **M** ▪ *Rostratula benghalensis s. lat.* - Painted Snipe - **M** ▪ *Tringa nebularia* - Common Greenshank, Greenshank - **M** Migratory Marine Birds ▪ *Apus pacificus* - Fork-tailed Swift - **M** ▪ *Ardea alba* - Great Egret, White Egret - **M** ▪ *Ardea ibis* - Cattle Egret - **M**

MNES	Present in study area	Details
		▪ *Diomedea amsterdamensis* - Amsterdam Albatross - **M** ▪ *Diomedea dabbenena* - Tristan Albatross - **M** ▪ *Diomedea exulans (sensu lato)* - Wandering Albatross - **M** ▪ *Diomedea gibsoni* - Gibson's Albatross - **M** ▪ *Macronectes giganteus* - Southern Giant-Petrel - **M** ▪ *Macronectes halli* - Northern Giant-Petrel - **M** ▪ *Sterna albifrons* - Little Tern - **M** ▪ *Sterna caspia* - Caspian Tern (breeding) - **M** ▪ *Thalassarche bulleri* -Buller's Albatross - **M** ▪ *Thalassarche cauta (sensu stricto*) - Shy Albatross, Tasmanian Shy Albatross - **M** ▪ *Thalassarche chlororhynchos* - Yellow-nosed Albatross, Atlantic Yellow-nosed Albatross - **M** ▪ *Thalassarche chrysostoma* - Grey-headed Albatross - **M** ▪ *Thalassarche impavida* - Campbell Albatross - **M** ▪ *Thalassarche melanophris* - Black-browed Albatross - **M** ▪ *Thalassarche salvini* - Salvin's Albatross - **M** Migratory Marine Species Mammals ▪ *Balaenoptera edeni* - Bryde's Whale - **M** ▪ *Balaenoptera musculus* - Blue Whale - **M** ▪ *Caperea marginate* - Pygmy Right Whale - **M** ▪ *Eubalaena australis* - Southern Right Whale - **M** ▪ *Lagenorhynchus obscurus* - Dusky Dolphin - **M** ▪ *Megaptera novaeangliae* - Humpback Whale - **M** ▪ *Orcinus orca* - Killer Whale, Orca - **M** Sharks ▪ *Carcharodon carcharias* - Great White Shark - **M**

CE – critically endangered; E – Endangered, V – Vulnerable; M - Migratory

5. Potential impacts of the project

5.1 Matters of NES

5.1.1 Construction impacts

The construction of the pumping stations and storage tanks would involve the clearing of a relatively small amount of land. The infrastructure would have the following approximate footprints:

- Whyalla storage – approximately 15 ha
- Lincoln Gap pumping station – approximately 1 ha
- Winninowie pumping station – approximately 1 ha
- Baroota storage – approximately 10 ha
- Huges Gap pumping station – approximately 1 ha.

5.1.2 Impacts on threatened ecological communities

There is the potential for the two threatened ecological communities as listed under the EPBC Act to be present at the proposed infrastructure sites:

- Iron-grass Natural Temperate Grassland of South Australia (Critically Endangered) at the Hughes Gap Site.
- Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia (Critically Endangered) at the Baroota, Hughes Gap and Winninowie sites.

These communities are described below and a map of their distribution is provided in Appendix C.

Iron-grass Natural Temperate Grassland of South Australia

The Iron-grass Natural Temperate Grassland of South Australia ecological community is a natural temperate grassland. Trees and tall shrubs are absent to sparse (cover less than 10%) and tussock-forming perennial grasses and Iron-grasses dominate the ground layer. Examples of common herbs include:

- Bulbine Lily (*Bulbine bulbosa*),
- Yellow Buttons (*Chrysocephalum apiculatum*)
- Australian Bindweed (*Convolvulus erubescens*)
- Scaly Buttons (*Leptorhynchos squamatus*).

Iron-grasses (*Lomandra multiflora* ssp. *dura* and *Lomandra effusa*) are the dominant and most characteristic feature of the vegetation. The genus *Lomandra* is not a member of the true grass family (Poaceae) but belongs to the Grass-tree family (Xanthorrhoeaceae).

South Australia is the only State or Territory in which natural temperate grassland dominated by Iron-grasses is known to occur. This community extends from the western bank of the Murray River, through the Lofty Ranges and north to Mount Brown Conservation Park, west of Carrieton.

The Iron-grass Natural Temperate Grassland of South Australia ecological community generally occurs on gentle slopes of low hills on predominantly loam to clay loam soils. The

mean annual rainfall ranges from 280–600 mm/year. The community experiences a Mediterranean climate of hot dry summers and cool, wet winters with frequent frosts and a predominantly winter rainfall pattern (Department of the Environment and Water Resources, June 2007).

Based on the broadscale vegetation mapping it is unlikely that Iron-grass Natural Temperate Grassland occurs at any of the infrastructure sites.

Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia

The Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia ecological community extends from the southern Flinders Ranges to Lake Alexandrina. It is mostly found in the Flinders–Lofty Block Bioregion but patches also extend into the Murray–Darling Depression, Kanmantoo, Eyre–Yorke Block and Gawler Bioregions.

The vegetation structure is an open to dense woodland. Peppermint Box (*Eucalyptus odorata*) is the dominant tree canopy species. This community is characterised by the woodland tree form (a single main trunk at the base with low branches). The following species may also be present in the canopy:

- Grey Box (*E. microcarpa*)
- South Australian Blue Gum (*E. leucoxylon*)
- Sugar Gum (*E. cladocalyx*)
- Mallee Box (*E. porosa*)
- Drooping Sheoak (*Allocasuarina verticillata*)
- White Cypresspine (*Callitris glaucophylla*)
- Southern Cypresspine (*C. preissii*).

The ground layer mainly comprises grasses and herbs including Wallaby Grasses (*Austrodanthonia* spp.), Spear Grasses (*Austrostipa* spp.), Iron-grasses (*Lomandra* spp.) and Black-anther Flax Lily (*Dianella revoluta*). Shrubs are sparse (up to 30% cover) with the most common species being Sweet Bursaria (*Bursaria spinosa*) and Golden Wattle (Acacia pycnantha).

This ecological community typically occurs on gentle to moderate slopes, hilltops and adjacent plains. The soil types range from sandy-loam to clay-loam. The annual rainfall is ranges from 310 to 610 mm a year (Department of the Environment and Water Resources, June 2007).

No vegetation has been mapped in this area, however, this community has been mapped north of the site.

Based on the field assessment (see Section 3), it is considered that the proposed pump station and associated infrastructure can be located well away from, and not impact upon, any *Eucalyptus odorata* Woodland or scattered *Eucalyptus odorata* trees. The scattered *Eucalyptus odorata* (at the Hughes Gap and Baroota sites) are unlikely to be considered as a *Eucalyptus odorata* Woodland based on the qualifying criteria that needs to be met under the EPBC Act 1999.

5.1.3 Impacts on threatened species

The threatened species of plants and animal that have been predicted to occur in areas around the proposed infrastructure sites are summarised in Table 5.1, along with the likelihood of their being affected by the proposal based on the habitats present (see

Section 3). A brief description of habitat requirements for each is provided and it is noted if they are likely to be present at the following sites:

- Site 1 – Whyalla storage tank
- Site 2 – Lincoln Gap pumping station
- Site 3 – Baroota storage tank
- Site 4 – Hughes Gap pumping station
- Site 5 – Winninowie storage tank.

Each of the five infrastructure sites has the potential for threatened species to occur. Under the EPBC Act Principal Significant Impact Guidelines (Department for Environment and Heritage 2006) an action is likely to have a significant impact on a threatened species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population of a species (or an important population in the case of a vulnerable species)
- reduce the area of occupancy of a species (or an important population in the case of a vulnerable species)
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of a population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a threatened species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

It is unlikely that the proposed infrastructure would have a significant impact on a listed threatened species.

5.1.4 Impacts on migratory species

Migratory species are those protected under international agreements to which Australia is a signatory. These include the *Japan Australia Migratory Bird Agreement* (JAMBA), the *China Australia Migratory Bird Agreement* (CAMBA), the *Republic of Korea Australia Migratory Bird Agreement* (ROKAMBA) and the *Bonn Convention on the Conservation of Migratory Species of Wild Animals*.

While migratory species of bird may potentially use the areas of infrastructure (refer Section 4), these areas would not be classed as 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (Department for Environment and Heritage, 2006), in that the study area does not contain:

- habitat used by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species
- habitat used by a migratory species that is at the limit of the species range
- habitat within an area where the species is declining.

As such, impacts of the proposal on migratory species would not be significant.

Table 5.1 Threatened species likely to occur at proposed infrastructure sites and their habitat requirements

Species	Habitat requirements	Likely to occur				
		Site 1	Site 2	Site 3	Site 4	Site 5
Birds						
Acanthiza iredalei iredalei - Slender-billed Thornbill (western) - **V**	Usually occurs in chenopod shrublands (dominated by samphires or *Maireana* and *Atriplex* associations) Occasionally occurs in acacia shrublands and mangroves adjacent to more preferred habitat	X	X	X		X
Amytornis textilis myall - Thick-billed Grasswren (Gawler Ranges) - **V**	Occurs in open chenopod shrublands (often where dense stands of Dead Finish *Acacia tetragonophylla* or Blackbush *Maireana pyramidata* surround drainage lines) Also occurs in saltbush *Atriplex* spp. and bluebush *Maireana* spp. shrublands with a sparse or open overstorey of low trees or shrubs	X				X
Diomedea gibsoni -Gibson's Albatross - **V**	Known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group Breeds among grass tussocks on isolated subantarctis islands Feeds pelagically on squid, fish and crustaceans					
Leipoa ocellata – Malleefowl - **V**	Occurs in semi-arid and arid zones of temperate Australia Occupies shrublands and low woodlands, dominated by mallee vegetation Also occurs in other habitat types including eucalypt or native pine Callitris woodlands, acacia shrublands, Broombush Melaleuca uncinata vegetation or coastal heathlands Breeding habitat, within its home range, is characterised by light soil and an abundant leaf litter, which is used in the construction of nesting mounds Sometimes forages in open areas located near more typical habitat i.e. in grasslands, crop fields and around roads	X				
Macronectes giganteus - Southern Giant-Petrel - **E**	Occurs in Antarctic to subtropical waters					
Macronectes halli - Northern Giant-Petrel - **V**	Marine and oceanic Mainly occurs in sub-Antarctic waters, but regularly occurs in Antarctic waters of the southwestern Indian Ocean, the Drake Passage and west of the Antarctic Peninsula Range extends into subtropical waters mainly between winter and spring, frequenting both oceanic and inshore waters near breeding islands and in the non-breeding range.					

Species	Habitat requirements	Likely to occur				
		Site 1	Site 2	Site 3	Site 4	Site 5
Neophema chrysogaster - Orange-bellied Parrot - **CE**	Habitat varies throughout the year — salt marshes, coastal dunes, pastures, shrub lands, estuaries, islands, beaches and moorlands generally within 10 km of the coast Hollows of mature eucalypts used for nesting during the breeding season, and breeding habitat is a mosaic of moorlands and sedgelands plains dominated by Button Grass (Gymnoschoenus sphaerocephalus) and forest			X		X
Pedionomus torquatus - Plains-wanderer - **V**	Inhabits sparse, treeless, lowland native grasslands Has also been recorded in the stubble, and amongst low crops, of cereal grasses and in chenopod shrublands Recorded in two ecological communities that are currently being considered for listing under the EPBC Act 1999: the Murray Valley Grassland of the Riverina Bioregion, and the Western (Basalt) Plains Natural Temperate Grasslands in Victoria	X	X			
Rostratula australis - Australian Painted Snipe - **V**	Usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled Nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats					
Thalassarche bulleri - Buller's Albatross - **V**	Breeds in a variety of habitats including grassy meadows, tussock covered slopes and cliffs, scrub and under forest canopy					
Thalassarche cauta (sensu stricto) - Shy Albatross, Tasmanian Shy Albatross - **V**	Marine Occurs in subantarctic and subtropical waters, reaching the tropics in the cool Humboldt Current off South America Occurs both inshore and offshore and enters harbours and bays Nests on level or gently sloping ledges, summits, slopes and caves of rocky islets and stacks, usually in broken terrain with little soil and vegetation					
Thalassarche impavida - Campbell Albatross - **V**	Nests on ledges and steep slopes covered in low native grasses, tussocks and mud					
Reptiles						
Aprasia pseudopulchella - Flinders Ranges Worm-lizard - **V**	Occurs in open woodland, native tussock grassland, riparian habitats and rocky isolates Prefers stony soils or clay soils with a stony surface				X	

Species	Habitat requirements	Likely to occur				
		Site 1	Site 2	Site 3	Site 4	Site 5
Notechis ater ater - Krefft's Tiger Snake (Flinders Ranges) - **V**	Restricted to the rocky margins of watercourses that may dry to become isolated pools during the summer, beginning in September Inhabits woodland dominated by River Red Gum (Eucalyptus camaldulensis) and Sugar Gums (Eucalyptus cladocalyx) and valley slope vegetation dominated by Long-leafed Box (Eucalyptus goniocalyx) with an understorey of Mustard Bush (Cassinia sp.) and Hymenanthera angustifolia (Mirtschin & Bailey 1990). They shelter in flood debris accumulated against trees and shrubs in creek beds, in rocky screes on valley slopes, and in shrubby undergrowth on the plains					
Plants						
Caladenia gladiolata - Bayonet Spider-orchid, Clubbed Spider-orchid - **E**	Grows in open grassy woodlands and woodlands with a shrub understorey.					
Caladenia tensa - Greencomb Spider-orchid, Rigid Spider-orchid - **E**	Occurs in Cypress-pine/Yellow Gum Woodland, Heathy Woodland and Mallee on sands and sandy loams derived from aeolian sand deposits	X				
Caladenia woolcockiorum - Woolcock's Spider-orchid - **V**	Grows on loamy soils in Sugar Gum, Blue Gum and Long-leafed Box woodland Usually found in or near open areas Only known from Mount Remarkable National Park					
Glycine latrobeana - Purple Clover, Clover Glycine - **V**	Associated with grasslands, grassy woodlands and heathy woodlands on a range of soil types.				X	
Halosarcia flabelliformis - Bead Glasswort - **V**	Grows on the margins of salt lakes and coastal salt marshes over gypsum deposits, and is often associated with other Halosarcia species Grows almost specifically in monoculture stands within low-lying habitat niches.					
Olearia pannosa subsp. Pannosa - Silver Daisy-bush - **V**	Grows on hill slopes in association with hard pedal mottled-yellow duplex soils and hard pedal red duplex soils Found in mallee, woodlands and forest communities	X		X	X	
Pterostylis sp. Eyre Peninsula - **V**	Primarily occurs on gently sloping south-west to west facing slopes of broad ridges Microhabitat with some moisture retention capacity	X	X		X	
Prasophyllum pallidum - Pale Leek-orchid - **V**	Grows on hard soils over rock in mallee and broombrush (*Melaleuca uncinata*) shrublands					
Senecio megaglossus - Superb Groundsel - **V**	Confined to rocky creek banks and rocky gorge/valley slopes					

Species	Habitat requirements	Likely to occur				
		Site 1	Site 2	Site 3	Site 4	Site 5
Swainsona pyrophila - Yellow Swainson-pea - **V**	Occurs on sandy or loamy soil in mallee scrub Usually found after fire Vegetation assemblages growing with Yellow Swainson-pea post-fire are young vegetation structures with open canopy					

Information referenced from: Pobke, 2007 and Department of the Environment, Water, Heritage and the Arts, 2008; Department for Environment and Heritage, 2001 and Department for Environment and Heritage, 2002

5.1.5 Operation

There would be no impacts on the immediate surroundings of the three pumping stations and the two storage tanks as a result of operation. There may, however, be impacts as a result of reducing the daily and annual extraction of water from the Murray River at Morgan.

It is forecast that by 2050, without the operation of the desalination plant, 65 megalitres (ML) per day may be extracted from the Murray River to supply water to communities in the Upper Spencer Gulf and Northern Eyre Peninsula. Should this extraction cease, there is potential for environmental benefit by returning this flow to the river channel and its dependent ecosystems.

5.2 General Impacts

5.2.1 Legislation

A consolidated list of relevant legislation is detailed below and listed where applicable in subsequent sections of the report.

Table 5.2 List of relevant legislation

Legislation	***Details***
Commonwealth Legislation	*Environment Protection and Biodiversity (EPBC) Act 1999*
	Native Title Act 1993
	Native Title Amendment Act 1998 and Native Title Amendment Act 2007
South Australian Legislation	*Natural Resources Management Act 2004*
	Native Vegetation Act 1991
	Aboriginal Heritage Act 1988
	Native Title (South Australia) Act 1994
	Heritage Places Act 1993
	Development Act 1993
	National Parks and Wildlife Act 1972
	Environment Protection Act 1993
	Native Vegetation Act 1991
	Local Government Act 1999

5.2.2 Terrestrial ecology

The relevant acts of legislation that govern terrestrial ecology in the State are:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *National Parks and Wildlife Act 1972.*
- *Natural Resources Management Act 2004*
- *Native Vegetation Act 1991.*

The project site falls within the Rangelands Biodiversity Planning Region, for which a documented plan is yet to be prepared.

A search was conducted of the Department for Environment and Heritage (DEH) Biological Database of South Australia for a 2 km radius surrounding each of the proposed pump station and water storage sites. Based on this search, a list of flora and fauna are likely to be located at or near the sites has been compiled and is included as Appendix D. Of the species listed as likely to be present in the area, the following have national conservation status and are listed as Vulnerable:

- Thick-billed Grass Wren *Amytornis textilis myall* (Lincoln Gap, Whyalla Storage)
- Krefft's Tiger Snake *Notechis ater ater* (Hughes Gap)

Of the species listed as likely to be present in the area, the following have state conservation status and are listed as Rare:

- Common Brushtail Possum *Trichosurus vulpecular* (Baroota Tanks)
- Elegant Parrot *Neophema elegans* (Hughes Gap)

5.2.3 Air quality

The relevant acts of legislation that govern air quality in the State are:

- *Mining Act 1971*
- *Natural Resources Management Act 2004*
- *Environment Protection (Air Quality) Policy 1994*
- *Environment Protection Act 1993.*
- National Parks and Wildlife Act 1974.

The potential air quality impacts from the construction and operation of the pump stations and water storage tanks are likely to result in:

- dust generated from construction activities
- greenhouse gas emissions associated with vehicle use and power generation.

The potential to generate dust with basic level earthworks is minimal. Standard mitigation measures are available to manage impacts.

Greenhouse gases will be emitted to the atmosphere due to construction and operation of the proposed infrastructure. The majority of greenhouse gas emissions will be contributed by the ongoing operation of the pump stations.

The following three pump stations are considered in the assessment of greenhouse gas emissions:

- Port Bonython SWRO Plant, SA Water Pump Station, 1500 kW
- New Winninowie Pump Station, 120 kW
- New Lincoln Gap EL 100/120 Pump Station, 100 kW

A total of 1.72 MW of pump capacity (at 90% load) operating between 85% and 95% of the time, will emit between 11,296 and 12,625 tonnes CO_2-e.

Given that the current practise of transporting water to the region from Morgan will no longer be required, the net power demand, and hence the associated greenhouse gas emissions, will be able to be partially offset and as such is likely to be significantly less.

5.2.4 Topography and soils

The relevant acts of legislation that govern soils in the State are:

- *Environment Protection Act 1993*
- *Natural Resources Management Act 2004.*

Based on the L4 Australian Soils Classification map generated by the Australian Soil Resource Information System (ASRIS) web based map service provided by *Commonwealth Scientific and Industrial Research Organisation* (CSIRO, 2008), the following soils are present at the project sites:

- Whyalla – soil types not recorded
- Lincoln Gap – soil types not recorded
- Winninowie – contains calcarosols
- Baroota – contains chromosols
- Hughes Gap – contains calcarosols

Based on the National Acid Sulfate Soils map generated by the ASRIS CSIRO web based map service (2008), all of the project sites are within Extremely Low Probability areas with the exception of the Winninowie site. From the plan of the new works for the pipeline, the site is shown to be on the existing alignment of the Morgan-Whyalla pipeline, approximately 1 km north of Gordon Leue Road and less than 1 km east of the Port Augusta-Port Wakefield Road. This location is on the outwash plain below Mt Gullet which is part of the Southern Flinders Ranges.

Contour plans of the area indicate that the pipeline is above the 25 mAHD contour. The South Australian Coast Protection Board has set out guidelines for the identification and management of coastal acid sulfate soils (CASS) and these list the 5 mAHD level as the upper limit for the presence of CASS. Thus, the site is not in an area of CASS. GIS information on soil and ground conditions in the area describes the soil as loam over moderately calcareous red clay and the levels of acid sulfate soil and saline ground conditions as negligible.

5.2.5 Surface water

Based on an assessment of catchment data, Winninowie, Baroota and Hughes Gap sites are located within the Mambray Coast Catchment Area. No catchment information was available for the Whyalla and Lincoln Gap sites.

With the exception of a minor tributary that runs 2–3 km southwest of Whyalla and Baroota Creek near Baroota, there are no large surface water creeks or lakes nearby to any of the sites.

The construction and ongoing operation of the pump stations have the potential of generating (minor) spills of fuel, oil and chemicals that may be transported by surface run-off water. In addition, sediment laden water may be produced in the event of significant surface

run-off water. It is recommended that these potential impacts are appropriately managed during construction and operation.

Based on the above information, it is unlikely that the construction and ongoing operation of the pump stations will significantly impact any large surface water bodies.

The relevant acts of legislation that govern surface water in the State are:

- *Natural Resources Management Act 2004*
- *Environment Protection Act 1993.*
- *National Parks and Wildlife Act 1972.*

5.2.6 Geological and hydrogeological setting

The relevant acts of legislation that govern groundwater in the State are:

- *Natural Resources Management Act 2004*
- *Environment Protection Act 1993.*

The following summary of site specific geology and hydrogeological setting is based on the Department of Mines Adelaide 1:250,000 Geological Map Series maps and the PIRSA groundwater bore database of licensed drill holes (https://info.pir.sa.gov.au/des).

Lincoln Gap

The geology in the Lincoln Gap area consists of recent aged fluviatile sands and gravels of the modern drainage channels overlying Proterozoic aged Corraberra Sandstone and medium grained and gritty red sandstones of the Pandurra Formation.

Little information is available regarding depth to groundwater in the Lincoln Gap area. The only well within 6 km of the proposed pumping station site is 242 m deep. The standing water level in this well was recorded as approximately 10 m below ground level (BGL), however this may be indicative of the potentiometric pressure from a deeper aquifer and not the regional unconfined water table. The available data suggests salinity in the area is very high with total dissolved solids (TDS) values ranging from 18,000 to 42,000 mg/L. The depths of these salinity readings are not available so it is not possible to assign quality to various aquifers.

Whyalla

At the Whyalla site the geology is dominated by Upper Proterozoic dolomitic shales and quartzite beds of the Burra Group. This is overlain in low lying areas by recent aged fluviatile sands and gravels of the modern drainage channels.

Groundwater ranges in depth from 5–12 mBGL in the low lying areas 2 km to the east of the proposed tank location. The tank location is assumed to be at the top of a hill 1 km west of the current water supply tanks. There is no groundwater well data for this area specifically, however depth to groundwater would be estimated to be greater than 40 m at the proposed construction site and salinity values quite high (>20,000 mg/L TDS).

Hughes Gap

The geology at Hughes Gap consists of Recent stream alluvium and alluvial plains overlying Tertiary age sandstone gravels with local coal seams. These are underlain by Upper

Proterozoic rocks of the Mintaro Shale and black slate of the Burra Group. The main source of groundwater in the area is likely to be from the fractured rock aquifer.

Groundwater in the vicinity of the Hughes Gap site is variable in terms of depth and quality. The closest wells to the site are 4 km away. The groundwater in this location has a TDS of approximately 2,000 mg/L and the depth to the watertable is 10 mBGL.

Baroota Tanks and Baroota Pumping Station

The dominant geology of the Baroota tank area is siltstone of the Tapley Hill Formation. Further down the hillside the siltstone is overlain by Quaternary age sediments including Telford Gravel and clays and alluvium of drainage channels and floodplains.

Groundwater in the Baroota tank area ranges from 2–15 mBGL depending on the location's elevation on the hillside. Due to the fractured rock (siltstone) aquifer the quality of the water is good with TDS ranging from 500–1300 mg/L.

Winninowie

The geology in the vicinity of Winninowie is predominantly Proterozoic age Tent Hill Formation quartzite. This is overlain in lower lying areas by Quaternary age Pooraka Formation, sands and clayey sands with clay lenses, and sand sheets and sief dunes (red brown Fulham Sand and pale yellow Molineaux Sand equivalents).

Depth to groundwater in the Winninowie area ranges from 17–35 mBGL. The quality is variable with TDS values ranging from 800–12,000 mg/L. This is somewhat dependent on the depth of the well, indicating potential multiple fractured frock aquifers exist or multiple fracture zones of variable quality.

Qualitative risk assessment of potential groundwater impact

At a given location, the potential for impact to groundwater will be affected by the following factors:

- depth to groundwater: shallow groundwater will have greater potential impacts than deeper groundwater
- depth of engineering works
- groundwater quality: potential impacts will be more likely in the event that groundwater has a high beneficial use. Alternatively, the beneficial uses of groundwater may be negligible in the event that they are highly saline, and as such, would be treated differently under the Environment Protection (Water Quality) Policy, 2003
- aquifer type (geology): sands and highly fractured rocks will enable the infiltration and mobilisation of contaminants and as such are likely to present a greater risk to groundwater quality than locations with tight clays and un-fractured rocks.

Based on available information, the potential impacts to groundwater from the construction, operation and maintenance of the proposed tanks and pumping stations are summarised in Table 5.3.

Table 5.3 Potential impacts to groundwater

Infrastructure Type	Potential Groundwater Impacting Activity	Risk to shallow (<15m) groundwater without control measures	Risk to deeper (>15m) groundwater without control measures	Potential Control Measures	Risk to shallow (<15m) groundwater with control measures	Risk to deeper (>15m) groundwater with control measures
Storage Tank	Storage tank cleaning (residues, cleaning agents, sludge)	Moderate – accumulation of contaminants in shallow soil providing source of shallow groundwater impact over time	Low - upper soils likely to attenuate discharges	Capture and dispose all cleaning agents, chemicals, sludges and residues	Low	Low
Pumping Station	Bulk storage of petroleum products (e.g. Diesel)	High – highly mobile contaminant, likely from spills during filling, leaks from tank or pipe failure	Moderate – same likelihood to occur but impacts may not reach deeper aquifers	All storage tanks above ground All pipework above ground All tanks and pipework in appropriately sealed and bunded areas in accordance with EPA Bunding Guidelines. Filling supervision mandatory Site security fencing (theft or vandalism) Prompt clean up of spills	Low	Low
	Power transformers (transformer oil)	Low – quantities of oil in transformers usually low, more likely to impact shallow soil but not reach groundwater	Low - quantities of oil in transformers usually low, unlikely to impact deep groundwater	Transformers located on concrete sealed areas only Disposal of used oil to appropriately EPA licensed waste depot (no onsite disposal of oils)	Low	Low
Both	During construction of infrastructure (disposal of wastes)	Low – mainly solid wastes generated during construction	Low – mainly solid wastes generated during construction	All waste disposed to EPA licensed waste depot	Low	Low
	Maintenance / cleaning (chemical storage and use for cleaning)	Moderate – some highly mobile cleaning agents used during cleaning	Low - quantities of chemicals usually low, unlikely to impact deep groundwater	Storage of chemicals on sealed and bunded areas only Procedures developed for safe use Disposal of used chemicals to EPA licensed depot	Low	Low

Infrastructure Type	Potential Groundwater Impacting Activity	Risk to shallow (<15m) groundwater without control measures	Risk to deeper (>15m) groundwater without control measures	Potential Control Measures	Risk to shallow (<15m) groundwater with control measures	Risk to deeper (>15m) groundwater with control measures
	Pipe flushing (chlorinated water discharge, ammonia, pipe residues)	Moderate – large volume of water may result in accumulation in shallow soils and groundwater	Low - upper soils likely to attenuate discharges	Capture flushing water in tanks and dispose of water Comply with EPA/SA Water protocols for discharges.	Low	Low
	During construction of infrastructure (disturbance of potential acid sulfate soil)	Moderate if present - during construction disturbance may oxygenate and produce acidic conditions	Low – mainly a shallow issue, only shallow soils disturbed	Be aware of location of potential acid sulfate soils Reduce disturbance where possible Import clean fill for construction and build up from natural soil	Low	Low

5.2.7 Noise and visual amenity

The relevant legislation that govern noise and visual amenity in the State are;

- *Environment Protection (Industrial Noise) Policy 1994*
- *Environment Protection Act 1993.*

Noise associated with construction activities will be typical of civil construction projects i.e. noise from earth moving equipment, traffic and some construction. Noise associated with the ongoing operation of the pump stations will consist of pumping water and occasional maintenance works (e.g. vehicle and tool usage). Generally, pump stations are housed within an enclosure which reduces noise levels produced by the pump.

Potential noise impacts on the surrounding environment and community will depend on the pump size and the proximity to the community. In the event that pump stations are established at distance from residences, the likely potential noise impacts will be low.

Potential impacts to visual amenity may occur during the construction and operation of the pump stations and associated water storage tanks. Potential visual amenity impacts to the surrounding area will be proportional to the proximity of the facilities to residences. In the event that pump stations are established at distance from residences and/or adjacent to existing similar infrastructure, the likely potential amenity impacts will be low.

5.3 Heritage

5.3.1 European Heritage

The relevant act of legislation that governs heritage in the State are:

- *Heritage Places Act 1993.*

Non-Indigenous heritage (often referred to as European heritage) places are protected at a National, State and Local level.

The national heritage system includes:

- the Australian **Heritage Council** – an independent expert body to advise the Minister on the listing and protection of heritage places
- a National **Heritage List** of places of national heritage significance
- a Commonwealth **Heritage List** of heritage places owned or managed by the Commonwealth
- **The Register of the National Estate**, maintained by the Australian Heritage Council.

Indigenous heritage places are also protected by the national heritage arrangements.

Places of state heritage significance are maintained by Heritage SA (DEH) on the State Heritage Register and local heritage places are usually listed in Council Development Plans or maintained on a local heritage register within Council.

The Register of the National Estate is a listing of natural and cultural heritage places in Australia. It can be found on the website of the Commonwealth Department of the

Environment, Water, Heritage and the Arts. The South Australian Heritage Register is a list of places of heritage significance to the State.

There were no national or Commonwealth Heritage Listed places recorded near the project site.

There were two sites listed under the Register of the National Estate:

- Whyalla – Iron Knob – Iron Baron Area, Lincoln Hwy, Whyalla, SA, Australia, Place ID 6964
- Whyalla Conservation Park, Lincoln Hwy, Whyalla, SA, Australia, Place ID 6962.

A search of the SA Heritage Register revealed five locations near the project areas.

- Copper Mine Chimney [Welsh], Charlton Run – Mount Remarkable, Main North road, ID H8300011.
- Port Germain Jetty Site, including two railway sheds – Port Germain, The Esplanade, H8300008.
- Dwelling – Gay Street Cottage (Relocated to the Mount Laura Homestead Museum Reserve in 1978 – Whyalla, Ekblom Street, ID H8500001.
- Former Coaching Stables, Wilmington – Wilmington, Fourth Street, ID H8300009.
- Former Wooden Lock-up from Whyalla Policeman's Dwelling (Relocated to the Mount Laura Homestead Museum Reserve in 1978) – Whyalla, Ekblom Street, ID H8500002.

None of the above heritage places are within the vicinity of the project areas.

5.3.2 Indigenous Heritage

The relevant act of legislation that governs Indigenous heritage in the State is:

- *Aboriginal Heritage Act 1988.*

The *Aboriginal Heritage Act 1988* binds the Crown. It sets up a process designed to ensure protection and preservation of Aboriginal sites, object and remains.

The construction of the infrastructure by the State to support the desalination plant may have an impact on Aboriginal heritage located in the area, but it is not possible to identify the extent of those impacts at this stage. Before constructing the infrastructure, the State will be required to comply with the processes set up under the *Aboriginal Heritage Act 1988* to protect relevant sites, objects and remains.

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Appendix A

NatureMaps search results

Fauna Information (most recent visit)

Patch Id: 16917 **Site Id:** TEL00101
Survey Name: FLINDERS RANGES **Survey Number:** 104
Visit Date: 23-Nov-1999

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code) and SA Structural Formation**
Eucalyptus camaldulensis var. camaldulensis (4) Open Forest
over
Eremophila santalina (2), Acacia iteaphylla (2)

Plant Litter Cover %: 80

Amphibians

Scientific Name	Common Name	No. Observations
Crinia riparia	Flinders Ranges Froglet	2
Limnodynastes tasmaniensis	Spotted Marsh Frog	2

Birds

Scientific Name	Common Name	No. Observations
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	11
Acanthiza apicalis	Inland Thornbill	2
Artamus cyanopterus	Dusky Woodswallow	2
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)	5
Cacatua roseicapilla	Galah	4
Calamanthus pyrrhopygius	Chestnut-rumped Heathwren	5
Colluricincla harmonica	Grey Shrike-thrush	4
Corvus mellori	Little Raven	1
Cracticus torquatus	Grey Butcherbird	1
Drymodes brunneopygia	Southern Scrub-robin	2
Geopelia placida	Peaceful Dove	3
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	5
Hirundo neoxena	Welcome Swallow	8
Lichenostomus chrysops	Yellow-faced Honeyeater	1
Lichenostomus plumulus	Grey-fronted Honeyeater)	12
Lichenostomus virescens	Singing Honeyeater	4
Malurus lamberti	Variegated Fairy-wren	7
Melopsittacus undulatus	Budgerigar	1
Pachycephala inornata	Gilbert's Whistler	3
Pachycephala rufiventris	Rufous Whistler	5
Pardalotus striatus	Striated Pardalote	1
Petrochelidon nigricans	Tree Martin	8
Phaps elegans	Brush Bronzewing	5
Platycercus elegans	Crimson Rosella	3
Pomatostomus superciliosus	White-browed Babbler	4
Rhipidura albiscapa	Grey Fantail	2
Rhipidura leucophrys	Willie Wagtail	1
Smicrornis brevirostris	Weebill	6
Stagonopleura guttata	Diamond Firetail	1
**Turdus merula*	Eurasian Blackbird	3

Zosterops lateralis	Silvereye	3

Mammals

Scientific Name	Common Name	No. Observations
**Felis catus*	Cat	1
Macropus fuliginosus	Western Grey Kangaroo	6
Macropus robustus	Euro	11
**Mus musculus*	House Mouse	10
Petrogale xanthopus	Yellow-footed Rock-wallaby	8
Tachyglossus aculeatus	Short-beaked Echidna	1

Reptiles

Scientific Name	Common Name	No. Observations
Christinus marmoratus	Marbled Gecko	1
Cryptoblepharus cf plagiocephalus (NC)	Desert Wall skink	6
Ctenophorus decresii	Tawny Dragon	12
Ctenotus robustus	Eastern Striped Skink	3
Egernia margaretae	Masked Rock Skink	34
Egernia stokesii	Gidgee Skink	1
Egernia striolata	Eastern Tree Skink	32
Gehyra 2n=44	Southern Rock Dtella	2
Heteronotia binoei	Bynoe's Gecko	4
Lerista bougainvillii	Bougainville's Skink	4
Lerista muelleri	Dwarf Three-toed Slider	1
Morethia boulengeri	Common Snake-eye	8
Pogona vitticeps	Central Bearded Dragon	1
Pygopus lepidopodus	Common Scaly-foot	1
Tiliqua rugosa	Sleepy Lizard	2

Total Species
Native: 51
Introduced: 3
Total: 54

Explanatory Notes
Structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

The number of observations of an animal species is determined through a combination of live captures, observations, tracks, droppings and skeletal material and fur, and calls

Taxonomic Abbreviations
? = identification uncertain, * = introduced animal/plant species, var. = variety, ssp. = subspecies, gp = group, nothossp. = hybrid of a subspecies, - = integrade, x = hybrid (secondary intergrade), sp. = identification possible only to genus level

Taxonomic Clarification Required
"animal/plant species" = names in inverted commas indicate that taxonomic changes have occurred and further research is required to positively identify this species
(SYN) = indicates that the name used is a synonym
(NC) = indicates that the name is a non-current name, which has been superseded by taxonomic changes

**Cover Abundance Codes
R - Solitary plant
T - sparsely present; cover small (less than 5%)
1 - plentiful, but of small cover (less than 5%)
2 - any number of individuals covering 5 - 25% of the area
3 - any number of individuals covering 25 - 50% of the area
4 - any number of individuals covering 50 - 75% of the area
5 - covering more than 75% of the area
Note: Adapted from Braun-Blanquet. J (1965).

Vegetation Information (most recent visit)

Patch Id: 15165 **Site Id:** MAM00901
Survey Name: NORTHERN SPENCER GULF **Survey Number:** 87
Visit Date: 14-Oct-1996 **Number of Visits:** 1
Patch/Quadrat Size: 50 x 50 m

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code**) and SA Structural Formation

Nitraria billardierei (2), Atriplex stipitata (2) Open Shrubland

over

**Carrichtera annua (3), *Medicago polymorpha var. polymorpha (3), *Hordeum glaucum (3), Atriplex vesicaria ssp. (2), Austrostipa elegantissima (2)*

Plant Litter Cover: 5 **%**

Herbarium Region: Eyre Peninsula

Scientific Name	Common Name	Cover/Abundance
Trees		
Myoporum platycarpum ssp.	False Sandalwood	1-10 individuals
Shrubs		
Atriplex stipitata	Bitter Saltbush	5-25%
Atriplex vesicaria ssp.	Bladder Saltbush	5-25%
Maireana turbinata	Top-fruit Bluebush	5-25%
Nitraria billardierei	Nitre-bush	5-25%
Rhagodia spinescens	Spiny Saltbush	5-25%
Sclerolaena diacantha	Grey Bindyi	<5%
Chenopodium desertorum ssp. desertorum	Frosted Goosefoot	sparsely present
Dissocarpus paradoxus	Ball Bindyi	sparsely present
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	sparsely present
Sclerolaena obliquicuspis	Oblique-spined Bindyi	sparsely present
Grasses		
**Hordeum glaucum*	Blue Barley-grass	25-50%
Austrostipa elegantissima	Feather Spear-grass	5-25%
**Bromus rubens*	Red Brome	5-25%
Austrodanthonia caespitosa	Common Wallaby-grass	<5%
Austrostipa nitida	Balcarra Spear-grass	sparsely present
**Lamarckia aurea*	Toothbrush Grass	sparsely present
**Schismus barbatus*	Arabian Grass	sparsely present
**Vulpia muralis*	Wall Fescue	sparsely present
Mat Plants		
**Galenia pubescens var. pubescens*	Coastal Galenia	sparsely present
Herbaceous Species		
**Carrichtera annua*	Ward's Weed	25-50%
**Medicago polymorpha var. polymorpha*	Burr-medic	25-50%
**Medicago minima var. minima*	Little Medic	<5%
Calotis hispidula	Hairy Burr-daisy	sparsely present
'Crassula sieberiana ssp. tetramera (NC)'	Australian Stonecrop	sparsely present
Daucus glochidiatus	Native Carrot	sparsely present
**Hypochaeris glabra*	Smooth Cat's Ear	sparsely present

**Sisymbrium erysimoides*	Smooth Mustard	sparsely present
**'Sonchus oleraceus (NC)'*	Common Sow-thistle	sparsely present
Tetragonia eremaea	Desert Spinach	sparsely present
**Malva parviflora*	Small-flower Marshmallow	1-10 individuals

Mosses and Lichens etc.

Moss sp.	sparsely present

No. of Plant Species (where the identification of the species is certain)
Native: 19
Introduced: 13
Total: 32

Explanatory Notes
Soil texture information is only recorded for the top 5cm of soil at the survey site, structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

Botanical Abbreviations'
? = identification uncertain, * = introduced plant species, var. = variety, ssp. = subspecies, gp = group, nothossp. = hybrid of a subspecies, - = integrade, x = hybrid (secondary intergrade), sp. = identification possible only to genus level'

Taxonomic Clarification Required
'plant species' = names in inverted commas indicate that taxonomic changes have occurred since the survey and that subsequent research is required to positively identify this species
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**Cover Abundance Codes
R - Solitary plant
T - sparsely present; cover small (less than 5%)
1 - plentiful, but of small cover (less than 5%)
2 - any number of individuals covering 5 - 25% of the area
3 - any number of individuals covering 25 - 50% of the area
4 - any number of individuals covering 50 - 75% of the area
5 - covering more than 75% of the area
Note: Adapted from Braun-Blanquet. J (1965).

Fauna Information (most recent visit)

Patch Id: 18074 **Site Id:** BEE00801
Survey Name: BEETALOO VALLEY(NCS) **Survey Number:** 129
Visit Date: 01-Oct-2001

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code) and SA Structural Formation**

Eucalyptus leucoxylon ssp. (2), Allocasuarina verticillata (1) Open Woodland
over
**Avena barbata (3), Triodia scariosa ssp. (NC) (1), Austrostipa elegantissima (1)*

Plant Litter Cover %: 20

Birds

Scientific Name	Common Name	No. Observations
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	1
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	2
Anthochaera carunculata	Red Wattlebird	11
Artamus cyanopterus	Dusky Woodswallow	3
Cacatua roseicapilla	Galah	4
Cincloramphus mathewsi	Rufous Songlark	6
Colluricincla harmonica	Grey Shrike-thrush	1
Corvus mellori	Little Raven	2
Coturnix sp.		2
Dacelo novaeguineae	Laughing Kookaburra	1
Elanus axillaris	Black-shouldered Kite	1
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	1
Grallina cyanoleuca	Magpie-lark	2
Gymnorhina tibicen	Australian Magpie	2
Hirundo neoxena	Welcome Swallow	2
Lalage tricolor	White-winged Triller	1
Lichenostomus penicillatus	White-plumed Honeyeater	4
Lichenostomus virescens	Singing Honeyeater	3
Ocyphaps lophotes	Crested Pigeon	1
Pardalotus striatus	Striated Pardalote	1
Petrochelidon nigricans	Tree Martin	1
Phaps chalcoptera	Common Bronzewing	2
Platycercus elegans	Crimson Rosella	10
Rhipidura albiscapa	Grey Fantail	1
Rhipidura leucophrys	Willie Wagtail	2
Smicrornis brevirostris	Weebill	1
**Sturnus vulgaris*	Common Starling	1

Reptiles

Scientific Name	Common Name	No. Observations
Cryptoblepharus pannosus	Desert Wall skink	8
Morethia boulengeri	Common Snake-eye	2
Tiliqua rugosa	Sleepy Lizard	1

Total Species

Native: 29
Introduced: 1
Total: 30

Explanatory Notes
Structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

The number of observations of an animal species is determined through a combination of live captures, observations, tracks, droppings and skeletal material and fur, and calls

Taxonomic Abbreviations
? = identification uncertain, * = introduced animal/plant species, var. = variety, ssp. = subspecies, gp = group, nothossp. = hybrid of a subspecies, - = integrade, x = hybrid (secondary intergrade), sp. = identification possible only to genus level

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5 - covering more than 75% of the area
Note: Adapted from Braun-Blanquet. J (1965).

Vegetation Information (most recent visit)

Patch Id: 10738 **Site Id:** CRY0301
Survey Name: MIDNORTH **Survey Number:** 49
Visit Date: 20-Oct-1992 **Number of Visits:** 1
Patch/Quadrat Size: 30 x 30 m

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code**) and SA Structural Formation

Eucalyptus socialis (NC) (1), Eucalyptus odorata (1) Open Mallee

over

Bursaria spinosa ssp. spinosa (2), Acacia calamifolia (NC) (2)

Plant Litter Cover: 10 **%**

Herbarium Region: Northern Lofty

Scientific Name	Common Name	Cover/Abundance
Mallees		
Eucalyptus odorata	Peppermint Box	<5%
'Eucalyptus socialis (NC)'	Beaked Red Mallee	<5%
Shrubs		
'Acacia calamifolia (NC)'	Wallowa	5-25%
Bursaria spinosa ssp. spinosa	Sweet Bursaria	5-25%
Daviesia genistifolia	Broom Bitter-pea	<5%
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris	<5%
**Lycium ferocissimum*	African Boxthorn	sparsely present
Pittosporum angustifolium	Native Apricot	1-10 individuals
Grasses		
**Aira cupaniana*	Small Hair-grass	<5%
Austrostipa scabra ssp. scabra	Rough Spear-grass	<5%
**Avena barbata*	Bearded Oat	<5%
Gramineae sp.	Grass Family	<5%
**Brachypodium distachyon*	False Brome	sparsely present
**Bromus diandrus*	Great Brome	sparsely present
**Bromus rubens*	Red Brome	sparsely present
Hummock Grasses		
'Triodia sp. (NC)'	Spinifex	5-25%
Sedges, Rushes and Related Lifeforms		
Dianella revoluta var. revoluta	Black-anther Flax-lily	<5%
Lepidosperma viscidum	Sticky Sword-sedge	<5%
Lomandra effusa	Scented Mat-rush	<5%
Herbaceous Species		
**Anagallis arvensis*	Pimpernel	<5%
**'Hedypnois rhagadioloides (NC)'*	Cretan Weed	sparsely present
**Hypochaeris glabra*	Smooth Cat's Ear	sparsely present
Maireana enchylaenoides	Wingless Fissure-plant	sparsely present
**Moraea setifolia*	Thread Iris	sparsely present
'Oxalis perennans (NC)'	Native Sorrel	sparsely present
**Petrorhagia dubia*	Velvet Pink	sparsely present
Schenkia australis	Spike Centaury	sparsely present

Stackhousia monogyna	Creamy Candles	sparsely present
**Trifolium campestre*	Hop Clover	sparsely present
Wahlenbergia stricta ssp. stricta	Tall Bluebell	sparsely present
**Carduus tenuiflorus*	Slender Thistle	1-10 individuals
Chenopodium desertorum ssp. microphyllum	Small-leaf Goosefoot	1-10 individuals
Convolvulus remotus	Grassy Bindweed	1-10 individuals
**Erodium cicutarium*	Cut-leaf Heron's-bill	1-10 individuals
Galium migrans	Loose Bedstraw	1-10 individuals
**Marrubium vulgare*	Horehound	1-10 individuals
Veronica plebeia	Trailing Speedwell	1-10 individuals

No. of Plant Species (where the identification of the species is certain)
Native: 22
Introduced: 15
Total: 37

Explanatory Notes
Soil texture information is only recorded for the top 5cm of soil at the survey site, structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

Botanical Abbreviations'
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4 - any number of individuals covering 50 - 75% of the area
5 - covering more than 75% of the area
Note: Adapted from Braun-Blanquet. J (1965).

Vegetation Information (most recent visit)

Patch Id: 14593 **Site Id:** CUL00105
Survey Name: COASTAL DUNE & CLIFFTOP **Survey Number:** 82
Visit Date: 08-Aug-1996 **Number of Visits:** 1
Patch/Quadrat Size: 30 x 30 m

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code**) and SA Structural Formation

Eucalyptus oleosa (NC) (3), Myoporum platycarpum ssp. (2), Eucalyptus gracilis (2) Mallee

Plant Litter Cover: 60 **%**

Herbarium Region: Eyre Peninsula

Scientific Name	Common Name	Cover/Abundance
Trees		
Myoporum platycarpum ssp.	False Sandalwood	5-25%
Mallees		
'Eucalyptus oleosa (NC)'	Red Mallee	25-50%
Eucalyptus gracilis	Yorrell	5-25%
Shrubs		
Alectryon oleifolius ssp. canescens	Bullock Bush	5-25%
Atriplex vesicaria ssp.	Bladder Saltbush	5-25%
Geijera linearifolia	Sheep Bush	5-25%
Rhagodia parabolica	Mealy Saltbush	5-25%
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	sparsely present
Tetragonia implexicoma	Bower Spinach	sparsely present
Acacia oswaldii	Umbrella Wattle	1-10 individuals
Grasses		
Austrostipa elegantissima	Feather Spear-grass	sparsely present
Mat Plants		
Carpobrotus sp.	Pigface	<5%
Herbaceous Species		
Calandrinia sp.	Purslane/Parakeelya	<5%
'Crassula sieberiana ssp. tetramera (NC)'	Australian Stonecrop	<5%
'Senecio glossanthus (NC)'	Annual Groundsel	<5%
**Sisymbrium erysimoides*	Smooth Mustard	<5%

No. of Plant Species (where the identification of the species is certain)
Native: 15
Introduced: 1
Total: 16

Explanatory Notes
Soil texture information is only recorded for the top 5cm of soil at the survey site, structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

Botanical Abbreviations'
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is required to positively identify this species
(SYN) = indicates that the plant species name used is a synonym name
(NC) = indicates that the plant species is a non valid name which has been superseded by taxonomic changes

**Cover Abundance Codes
R - Solitary plant
T - sparsely present; cover small (less than 5%)
1 - plentiful, but of small cover (less than 5%)
2 - any number of individuals covering 5 - 25% of the area
3 - any number of individuals covering 25 - 50% of the area
4 - any number of individuals covering 50 - 75% of the area
5 - covering more than 75% of the area
Note: Adapted from Braun-Blanquet. J (1965).

Fauna Information (most recent visit)

Patch Id: 16936 **Site Id:** N8TRA15
Survey Name: MT REMARKABLE NAT PARK 1982 **Survey Number:** 114
Visit Date: 15-May-1988

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code) and SA Structural Formation**

No Vegetation Association information available

Plant Litter Cover %:

Amphibians

Scientific Name	Common Name	No. Observations
Limnodynastes tasmaniensis	Spotted Marsh Frog	1

Mammals

Scientific Name	Common Name	No. Observations
**Mus musculus*	House Mouse	2

Total Species
Native: 1
Introduced: 1
Total: 2

Explanatory Notes
Structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

The number of observations of an animal species is determined through a combination of live captures, observations, tracks, droppings and skeletal material and fur, and calls

Taxonomic Abbreviations
? = identification uncertain, * = introduced animal/plant species, var. = variety, ssp. = subspecies, gp = group, nothossp. = hybrid of a subspecies, - = integrade, x = hybrid (secondary intergrade), sp. = identification possible only to genus level

Taxonomic Clarification Required
"animal/plant species" = names in inverted commas indicate that taxonomic changes have occurred and further research is required to positively identify this species
(SYN) = indicates that the name used is a synonym
(NC) = indicates that the name is a non-current name, which has been superseded by taxonomic changes

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Vegetation Information (most recent visit)

Patch Id: 15174 **Site Id:** MAM00401
Survey Name: NORTHERN SPENCER GULF **Survey Number:** 87
Visit Date: 16-Oct-1996 **Number of Visits:** 1
Patch/Quadrat Size: 30 x 30 m

Vegetation Association Description - Dominant Overstorey and Understorey Species with (cover abundance code**) and SA Structural Formation

Casuarina pauper (2) Low Woodland

over

Maireana pyramidata (3)

Plant Litter Cover: 15 **%**

Herbarium Region: Eyre Peninsula

Scientific Name	Common Name	Cover/Abundance
Trees		
Casuarina pauper	Black Oak	5-25%
Alectryon oleifolius ssp. canescens	Bullock Bush	sparsely present
Shrubs		
Maireana pyramidata	Black Bluebush	25-50%
Atriplex vesicaria ssp.	Bladder Saltbush	<5%
Atriplex lindleyi ssp. inflata	Corky Saltbush	sparsely present
Atriplex spongiosa	Pop Saltbush	sparsely present
Chenopodium desertorum ssp. anidiophyllum	Mallee Goosefoot	sparsely present
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	sparsely present
Rhagodia spinescens	Spiny Saltbush	sparsely present
Zygophyllum crenatum	Notched Twinleaf	sparsely present
Dissocarpus biflorus var.	Two-horn Saltbush	1-10 individuals
Maireana sedifolia	Bluebush	1-10 individuals
Grasses		
**Hordeum glaucum*	Blue Barley-grass	<5%
**Lamarckia aurea*	Toothbrush Grass	<5%
**Aira cupaniana*	Small Hair-grass	sparsely present
Austrodanthonia setacea	Small-flower Wallaby-grass	sparsely present
Austrostipa sp.	Spear-grass	sparsely present
**Schismus barbatus*	Arabian Grass	sparsely present
**Vulpia muralis*	Wall Fescue	sparsely present
Herbaceous Species		
**Carrichtera annua*	Ward's Weed	<5%
**Medicago minima var. minima*	Little Medic	<5%
**Mesembryanthemum nodiflorum*	Slender Iceplant	<5%
Tetragonia eremaea	Desert Spinach	<5%
Brachyscome lineariloba	Hard-head Daisy	sparsely present
Calotis hispidula	Hairy Burr-daisy	sparsely present
Chenopodium cristatum	Crested Goosefoot	sparsely present
Crassula colorata var.	Dense Crassula	sparsely present
**Herniaria cinerea*	Rupturewort	sparsely present
Lepidium papillosum	Warty Peppercress	sparsely present

**Sisymbrium erysimoides*	Smooth Mustard	sparsely present
**'Sonchus oleraceus (NC)'*	Common Sow-thistle	sparsely present
'Zygophyllum ammophilum (NC)'	Sand Twinleaf	1-10 individuals
Mosses and Lichens etc.		
Lichen sp.		sparsely present
Moss sp.		sparsely present

No. of Plant Species (where the identification of the species is certain)
Native: 23
Introduced: 11
Total: 34

Explanatory Notes
Soil texture information is only recorded for the top 5cm of soil at the survey site, structural formation according to the SA Structural Vegetation Formation (Heard & Channon, 1997)

Botanical Abbreviations'
? = identification uncertain, * = introduced plant species, var. = variety, ssp. = subspecies, gp = group, nothossp. = hybrid of a subspecies, - = integrade, x = hybrid (secondary intergrade), sp. = identification possible only to genus level'

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Appendix B

EPBC Act protected matters search tool results

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

17 July 2008 11:11

EPBC Act Protected Matters Report

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Search Type: Area

Buffer: 0 km

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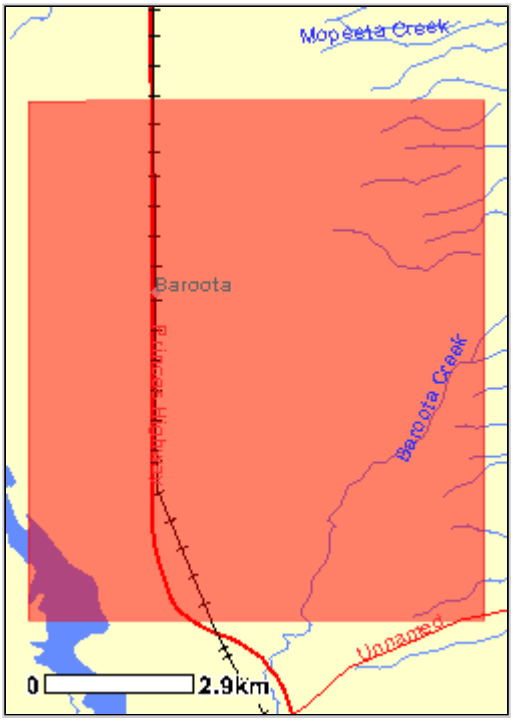

Report Contents:

Summary

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	1
Threatened Species:	19
Migratory Species:	30

Other Matters Protected by the EPBC Act

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Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	49
Whales and Other Cetaceans:	8
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

21 July 2008 12:25

EPBC Act Protected Matters Report

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Search Type: Area

Buffer: 0 km

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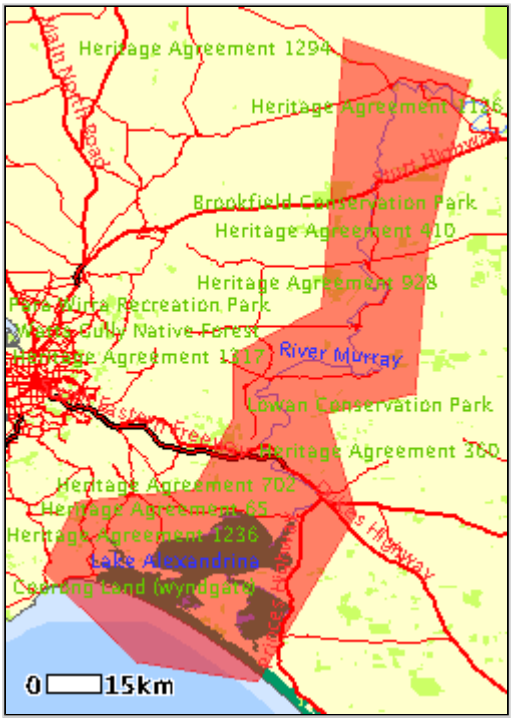

This map may contain data which are
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© 2007 MapData Sciences Pty Ltd, PSMA

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	4
Commonwealth Marine Areas:	Relevant
Threatened Ecological Communities:	4
Threatened Species:	62
Migratory Species:	43

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Commonwealth Lands:	5
Commonwealth Heritage Places:	None
Places on the RNE:	83
Listed Marine Species:	68
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves:	None

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

17 July 2008 11:17

EPBC Act Protected Matters Report

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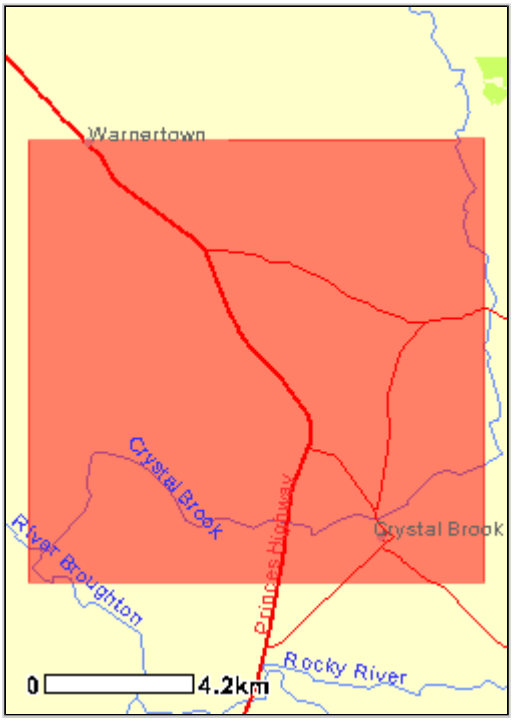

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	2
Threatened Species:	10
Migratory Species:	10

Other Matters Protected by the EPBC Act

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Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	8
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

17 July 2008 10:09

EPBC Act Protected Matters Report

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Search Type: Area

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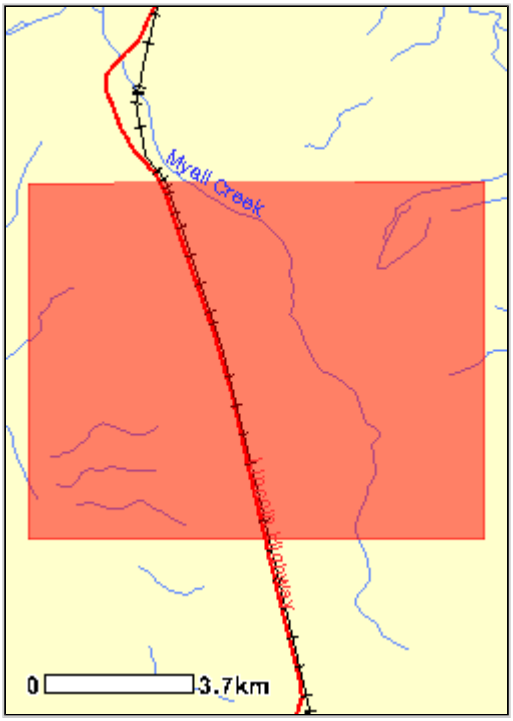

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	3
Migratory Species:	10

Other Matters Protected by the EPBC Act

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Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	8
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

17 July 2008 10:15

EPBC Act Protected Matters Report

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Search Type: Area

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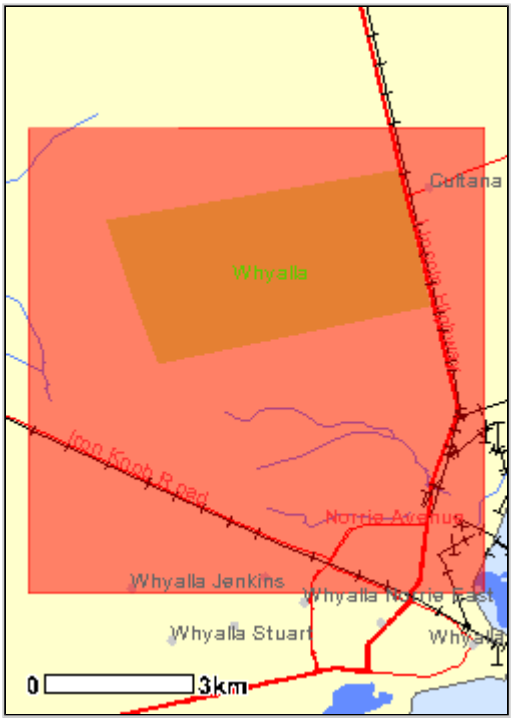

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	15
Migratory Species:	31

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Commonwealth Lands:	3
Commonwealth Heritage Places:	None
Places on the RNE:	2
Listed Marine Species:	51
Whales and Other Cetaceans:	8
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

17 July 2008 10:25

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Search Type: Area

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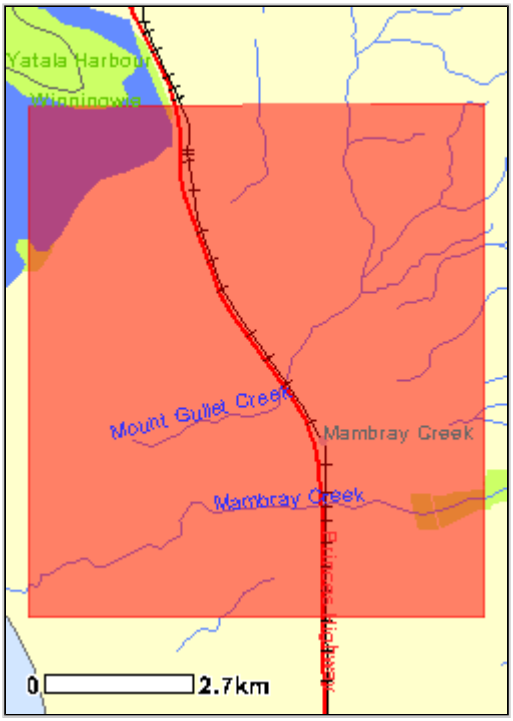

This map may contain data which are
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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	1
Threatened Species:	22
Migratory Species:	30

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

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	1
Listed Marine Species:	49
Whales and Other Cetaceans:	8
Critical Habitats:	None
Commonwealth Reserves:	None

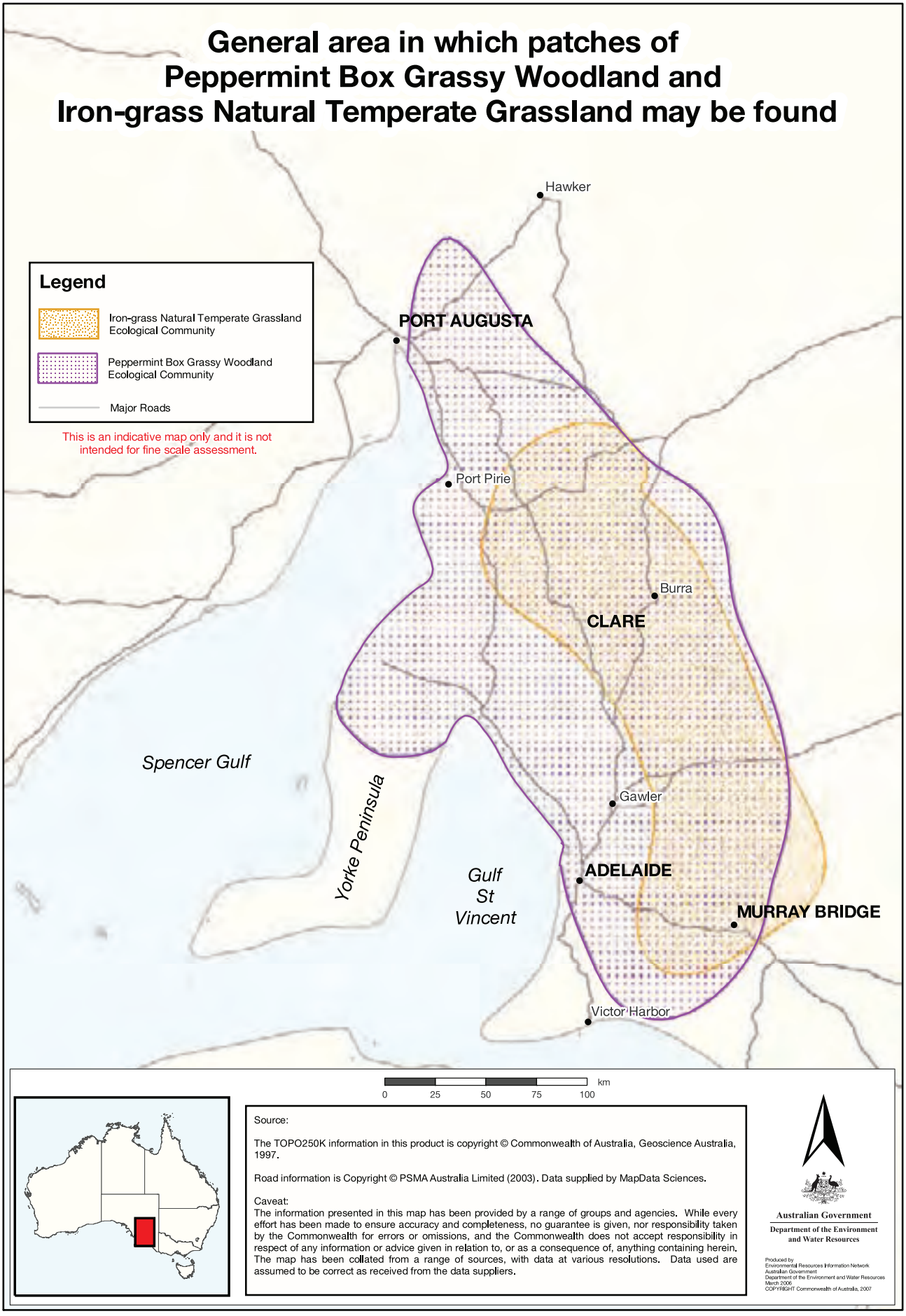
Extra Information

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

Appendix C

Maps

General area in which patches of Peppermint Box Grassy Woodland and Iron-grass Natural Temperate Grassland may be found



Source:

Caveat:
The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein. The map has been collated from a range of sources, with data at various resolutions. Data used are assumed to be correct as received from the data suppliers.

Australian Government
Department of the Environment and Water Resources

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Environmental Resources Information Network
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Appendix D

Biological database of South Australia search results

FLORA

NAME	COMMON NAME	National Conservation Status	State Conservation Status
Baroota Tanks			
Acacia ligulata (NC)	Umbrella Bush		
Acacia pycnantha	Golden Wattle		
Alectryon oleifolius ssp. canescens	Bullock Bush		
Amyema miquelii	Box Mistletoe		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Avena barbata	Bearded Oat		
Bromus madritensis	Compact Brome		
Carrichtera annua	Ward's Weed		
Cassinia laevis	Curry Bush		
Cassinia uncata (NC)	Sticky Cassinia		
Centaurea melitensis	Malta Thistle		
Cheilanthes lasiophylla	Woolly Cloak-fern		
Convolvulus erubescens/remotus (NC)	Native Bindweed		
Crassula colorata var.	Dense Crassula		
Critesion murinum ssp. (NC)	Barley-grass		
Cymbopogon ambiguus	Lemon-grass		
Dodonaea lobulata	Lobed-leaf Hop-bush		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Echium plantagineum	Salvation Jane		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila alternifolia	Narrow-leaf Emubush		
Eremophila glabra (NC)	Tar Bush		
Eremophila scoparia	Broom Emubush		
Eucalyptus porosa	Mallee Box		
Eucalyptus socialis (NC)	Beaked Red Mallee		
Haloragis aspera	Rough Raspwort		
Hedypnois rhagadioloides (NC)	Cretan Weed		
Isotoma petraea	Rock Isotome		
Lamarckia aurea	Toothbrush Grass		
Lepidium sagittulatum	Fine-leaf Peppercress		
Lichen sp.			
Lycium ferocissimum	African Boxthorn		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana enchylaenoides	Wingless Fissure-plant		
Olearia decurrens	Winged Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Pimelea microcephala ssp. microcephala	Shrubby Riceflower		
Pittosporum angustifolium	Native Apricot		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Pultenaea densifolia	Dense Bush-pea		
Rhodanthe corymbiflora	Paper Everlasting		
Sonchus oleraceus (NC)	Common Sow-thistle		
Themeda triandra	Kangaroo Grass		
Triodia irritans var. (NC)			
Tripteris clandestina	Tripteris		
Zygophyllum billardierei (NC)	Coast Twinleaf		
Hughes Gap PS			
Acacia pravifolia	Coil-pod Wattle		
Acrotriche patula	Prickly Ground-berry		
Allocasuarina verticillata	Drooping Sheoak		
Callistemon teretifolius	Needle Bottlebrush		
Cassinia laevis	Curry Bush		
Chrysocephalum apiculatum	Common Everlasting		
Daviesia genistifolia	Broom Bitter-pea		
Didymodon torquatus			
Dodonaea baueri	Crinkled Hop-bush		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Eucalyptus gracilis	Yorrell		
Eucalyptus leucoxylon ssp. pruinosa	Inland South Australian Blue Gum		
Gonocarpus elatus	Hill Raspwort		
Goodenia robusta	Woolly Goodenia		

NAME	COMMON NAME	National Conservation Status	State Conservation Status
Heliotropium asperrimum	Rough Heliotrope		
Isolepis inundata	Swamp Club-rush		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Millotia myosotidifolia	Broad-leaf Millotia		
Nicotiana goodspeedii	Small-flower Tobacco		
Olearia pimeleoides ssp. pimeleoides	Pimelea Daisy-bush		
Pimelea stricta	Erect Riceflower		
Ptilotus nobilis var. nobilis	Yellow-tails		
Rhagodia parabolica	Mealy Saltbush		
Solanum cinereum	Narrawa Burr		
Trymalium wayi	Grey Trymalium		
Lincoln Gap			
Acacia burkittii	Pin-bush Wattle		
Acacia papyrocarpa	Western Myall		
Sclerolaena obliquicuspis	Oblique-spined Bindyi		
Whyalla Storage			
Cassinia laevis	Curry Bush		
Dittrichia graveolens	Stinkweed		
Lomandra effusa	Scented Mat-rush		
Opuntia stricta	Erect Prickly Pear		
Winninowie			
Arthropodium strictum	Common Vanilla-lily		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa sp.	Spear-grass		
Avellinia michelii	Avellinia		
Beyeria lechenaultii	Pale Turpentine Bush		
Bromus rubens	Red Brome		
Cacatua roseicapilla	Galah		
Calotis hispidula	Hairy Burr-daisy		
Carduus tenuiflorus	Slender Thistle		
Carrichtera annua	Ward's Weed		
Carthamus lanatus	Saffron Thistle		
Cassinia arcuata	Drooping Cassinia		
Chalinolobus gouldii	Gould's Wattled Bat		
Cincloramphus cruralis	Brown Songlark		
Cincloramphus mathewsi	Rufous Songlark		
Convolvulus remotus	Grassy Bindweed		
Corvus sp.			
Ctenotus robustus	Eastern Striped Skink		
Daucus glochidiatus	Native Carrot		
Dodonaea lobulata	Lobed-leaf Hop-bush		
Egernia striolata	Eastern Tree Skink		
Epthianura albifrons	White-fronted Chat		
Erodium cicutarium	Cut-leaf Heron's-bill		
Eucalyptus odorata	Peppermint Box		
Falco cenchroides	Nankeen Kestrel		
Galium murale	Small Bedstraw		
Gehyra 2n=44	Southern Rock Dtella		
Hordeum glaucum	Blue Barley-grass		
Hordeum leporinum	Wall Barley-grass		
Hypochaeris glabra	Smooth Cat's Ear		
Lamarckia aurea	Toothbrush Grass		
Lerista bougainvillii	Bougainville's Skink		
Lichen sp.			
Lolium rigidum	Wimmera Ryegrass		
Macropus robustus	Euro		
Malurus leucopterus	White-winged Fairy-wren		
Medicago minima var. minima	Little Medic		
Millotia myosotidifolia	Broad-leaf Millotia		
Morethia boulengeri	Common Snake-eye		
Mormopterus spp. (species complex) (NC)	Southern Freetail-bats		
Moss sp.			
Olearia decurrens	Winged Daisy-bush		
Parietaria cardiostegia	Mallee Smooth-nettle		
Pimelea microcephala ssp. microcephala	Shrubby Riceflower		

NAME	COMMON NAME	National Conservation Status	State Conservation Status
Ranunculus hamatosetosus	Hill Buttercup		
Rostraria cristata	Annual Cat's-tail		
Sagina apetala	Annual Pearlwort		
Silene nocturna	Mediterranean Catchfly		
Sisymbrium erysimoides	Smooth Mustard		
Sonchus oleraceus (NC)	Common Sow-thistle		
Stuartina muelleri	Spoon Cudweed		
Tadarida australis	White-striped Freetail-bat		
Tiliqua scincoides	Eastern Bluetongue		
Urospermum picroides	False Hawkbit		
Vulpia myuros f. megalura	Fox-tail Fescue		
Wahlenbergia gracilenta	Annual Bluebell		

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NAME	COMMON NAME	National Conservation Status	State Conservation Status
Baroota Tanks			
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anthus novaeseelandiae	Richard's Pipit		
Artamus cinereus	Black-faced Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacatua roseicapilla	Galah		
Cincloramphus mathewsi	Rufous Songlark		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus mellori	Little Raven		
Dacelo novaeguineae	Laughing Kookaburra		
Delma butleri	Spinifex Snake-lizard		
Dicaeum hirundinaceum	Mistletoebird		
Egretta novaehollandiae	White-faced Heron		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Furina diadema	Red-naped Snake		
Geopelia placida	Peaceful Dove		
Gliciphila melanops	Tawny-crowned Honeyeater		
Glossopsitta concinna	Musk Lorikeet		
Grallina cyanoleuca	Magpie-lark		
Gymnorhina tibicen	Australian Magpie		
Haliastur sphenurus	Whistling Kite		
Hirundo neoxena	Welcome Swallow		
Lerista bougainvillii	Bougainville's Skink		
Lichenostomus penicillatus	White-plumed Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Limnodynastes tasmaniensis	Spotted Marsh Frog		
Macropus robustus	Euro		
Malurus lamberti	Variegated Fairy-wren		
Manorina melanocephala	Noisy Miner		
Menetia greyii	Dwarf Skink		
Ocyphaps lophotes	Crested Pigeon		
Pachycephala rufiventris	Rufous Whistler		
Pardalotus striatus	Striated Pardalote		
Passer domesticus	House Sparrow		
Petrochelidon ariel	Fairy Martin		
Platycercus elegans	Crimson Rosella		
Pomatostomus superciliosus	White-browed Babbler		
Psephotus haematonotus	Red-rumped Parrot		
Pseudechis australis	Mulga Snake		
Pseudonaja nuchalis	Western Brown Snake		
Ramphotyphlops bicolor	Southern Blind Snake		
Ramphotyphlops bituberculatus	Rough-nosed Blind Snake		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sturnus vulgaris	Common Starling		
Trichosurus vulpecula	Common Brushtail Possum		R
Turdus merula	Eurasian Blackbird		
Vulpes vulpes	Fox		
Hughes Gap			
Cincloramphus cruralis	Brown Songlark		
Falco berigora	Brown Falcon		
Gymnorhina tibicen	Australian Magpie		
Lichenostomus virescens	Singing Honeyeater		
Neophema elegans	Elegant Parrot		R
Notechis ater ater	Krefft's Tiger Snake	VU	
Ocyphaps lophotes	Crested Pigeon		
Passer domesticus	House Sparrow		
Lincon Gap			
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Amytornis textilis myall	Thick-billed Grasswren	VU	
Artamus cinereus	Black-faced Woodswallow		
Cincloramphus cruralis	Brown Songlark		
Epthianura albifrons	White-fronted Chat		

NAME	COMMON NAME	National Conservation Status	State Conservation Status
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Malurus leucopterus	White-winged Fairy-wren		
Pogona vitticeps	Central Bearded Dragon		
Pomatostomus superciliosus	White-browed Babbler		
Whyalla			
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Amytornis textilis myall	Thick-billed Grasswren	VU	
Anthus novaeseelandiae	Richard's Pipit		
Chrysococcyx basalis	Horsfield's Bronze-cuckoo		
Cincloramphus cruralis	Brown Songlark		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Cuculus pallidus	Pallid Cuckoo		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Malurus leucopterus	White-winged Fairy-wren		
Malurus splendens	Splendid Fairy-wren		
Pomatostomus superciliosus	White-browed Babbler		