

# Native Vegetation Clearance

## RN10039 Kempe Road - Road and floodways upgrade

### Data Report

Clearance under the *Native Vegetation Regulations 2017*

12/07/2022

Prepared by H. Merigot & G. Wilson – EBS Ecology



# Native Vegetation Clearance RN10039 Kempe Road – Road and floodways upgrade Data Report

12 July 2022

Version 2

Prepared by EBS Ecology for Department for Infrastructure and Transport

Document Control					
Revision No.	Date issued	Authors	Reviewed by	Date Reviewed	Revision type
-	17/06/2022	H. Merigot (NVC Accredited Consultant) & G. Wilson	J. Carpenter	-	In Prep
1	04/07/2022	H. Merigot (NVC Accredited Consultant) & G. Wilson	A. Dery	05/07/2022	Draft 1
2	12/7/2022	H. Merigot (NVC Accredited Consultant) & G. Wilson	-	-	Final

Distribution of Copies			
Revision No.	Date issued	Media	Issued to
-	17/06/2022	Electronic	Hannah Keynes, Department for Infrastructure and Transport
1	04/07/2022	Electronic	Hannah Keynes, Department for Infrastructure and Transport
2	12/7/2022	Electronic	Hannah Keynes, Department for Infrastructure and Transport

EBS Ecology Project Number: GX200703

**COPYRIGHT:** Use or copying of this document in whole or in part (including photographs) without the written permission of EBS Ecology's client and EBS Ecology constitutes an infringement of copyright.

**LIMITATION:** This report has been prepared on behalf of and for the exclusive use of EBS Ecology's client, and is subject to and issued in connection with the provisions of the agreement between EBS Ecology and its client. EBS Ecology accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

**CITATION:** EBS Ecology (2022) Kempe Road – Road and floodway upgrade Native Vegetation Clearance Report. Report to Department for Infrastructure and Transport. EBS Ecology, Adelaide.

Cover photograph: Vegetation within the Project Area.

EBS Ecology  
112 Hayward Avenue  
Torrensville, South Australia 5031  
t: 08 7127 5607  
<http://www.ebsecology.com.au>  
email: [info@ebsecology.com.au](mailto:info@ebsecology.com.au)

# Glossary and abbreviations

BDBSA	Biological Databases of South Australia (managed by DEW)
CEMP	Contractor's Environmental Management Plan
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
Declared Weed	A weed that is regulated under the <i>Landscape South Australia Act 2019</i> due to its threat to primary industry, the natural environment and/or public safety.
DEW	Department for Environment and Water
DIT	Department for Infrastructure and Transport
DPTI	Department of Planning, Transport and Infrastructure (now DIT)
EBS Ecology	Environmental and Biodiversity Services / EBS Ecology
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
km	kilometres
LMR	Landscape Management Region
LSA Act	<i>Landscape South Australia Act 2019</i>
m	metre(s)
MM	Maintenance Marker
mm	millimetres
NatureMaps	An initiative of the Department of Environment and Water that provides a common access point to maps and geographic information about South Australia's natural resources in an interactive online mapping format.
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NV Act	<i>Native Vegetation Act 1991</i>
NVAP	Native Vegetation Assessment Panel
NVB	Native Vegetation Branch
NVC	Native Vegetation Council
PMR	Protected Matters Report
PMST	Protected Matters Search Tool

Project	The proposed upgrade of nine existing floodways and 39.8 km of road reforming, resheeting and sealing on RN10039 Kempe Road.
Project Area	The area required for the road reforming, resheeting and sealing and floodway upgrades, as well as the borrow pits, located between MM38.5 and MM164.63.
RAM	Rangelands Assessment Method
RN	Road Number (DIT road identification number)
SA	South Australia / South Australian
SAAL	South Australian Arid Lands
SEB	Significant Environmental Benefit
sp.	species
ssp.	sub-species
spp.	species (plural)
TEC	Threatened Ecological Community

# Table of contents

<b>1. Application information</b>	<b>7</b>
<b>2. Purpose of clearance</b>	<b>10</b>
2.1. Description	10
2.2. Background	10
2.3. General location map	12
2.4. Details of the proposal	13
2.5. Approvals required or obtained	15
2.6. Native Vegetation Regulation	15
<b>3. Method</b>	<b>16</b>
3.1. Desktop assessment	16
3.1.1. PMST report	16
3.1.2. BDBSA data extract	16
3.1.3. Likelihood of occurrence	16
3.2. Flora assessment	17
3.2.1. Rangelands Assessment Method	17
3.3. Fauna assessment	17
<b>4. Assessment outcomes</b>	<b>18</b>
4.1. Vegetation assessment	18
4.1.1. General description of the landform type, vegetation, the site and matters of significance	18
4.1.2. Vegetation types present on drainage lines	19
4.1.3. Vegetation types present on undulating plains	22
4.1.4. Floodways – Summary of area and total biodiversity score	29
4.1.5. Resheeting & Pits – summary of area and total biodiversity score	29
4.1.6. Site map showing areas of proposed impact	30
4.2. Threatened species assessment	30
<b>4.2.1. Matters of National Environmental Significance</b>	<b>30</b>
<b>4.2.2. Threatened fauna</b>	<b>30</b>
<b>4.2.3. Threatened flora</b>	<b>32</b>
4.3. Cumulative impacts	44
4.4. Addressing the Mitigation Hierarchy	44
4.5. Principles of Clearance (Schedule 1, <i>Native Vegetation Act 1991</i> )	45

4.6. Risk assessment .....	49
<b>5. Clearance summary .....</b>	<b>50</b>
<b>6. Significant Environmental Benefit.....</b>	<b>52</b>
<b>7. References .....</b>	<b>53</b>
<b>8. Appendices.....</b>	<b>54</b>

### List of Tables

Table 1. Application details. ....	7
Table 2. Summary of the proposed clearance. ....	7
Table 3. Proposed scope of works and associated infrastructure that will be utilised (in MM order). ....	13
Table 4. Criteria for the likelihood of occurrence of threatened species within the Project Area. ....	16
Table 5. Vegetation associations present at each of the floodways, pits and resheeting area. Refer to above VA descriptions. ....	19
Table 6. Description of vegetation association VA1.....	19
Table 7. Description of vegetation association VA2.....	21
Table 8. Description of vegetation association VA3.....	22
Table 9. Description of vegetation association VA4.....	23
Table 10. Description of vegetation association VA5.....	24
Table 11. Description of vegetation association VA6.....	25
Table 12. Description of vegetation association VA7.....	26
Table 13. Description of vegetation association VA8.....	27
Table 14. Description of vegetation association VA9.....	28
Table 15. Likelihood of occurrence of threatened species identified in the desktop assessment. The data source and threat levels are described in the table footer.....	35
Table 16. Assessment against the Principles of Clearance.....	45
Table 17. Summary of the level of risk associated with the application. ....	49

### List of Figures

Figure 1. Location of the Project, including the nine floodways proposed to be upgraded. ....	12
---	----

### Attachments

Attachment 1 – Maps of Impacts (PDF document)

# 1. Application information

**Table 1. Application details.**

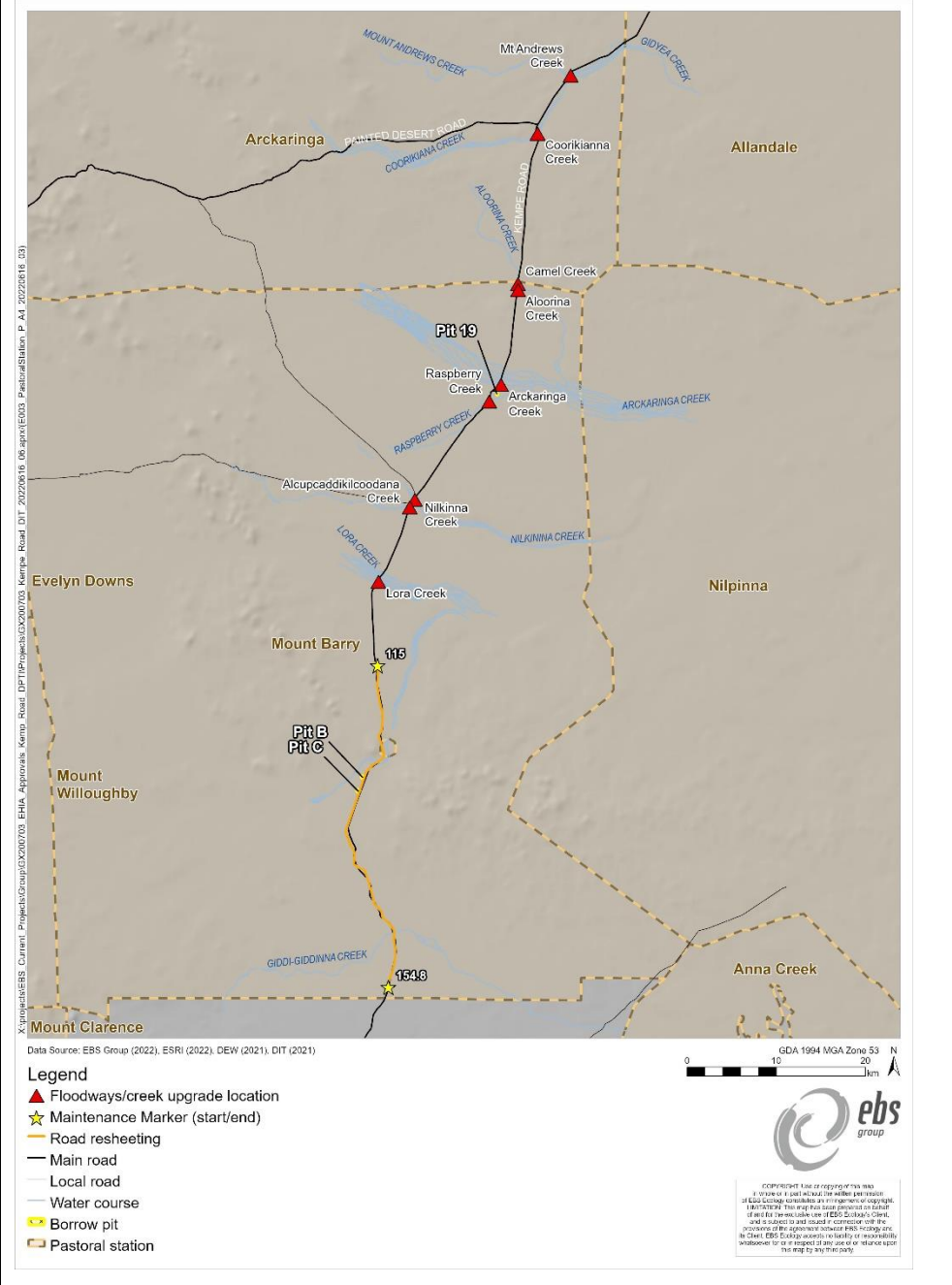
<b>Applicant:</b>	Department for Infrastructure and Transport (DIT)		
<b>Key contact:</b>	Hannah Keynes [REDACTED] [REDACTED]		
<b>Landowner:</b>	DIT		
<b>Site Address:</b>	Kempe Road between MM38.5 and 154.8		
<b>Local Government Area:</b>	Pastoral Unincorporated Area	<b>Hundred:</b>	Not applicable
<b>Title ID:</b>	Properties the road travels through: Arckaringa CL/6184/247 Mt Barry CL/6182/595 Coober Pedy Commonage CR/5986/952	<b>Parcel ID</b>	Properties the road travels through: F251780 A50 F251733 A50 F42266 A1

**Table 2. Summary of the proposed clearance.**

<b>Purpose of clearance:</b>	Clearance is required for the upgrade of Kempe Road from MM115-154.8 for a 30 m width (4 m on either side outside of the current maintenance zone), the upgrade of 9 floodways from MM38.5-101 (up to 31 m including current roadway) and the expansion of three borrow pits.
<b>Native Vegetation Regulation:</b>	Regulation 12, Schedule 1: Clause 32 – Works on behalf of Commissioner of Highways
<b>Description of the vegetation under application:</b>	<p><u>Floodways:</u>          6.48 ha of VA1: <i>Acacia stenophylla</i> tall open woodland over <i>Maireana aphylla</i> low open shrubland and low open tussock grassland.          0.49 ha of VA2: <i>Eucalyptus coolabah</i> very open woodland over <i>Eragrostis setifolia</i> low open shrubland and <i>Austrostipa elegantissima</i> +/- <i>Salsola australis</i> low open grassland.          1.32 ha of VA3: <i>Maireana aphylla</i> low open shrubland with <i>Enneapogon avenaceus</i>.          0.14 ha of VA5: Mixed <i>Sclerolaena sp.</i> low open shrubland.          0.38 ha of VA6: <i>Dactyloctenium radulans</i> low open grassland with <i>Frankenia serpyllifolia</i>.          0.21 ha of VA7: <i>Astrebla pectinata</i> ± <i>Iseilema membranaceum</i> ± <i>Panicum decompositum</i> ± <i>Eragrostis setifolia</i> low open grassland.</p> <p><u>Resheeting &amp; Pits:</u>          0.35 ha of VA2: <i>Eucalyptus coolabah</i> very open woodland over <i>Eragrostis setifolia</i> low open shrubland and <i>Austrostipa elegantissima</i> +/- <i>Salsola australis</i> low open grassland.          7.59 ha of VA3: <i>Maireana aphylla</i> low open shrubland with <i>Enneapogon avenaceus</i>.          7.70 ha of VA4: <i>Atriplex vesicaria</i> low open shrubland          30.32 ha of VA5: Mixed <i>Sclerolaena sp.</i> low open shrubland.          1.73 ha of VA7: <i>Astrebla pectinata</i> ± <i>Iseilema membranaceum</i> ± <i>Panicum decompositum</i> ± <i>Eragrostis setifolia</i> low open grassland.</p>

	1.68 ha of VA8: <i>Eragrostis setifolia</i> with <i>Sclerolaena diacantha</i> grassland. 5.42 ha of VA9: <i>Enneapogon avenaceus</i> and <i>Dissocarpus paradoxus</i> grassland.
<b>Total proposed clearance – area (ha) and/or number of trees:</b>	63.81 ha proposed to be cleared.
<b>Level of clearance:</b>	Level 4
<b>Overlay (Planning and Design Code):</b>	NA

**Map of proposed clearance area:**



**Mitigation Hierarchy:**

**Avoidance** - The upgrades are required to meet the minimum standards for an unsealed road classified as PBS Level 4 (for use by Triple Road train) including minimum carriageway width, appropriately graded swale drains and scour protection. The upgrades must occur along the existing roadway, in which native vegetation cannot be avoided.

**Minimization** - The impacts have been reduced to the minimum possible to achieve safety standards and drainage requirements. The road width



	<p>requirements will continue to be reviewed and reduced where possible. The resheeting and upgrade of the floodways aims to reduce the impact of heavy rainfall events on the surface of the road. As such this aims to reduce the need to create diversions or grade larger areas of road which will mean the bank and levy area will have less disturbance in the long term. Previously disturbed areas will be used wherever possible, and pre-existing borrow pits have been proposed for expansion rather than establishing new areas of clearance within the Project Area. The contractor undertaking the clearance will implement a Construction Environmental Management Plan to ensure impacts to non-target vegetation is minimised.</p> <p><b>Rehabilitation or restoration</b> - The proposed works for the road upgrades are permanent land clearance and it is unlikely that this area will be rehabilitated or restored. However, under current plans, outside of the current road base dirt will be piled on top of existing vegetation to create a levy, as such this area will not be paved, allowing vegetation to naturally recolonise where possible.</p>
<b>SEB Offset proposal</b>	Payment of \$304,269.21, which includes an administration fee of \$11,278.62

# 2. Purpose of clearance

## 2.1. Description

The Department for Infrastructure and Transport (DIT) is proposing to upgrade sections of Kempe Road (DIT Road Number (RN) 10039 Oodnadatta – Coober Pedy), between Oodnadatta and Coober Pedy, in the Far North Region of South Australia (SA). The proposed upgrade works include reforming, resheeting and sealing 39.8 km of the existing road formation between MM115 and MM154.8, upgrading nine floodways between MM38.5 and MM143.9 and expanding existing borrow pits.

EBS Ecology were engaged by DIT to undertake a native vegetation clearance assessment to determine potential ecological impacts and provide an SEB offset value. Kempe Road is an important road for local communities, freight and tourists. The upgrades are required to meet the minimum standards for an unsealed road classified as PBS Level 4 (for use by a Triple Road train) including minimum carriageway width, appropriately graded swale drains and scour protection.

### Objectives

The objectives of the report are to:

- Undertake a desktop assessment of the likelihood of occurrence and status of threatened flora and fauna protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and State *National Parks and Wildlife Act 1972* (NPW Act);
- Undertake a survey of the vegetation and identify and include vegetation that will require removal because of the works; and
- Prepare a Data Report, including calculation of the required SEB offset and addressing of the mitigation hierarchy.

This report presents findings of the desktop assessment; in addition to results of the Rangeland Assessment Method (RAM) required for assessing vegetation proposed for clearance under the *Native Vegetation Regulations*.

## 2.2. Background

The Project is in the far north of SA, approximately 760 – 860 kilometres (km) north of Adelaide, between the townships of Coober Pedy and Oodnadatta (Figure 1).

The current and surrounding land use is pastoral. The closest protected area is Kanku-Breakaways Conservation Park located approximately 9.5 km to the south of the southern end of the Project Area.

The Project will occur approximately between Maintenance Marker (MM) 38.5 in the north and MM 154.8 in the south from approximately 38.5 km south of Oodnadatta and 32 km north of Coober Pedy.

### **Administrative Boundaries**

The Project Area is located within the South Australian Arid Lands (SAAL) Landscape Management Region (LMR) and within the Pastoral Unincorporated Area, outside of any Local Government Area. The Project Area extends across two pastoral stations, including Arckaringa and Mount Barry, which are currently used for grazing, as well as the Coober Pedy Commonage (surrounding the township of Coober Pedy).

### **Bioregions**

The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The bioregions are further refined into subregions and environmental associations. The Project Area is located within the Stony Plains IBRA bioregion and across the Baltana and Oodnadatta sub-regions.

Approximately 99% (2646867 ha) of the Baltana IBRA subregion and approximately 99% (2575667 ha) of the Oodnadatta IBRA subregion is mapped as remnant native vegetation, of which 2% (44931 ha) and 3% (72943 ha) is formally conserved and protected, respectively.

## 2.3. General location map

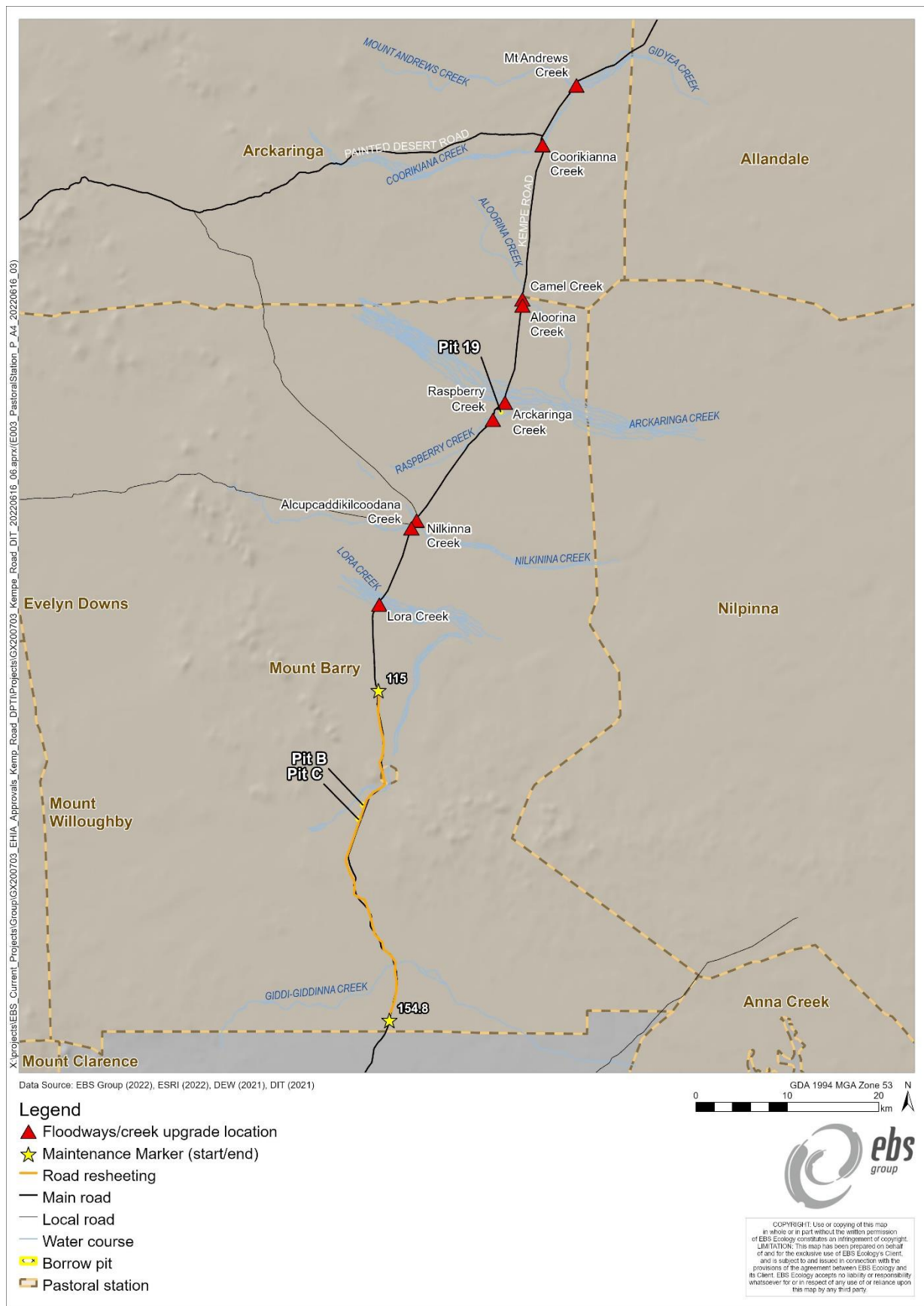


Figure 1. Location of the Project, including the nine floodways proposed to be upgraded.

## 2.4. Details of the proposal

The proposed scope of works includes reforming, resheeting and sealing 39.8 km of the existing road formation between MM115 and MM154.8 and upgrading nine floodways between MM38.5 and MM143.9. To complete these the expansion of three existing borrow pits is also required.

Kempe Road is roughly 9 m wide with an additional 11 m currently part of their maintenance zone which ends at the outside of a windrow. On average, the road and maintenance zone is approximately 20 m wide and as such the clearance area for this application has been considered from outside of this maintenance zone. The proposed resheeting upgrade includes clearance up to 30 m wide while the floodway upgrades include clearance up to 31 m wide. These widths are the maximum clearance requirements and the road width will be reduced wherever possible.

Under current plans, the resheeting also includes the depositing of materials to create a larger windrow to act as a levy. The floodway upgrade will increase the height of the road at the floodways.

The location of the proposed scope of works and associated infrastructure that will be utilised is presented in Table 3.

**Table 3. Proposed scope of works and associated infrastructure that will be utilised (in MM order).**

ID / Name	Type	MM	Coordinates
Mt Andrews Creek	Floodway upgrade	38.5	A - 27°48'18.40"S 135° 9'44.19"E B - 27°48'18.66"S 135° 9'44.78"E C - 27°48'34.48"S 135° 9'33.85"E D - 27°48'34.17"S 135° 9'33.45"E E - 27°48'26.98"S 135° 9'38.36"E F - 27°48'27.12"S 135° 9'38.99"E
Coorikiana Creek (alt Goorikianna Creek)	Floodway upgrade	46.2	A - 27°51'49.95"S 135° 7'22.75"E B - 27°52'5.93"S 135° 7'27.25"E C - 27°52'6.07"S 135° 7'26.54"E D - 27°51'50.23"S 135° 7'22.09"E
Camel Creek	Floodway upgrade	62.5	A - 28° 1'3.10"S 135° 6'6.38"E B - 28° 1'9.98"S 135° 6'4.96"E C - 28° 1'9.83"S 135° 6'4.37"E D - 28° 1'2.88"S 135° 6'5.74"E
Aloorina Creek	Floodway upgrade	64.0	A - 28° 1'21.33"S 135° 6'5.70"E B - 28° 1'27.40"S 135° 6'5.50"E C - 28° 1'32.86"S 135° 6'5.01"E D - 28° 1'32.62"S 135° 6'4.31"E E - 28° 1'27.29"S 135° 6'4.88"E F - 28° 1'21.32"S 135° 6'4.89"E
Arckaringa Creek	Floodway upgrade	75.0	A - 28° 6'16.08"S 135° 5'12.97"E B - 28° 6'15.69"S 135° 5'12.04"E C - 28° 7'39.64"S 135° 4'34.10"E D - 28° 7'39.13"S 135° 4'33.36"E E - 28° 7'14.48"S 135° 4'55.10"E F - 28° 7'14.24"S 135° 4'54.54"E G - 28° 6'44.04"S 135° 5'2.32"E H - 28° 6'43.90"S 135° 5'1.64"E

ID / Name	Type	MM	Coordinates
Raspberry Creek	Floodway upgrade	77.2	A - 28° 8'9.24"S 135° 4'10.16"E B - 28° 8'8.92"S 135° 4'9.65"E C - 28° 8'17.61"S 135° 4'5.51"E D - 28° 8'17.36"S 135° 4'5.09"E
Nilkinna Creek	Floodway upgrade	91.0	A - 28°14'6.21"S 134°59'6.46"E B - 28°14'5.73"S 134°59'6.06"E C - 28°14'17.33"S 134°58'56.20"E D - 28°14'16.97"S 134°58'55.70"E
Alcupcaddikilcoodana Creek	Floodway upgrade	92.0	A - 28°14'32.27"S 134°58'44.50"E B - 28°14'31.84"S 134°58'43.75"E C - 28°14'43.44"S 134°58'38.12"E D - 28°14'43.24"S 134°58'37.54"E
Lora Creek	Floodway upgrade	101	A - 28°18'38.46"S 134°56'58.67"E B - 28°18'37.82"S 134°56'57.82"E C - 28°19'29.18"S 134°56'20.86"E D - 28°19'28.89"S 134°56'19.98"E E - 28°18'57.37"S 134°56'40.79"E F - 28°18'56.66"S 134°56'40.49"E G - 28°18'48.27"S 134°56'50.39"E H - 28°18'47.93"S 134°56'49.41"E I - 28°19'47.36"S 134°56'9.17"E J - 28°19'46.78"S 134°56'8.26"E
RN100039 Oodnadatta – Coober Pedy (Kempe Road)	Road reforming, resheeting and sealing (start)	115-154.8	
Pit 19	Borrow pit	76	28°7'50.45"S 135°4'36.54"E
Pit B (Originally Pit 254 and also Pit 39 Algebullcullia)	Borrow pit	124.75	28°31'4.89"S 134°55'30.08"E
Pit C (Originally Pit 588 and Pit 40 Algebullcullia)	Borrow pit	125.94	28°31'56.46"S 134°55'13.41"E

Source: Supplied by DIT (via email 8/03/2022).

## 2.5. Approvals required or obtained

Native Vegetation Act 1991 – no previous approvals associated with this Project.

National Parks and Wildlife Act 1972 - EBS has the required flora collection permit.

Environment Protection and Biodiversity Conservation Act 1999 - EPBC approval may be required for this Project.

Landscape South Australia Act 2019 - A Permit to transport declared weeds on a public road may be required for this Project. A Water Affecting Activity Permit is likely to be required for the floodways.

Aboriginal Heritage Act 1988 – Approval will be required if any sites, objects or remains are uncovered during the works.

## 2.6. Native Vegetation Regulation

An assessment against the Principles of Clearance under the *Native Vegetation Act 1991* is considered to not be required as the clearance associated with the Project is in accordance with Division 5 of the *Native Vegetation Regulations 2017*, which allows for the clearance of native vegetation in relation to specific activities as set out in Schedule 1, Parts 4, 5 or 6 of the Regulations. The Project is considered to be permitted under the following regulation:

### **Regulation 12(32)—Works on behalf of Commissioner of Highways**

Clearance of vegetation incidental to work being undertaken by or on behalf of the Commissioner of Highways (other than repair or maintenance work of a kind referred to in Part 1 clause 2).

# 3. Method

## 3.1. Desktop assessment

A desktop assessment was undertaken to determine the potential for any threatened fauna species and Threatened Ecological Communities (TECs) (both Commonwealth and State listed) to occur within the Project Area. This was achieved by undertaking database searches using a 5 km buffer of the Project Area (Search Area).

### 3.1.1. PMST report

A Protected Matters Search Tool (PMST) report was generated on 5/07/2022 to identify nationally threatened flora and fauna, migratory fauna and TECs under the EPBC Act relevant to the Project Area (DAWE 2022). Only species and TECs identified in the PMST report that are likely or known to occur within the Search Area were assessed for their likelihood of occurrence within the Project Area.

### 3.1.2. BDBSA data extract

A data extract from the Biological Database of South Australia (BDBSA) was obtained from NatureMaps to identify flora and fauna species that have been recorded within 50 km of the Project Area (data extracted 1/2/2021; DEW 2021) (recordset number DEWBDBSA210202-1). An updated NatureMaps search was conducted on 5/07/2022 to ensure the records were up to date. The BDBSA is comprised of an integrated collection of species records from the South Australian Museum, conservation organisations, private consultancies, Birds SA, Birdlife Australia and the Australasian Wader Study Group, which meet the Department for Environment and Water's (DEW) standards for data quality, integrity and maintenance. Only species with records since 1995 and a spatial reliability of less than 1 km were assessed for their likelihood of occurrence.

### 3.1.3. Likelihood of occurrence

The criteria for the likelihood of occurrence of threatened species within the Project Area are described Table 4.

**Table 4. Criteria for the likelihood of occurrence of threatened species within the Project Area.**

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.



Likelihood	Criteria
Unlikely	<p>Recorded within the previous 20 years, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter.</p> <p>Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area.</p> <p>No records despite adequate survey effort.</p>

## 3.2. Flora assessment

The flora assessment was undertaken by H. Merigot & G. Wilson on the 10-12 May 2022 in accordance with the Rangelands Assessment Method (RAM) (NVC, 2020).

### 3.2.1. Rangelands Assessment Method

The RAM was developed by the NVMU for the purpose of assessing areas of native vegetation requiring clearance and to calculate SEB requirements in the arid zone of South Australia. This includes the section of the Project Area that is located within the South Australian Arid Lands NRM region.

The RAM aligns with the methods used for the assessment of land and vegetation condition developed by Natural Resources South Australia Arid Lands, requiring quantitative on ground and desktop assessment of landscape, native vegetation and ecological values.

Details of site selection/stratification and assessment protocols, and the biodiversity value components assessed and the factors that influence these components are outlined in the *Rangelands Assessment Manual* (NVC 2020b).

The Conservation Significance Scores were calculated from direct observations of flora and direct and historical observations of fauna species of conservation significance. All fauna identified as known to occur in the PMST, and fauna with BDBSA records since 1995 and with a spatial reliability of less than 1 km, within 50 km of the Project Area, were included in the RAM scoresheets. Species determined as unlikely to occur within the Project Area will be removed by the Native Vegetation Branch if the finding is supported. Marine and/or wetland species were omitted from the scoresheets given the Project Area is terrestrial.

## 3.3. Fauna assessment

All native and exotic fauna species opportunistically encountered (directly observed, or tracks, scats, burrows, nests and other signs of presence) during the native vegetation clearance assessment were recorded. Potential fauna refuge sites, such as hollows, were noted as an indication of availability of suitable habitat. Particular attention was paid to identifying habitat for threatened species. For each opportunistic fauna observation, the species, number of individuals, GPS location, detection methodology (sight, sound or sign) and habitat were recorded.

# 4. Assessment outcomes

## 4.1. Vegetation assessment

### 4.1.1. General description of the landform type, vegetation, the site and matters of significance

Seven vegetation associations were identified and assessed in the Kempe Road Project Area. The resheeting and pit area was separated into three blocks based on IBRA Environmental Association (Block A and B) and property boundary (Block C): Block A (Oodnadatta), B (Baltana) and C (Coober Pedy Commonage). The seven vegetation associations were present over two landform types (LT) including drainage lines (DL) and undulating plains (UP) (Maps of each VA is provided in Attachment 1):

- VA1: *Acacia stenophylla* tall open woodland over *Maireana aphylla* low open shrubland and low open tussock grassland (Table 6);
- VA2: *Eucalyptus coolabah* very open woodland over *Eragrostis setifolia* low open shrubland and *Austrostipa elegantissima* +/- *Salsola australis* low open grassland (Table 7);
- VA3: *Maireana aphylla* low open shrubland with *Enneapogon avenaceus* (Table 8);
- VA4: *Atriplex vesicaria* low open shrubland (Table 9);
- VA5: Mixed *Sclerolaena sp.* low open shrubland (Table 10);
- VA6: *Dactyloctenium radulans* low open grassland with *Frankenia serpyllifolia* (Table 11);
- VA7: *Astrebla pectinata* ± *Iseilema membranaceum* ± *Panicum decompositum* ± *Eragrostis setifolia* low open grassland (Table 12);
- VA8: *Eragrostis setifolia* with *Sclerolaena diacantha* grassland (Table 13); and
- VA9: *Enneapogon avenaceus* and *Dissocarpus paradoxus* grassland (Table 14).


Vegetation Associations present at each of the floodways, pits and resheeting area are provided in Table 5.

**Table 5. Vegetation associations present at each of the floodways, pits and resheeting area. Refer to above VA descriptions.**

	VA1	VA2	VA3	VA4	VA5	VA6	VA7	VA8	VA9
Mt Andrews Creek	✓					✓			
Coorikianna Creek	✓								
Camel Creek	✓				✓				
Aloorina Creek		✓							
Arckaringa Creek	✓								
Raspberry Creek	✓								
Nilkinna Creek	✓								
Alcupaddikilcoodana Creek	✓						✓		
Lora Creek	✓	✓	✓						
Resheeting		✓		✓	✓		✓		
Pit 19								✓	
Pit B									✓
Pit C			✓						

#### 4.1.2. Vegetation types present on drainage lines

**Table 6. Description of vegetation association VA1.**


<b>Vegetation Association</b>	<i>Acacia Stenophylla</i> tall open woodland over <i>Maireana appressa</i> low open shrubland and low open tussock grassland.	
<b>RAM Survey Sites</b>	MTA2_DL1, COO5-UP1, CAM1-DL1, ARC1-DL1, ARC2-DL1, RAS2-DL1, NIL2-DL1, ALC2-DL1, LOR1-DL1	
		
<b>General description</b>	This vegetation type occurred mainly undulating plains comprised of loam and clay soils. Palatable shrubs were mostly intact with a low presence of animal tracks or scats.	Dominant species within this VA: <i>Acacia stenophylla</i> <i>Astrebla pectinata</i> <i>Enneapogon avenaceus</i> <i>Maireana aphylla</i>
<b>Threatened species or community</b>	Threatened species assessed as potentially occurring within this Vegetation Association. <ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> </ul>	

	<ul style="list-style-type: none"> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>
--	---

<b>Landscape context score</b>	1.13	<b>Vegetation Condition Score</b>	48.30
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	69.43




**Table 7. Description of vegetation association VA2.**


<b>Vegetation Association</b>	<i>Eucalyptus coolabah</i> very open woodland over <i>Eragrostis setifolia</i> low open shrubland and <i>Austrostipa elegantissima</i> +/- <i>Salsola australis</i> low open grassland.		
<b>RAM Survey Sites</b>	B2_DL1, ALO1-DL1, LOR2-DL1		
			
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within this VA: <i>Eucalyptus coolabah</i> <i>Eragrostis setifolia</i>	
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>• [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>		
<b>Landscape context score</b>	1.13	<b>Vegetation Condition Score</b>	55.9
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	82.29

#### 4.1.3. Vegetation types present on undulating plains


Table 8. Description of vegetation association VA3.

<b>Vegetation Association</b>	<i>Maireana aphylla</i> low open shrubland with <i>Enneapogon avenaceus</i>		
<b>RAM Survey Sites</b>	Pit C, LOR2-UP1		
			
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within this VA: <i>Maireana aphylla</i> <i>Enneapogon avenaceus</i>	
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>		
<b>Landscape context score</b>	1.12	<b>Vegetation Condition Score</b>	45.50
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	66.25

**Table 9. Description of vegetation association VA4.**


<b>Vegetation Association</b>	<i>Atriplex vesicaria</i> low open shrubland		
<b>RAM Survey Sites</b>	B11-UP1, B11-DL1, C-UP1		
			
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within this VA: <i>Atriplex vesicaria</i> <i>Salsola australis</i> <i>Iseilema membranaceum</i>	
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>		
<b>Landscape context score</b>	1.13	<b>Vegetation Condition Score</b>	46.75
<b>Conservation significance score</b>	1.3	<b>Unit biodiversity Score</b>	68.99

**Table 10. Description of vegetation association VA5.**


<b>Vegetation Association</b>	Mixed <i>Sclerolaena</i> sp. low open shrubland.		
<b>RAM Survey Sites</b>	A1-UP1, A2-UP1, A3-UP1, B1-UP1, B2-UP1, B4-UP1, B6-UP1, B7-UP1, B9-UP1, B10-UP1, CAM1-UP1		
			
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within the VA: <i>Dissocarpus paradoxus</i> <i>Salsola australis</i> <i>Sclerolaena</i> sp. <i>Sclerolaena brachyptera</i> <i>Sclerolaena divaricata</i> <i>Sclerolaena muricata</i>	
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>		
<b>Landscape context score</b>	1.13	<b>Vegetation Condition Score</b>	42.48
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	62.61



**Table 11. Description of vegetation association VA6.**


<b>Vegetation Association</b>	<i>Dactyloctenium radulans</i> low open grassland with <i>Frankenia serpyllifolia</i>		
<b>RAM Survey Sites</b>	MTA2-UP1, COO5-DL1		
			
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within the VA: <i>Dactyloctenium radulans</i> <i>Frankenia serpyllifolia</i>	
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> </ul> <p>[Redacted] Ecological Community.</p> <p>There was one plant species listed as threatened under the NPW Act recorded within this vegetation association:</p> <ul style="list-style-type: none"> <li>• <i>Atriplex eichleri</i> (Rare).</li> </ul> <p>A list of all other threatened flora that may occur within this association is provided in section 4.2.3.</p>		
<b>Landscape context score</b>	1.13,	<b>Vegetation Condition Score</b>	51.22
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	75.24

**Table 12. Description of vegetation association VA7.**

<b>Vegetation Association</b>	<i>Astrebla pectinata</i> ± <i>Iseilema membranaceum</i> ± <i>Panicum decompositum</i> ± <i>Eragrostis setifolia</i> low open grassland	
<b>RAM Survey Site</b>	A1-DL1, A2-DL1, A3-DL1, B1-DL1, B4-DL1, B7-DL1, B9-DL1, B10-DL1, C-DL1, ALC2-UP1	
		
<b>General description</b>	<p>Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.</p>	<p>Dominant species within the VA:  <i>Panicum decompositum</i>  <i>Salsola australis</i>  <i>Astrebla pectinata</i>  <i>Enneapogon avenaceus</i>  <i>Atriplex</i> sp.  <i>Iseilema membranaceum</i>  <i>Rytidosperma</i> sp.</p>
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. There was one plant species listed as threatened under the NPW Act recorded within this vegetation association:</p> <ul style="list-style-type: none"> <li>• <i>Atriplex eichleri</i> (Rare).</li> </ul> <p>A list of all other threatened flora that may occur within this association is provided in section 4.2.3.</p>	


<b>Landscape context score</b>	1.12	<b>Vegetation Condition Score</b>	42.65
<b>Conservation significance score</b>	1.3	<b>Unit biodiversity Score</b>	62.43

**Table 13. Description of vegetation association VA8.**

<b>Vegetation Association</b>	<i>Eragrostis setifolia</i> with <i>Sclerolaena diacantha</i> grassland	
<b>RAM Survey Site</b>	Pit 19	
		
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within the VA: <i>Eragrostis setifolia</i> <i>Sclerolaena diacantha</i>
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> <li>■ [Redacted]</li> </ul> <p>[Redacted] Ecological Community.</p> <p>A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>	

<b>Landscape context score</b>	1.07	<b>Vegetation Condition Score</b>	32.50
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	75.95

**Table 14. Description of vegetation association VA9.**

<b>Vegetation Association</b>	<i>Enneapogon avenaceus</i> and <i>Dissocarpus paradoxus</i> grassland	
<b>RAM Survey Site</b>	Pit B	
		
<b>General description</b>	Occurs on an undulating plain with gibber pavement and clay soils. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.	Dominant species within the VA: <i>Enneapogon avenaceus</i> <i>Dissocarpus paradoxus</i>
<b>Threatened species or community</b>	<p>Threatened species assessed as potentially occurring within this Vegetation Association.</p> <ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> <li>■ [REDACTED]</li> </ul> <p>The association does not make up part of a Threatened Ecological Community. A list of all threatened flora that may occur within this association is provided in section 4.2.3.</p>	

<b>Landscape context score</b>	1.08	<b>Vegetation Condition Score</b>	41.25
<b>Conservation significance score</b>	1.30	<b>Unit biodiversity Score</b>	57.92

#### 4.1.4. Floodways – Summary of area and total biodiversity score

<b>Location</b>	<b>Vegetation Association</b>	<b>Area (ha)</b>	<b>Total Biodiversity Score</b>
Mt Andrews	VA1	0.42	29.18
	VA6	0.21	15.46
Coorikianna Creek	VA1	0.38	29.21
	VA6	0.17	12.51
Camel Creek	VA1	0.10	6.63
	VA5	0.14	9.09
Aloorina Creek	VA2	0.40	34.43
Arckaringa Creek	VA1	3.17	66.92
Raspberry Creek	VA1	0.32	22.24
Nilkianna Creek	VA1	0.49	33.01
Alcupaddikilcoodana Creek	VA1	0.22	16.18
	VA7	0.21	10.85
Lora Creek	VA1	1.38	99.46
	VA2	0.09	6.60
	VA3	1.32	87.45

#### 4.1.5. Resheeting & Pits – summary of area and total biodiversity score

<b>Location</b>	<b>Vegetation Association</b>	<b>Area (ha)</b>	<b>Total Biodiversity Score</b>
Block A	VA5	6.08	325.70
	VA7	0.28	17.56
Block B	VA2	0.35	30.50
	VA4	6.47	460.25
	VA5	24.24	1618.06
	VA7	1.45	82.73
Block C	VA4	1.23	82.2
Pit 19	VA8	1.68	75.95
Pit B	VA9	5.42	313.90
Pit C	VA3	7.59	433.36

#### 4.1.6. Site map showing areas of proposed impact

Maps showing the proposed impact and vegetation associations are provided in Attachment 1.

## 4.2. Threatened species assessment

### 4.2.1. Matters of National Environmental Significance

There are two MNES relevant to the Project Area, consisting of one Listed Threatened Ecological Communities (TEC) and one Nationally Important Wetland:

- The community of native species dependant on natural discharge of groundwater from the Great Artesian Basin (Endangered); and
- The Lake Eyre Mound Springs (DAWE 2021b).

The PMST report lists the two MNES as “may occur” and are considered highly unlikely to occur within the Project Area as they do not contain the relevant species/features that constitute either of the MNES and therefore, the Project is unlikely to impact either.

### 4.2.2. Threatened fauna

#### EPBC Act

The desktop assessment identified eight fauna species listed as threatened under the EPBC Act as potentially occurring within the Project Area (Table 15):

- *Amytornis modestus* (Thick-billed Grasswren) (Vulnerable);
- *Falco hypoleucos* (Grey Falcon) (Vulnerable, SA: Rare);
- *Pedionomus torquatus* (Plains-wanderer) (Critically Endangered, SA: Endangered);
- *Pezoporus occidentalis* (Night Parrot) (Endangered, SA: Endangered);
- *Polytelis alexandrae* (Princess Parrot) (Endangered, SA: Vulnerable);
- *Notomys fuscus* (Dusky Hopping-mouse) (Vulnerable, SA: Vulnerable);
- *Pseudomys australis* (Plains mouse) (Vulnerable, SA: Vulnerable); and
- *Ophidiocephalus taeniatus* (Bronzeback Snake-lizard) (Endangered, SA: Rare).

The **Thick-billed Grasswren** (TBG) (*Amytornis modestus*) was recorded from the PMST search as “known to occur” in the 50 km search area. The TBG occurs in chenopod shrublands in the arid and semi-arid zones, particularly saltbush (*Atriplex spp.*) and bluebush (*Maireana spp.*) dominated shrublands with widely isolated trees. Records show that TBGs have been recorded on claypans and gignals with sparse to open *Atriplex* and *Sclerolaena* shrublands near Oodnadatta. TBGs tend to favour areas on drainage lines where saltbush and bluebush are taller and denser. Since the Project Area contains the preferred habitat of the TBG, it is possible that they occur within the Project Area. In areas of better-quality habitat (taller shrublands near drainage lines), targeted surveys were conducted, however no TBG’s were observed. Given that the clearance of vegetation suitable for this species will be minor and restricted to roadsides, the proposed clearance is unlikely to have a significant impact on the TBG population.

**Grey Falcons** (*Falco hypoleucos*) are also found in arid and semi-arid areas, where rainfall is less than 500 mm, except when wet years are followed by drought, which leads to their species distribution widening. They favour *Triodia* grassland, *Acacia* shrubland and lightly timbered arid woodland. Tall trees are usually selected for nesting. Although there is some treed habitat within the Project Area, the impact to this vegetation is small therefore, it is unlikely that the Grey Falcon will be impacted by the proposed clearance.

The **Plains-wanderer** (*Pedionomus torquatus*) inhabits sparse native grasslands and are usually absent from areas where grass is too dense or bare, with nesting occurring amongst native grasses and herbs. There are no recent records within 50 km of the Project Area since 1995 and the vegetation within the Project Area is not preferred habitat, therefore, it is unlikely that the species is to be impacted by the proposed clearance.

The **Night Parrot** (*Pezoporus occidentalis*) is a highly elusive nocturnal ground dwelling parrot that inhabits the arid and semi-arid zones of Australia. This species typically occurs within spinifex vegetation which is not present within the Project Area and there are no recent records within 50 km of the Project Area since 1995, therefore it is unlikely that the species will be impacted by the proposed clearance.

**Princess Parrots** (*Polytelis alexandrae*) are confined to arid regions with a sparse distribution near Oodnadatta. They inhabit sand dunes, sand flats, and occur in open savanna woodlands and shrublands of highly scattered *Eucalyptus sp.* There has been a decline in the frequency of records of the Princess Parrot within South Australia and there are no recent records within 50 km of the Project Area since 1995, therefore it is unlikely that the species will be impacted by the proposed clearance.

The **Dusky Hopping-mouse** (*Notomys fuscus*) occurs in arid areas and in SA, predominantly in the dune crests of continuous sand dunes or sand plains with nearby hummocks and water. Given that there is no suitable dune habitat within the Project Area, it is unlikely that the proposed clearance will impact the Dusky Hopping-mouse.

The **Plains Mouse** (*Pseudomys australis*) are primarily found in gibber plains with mid slopes, small stones and gilgais. Their preferred vegetation is predominantly chenopod of saltbush (*Atriplex spp.*) and bluebush (*Maireana spp.*) open shrubland on gibber and gypseous cracking clay plains dominated by low *Sclerolaena* shrubs. The vegetation within the Project Area is suitable for this species (approximately 38 ha proposed to be cleared). However, as this clearance is an expansion on the current road width (and therefore narrow and linear) and given the size of the clearance relative to the presence of suitable habitat within the broader area the proposed clearance is unlikely to be considered a significant impact on this species.

The **Bronzeback Snake-lizard** occurs around the Lake Eyre Basin. Vegetation they inhabit consist of low open woodland dominated by, Gidgee (*Acacia cambagei*), Mulga (*Acacia aneura*) or Dead Finish (*Acacia tetragonophylla*). Their microhabitat is predominantly deep, matted leaf litter and plant debris over deep cracking clays by the base of trees or shrubs. Populations have been found near Oodnadatta in the Arkaringa Hills within 50 km of the Project Area. There is some habitat within the Project Area that may be suitable (around the floodways), however, generally these areas do not contain deep leaf litter due to seasonal flooding. As such given the small area of clearance of suitable habitat relative to the presence of wooded drainage lines within the area, the proposed clearance is unlikely to be considered significant for this species.

Two species listed as Migratory were assessed as "Likely to occur" within 50 km of the Project Area: *Charadrius veredus* (Oriental Plover); and *Merops ornatus* (Rainbow Bee-eater). Two species were assessed as possibly occurring within the Project Area: *Apus pacificus* (Fork-tailed Swift); *Chrysococcyx osculans* (Black-eared Cuckoo). The Project Area does not

represent either suitable habitat or important habitat for these species, therefore, clearance of vegetation within the Project Area is unlikely to impact these species.

A full list of fauna species observed during the field surveys is provided in Appendix 1 and the locations of fauna species identified in the BDBSA 50 km search is provided in Appendix 3.

### **NPW Act**

An additional nine bird species listed threatened under the NPW Act were assessed as potentially occurring in the Project Area:

- *Aphelocephala pectoralis* (Chestnut-breasted Whiteface) (Rare);
- *Ardeotis australis* (Australian Bustard) (Vulnerable);
- *Emblema pictum* (Painted Finch) (Rare);
- *Falco peregrinus macropus* (Peregrine Falcon) (Rare);
- *Falco subniger* (Black Falcon) (Rare);
- *Hamirostra melanosternon* (Black-breasted Buzzard) (Rare);
- *Hieraaetus morphnoides* (Little Eagle) (Vulnerable);
- *Myiagra inquieta* (Restless Flycatcher) (Rare); and
- *Phaps histrionica* (Flock Bronzewing) (Rare).

One species was observed during the field survey, Australian Bustard which was observed near Raspberry Creek.

In general, the vegetation proposed to be cleared is not specialised habitat for these species (i.e., they can occur in a broad range of wooded habitats) and given the narrow linear nature of the clearance, the clearance is unlikely to significantly impact on these species.

### **4.2.3. Threatened flora**

#### **EPBC Act**

The desktop assessment identified three flora species listed as threatened under the EPBC Act as potentially occurring in the Project Area (Table 15):

- *Eleocharis papillosa* (Dwarf Desert Spike-rush) (Vulnerable, SA: Rare);
- *Frankenia plicata* (Sea Heath) (Endangered, SA: Vulnerable); and
- *Olearia arckaringensis* (Arckaringa Daisy) (Endangered, SA: Endangered).

*Eleocharis papillosa* is known in SA from scattered disjunct populations. The species is more often associated with ephemeral (temporary) wetlands, predominantly freshwater and semi-saline swamps, and growing in plant communities dominated by Coolabah (*Eucalyptus coolabah*), Samphire (*Halosarcia spp.*), Northern Bluebush (*Chenopodium auricomum*) and *Eragrostis spp.* including Swamp Canegrass (*E. australasica*), *Cyperus spp.* and *Acacia stenophylla* (SA DEH, 2007). Although there was some vegetation that would be suitable habitat for this species, the understorey species present within the floodways were not appropriate and most floodways and drainage lines do not retain water long after rainfall. There are records for this species along the roadside (included in a roadside significant site (outside of the Project Area), however, it was not present when the area was checked in 2003. This record was not verified in the current survey.



*Frankenia plicata* occurs in habitats consisting of small hillside channels, in swales of loamy sands to clay and in areas with good drainage. Forty-one records of this species occur between Port Augusta along the Stuart Highway and north-east to Maree, none of which are within 50 km of Kempe Road. Habitat suitable for this species within the Project Area is minimal (round the floodways and drainage lines) and as such the possibility of this species occurring within the area is reduced. As such the clearance is unlikely to significantly impact this species.

*Olearia arckaringensis* occurs in association with low, very open woodland of *Acacia papyrocarpa* (Western Myall) and/or *Eucalyptus socialis* ssp. *socialis* (Beaked Red Mallee) with sparse *Acacia tetragonophylla* (Dead Finish) shrubs. This vegetation type is not present within the Project Area and this species has been well searched for in this area. As such, it is unlikely that this species will occur within the Project Area and as such there is unlikely to be an impact to this species.

### **NPW Act**

An additional twenty-eight flora species were listed as threatened under the NPW Act and assessed as potentially occurring in the Project Area (Table 15):

- *Aristida arida* (Rare);
- *Atriplex eichleri* (Eichler's Saltbush) (Rare);
- *Atriplex humifusa* (Vulnerable);
- *Austrostipa nullanulla* (Club Spear-grass) (Vulnerable);
- *Austrostipa vickeryana* (Vickery's Spear-grass) (Vulnerable);
- *Cyperus bifax* Downs (Flat-sedge) (Rare);
- *Eleocharis papillosa* (Vulnerable);
- *Embadium johnstonii* (Johnston's Slipper-plant) (Rare);
- *Embadium stagnense* (Arcoona Slipper-plant) (Rare);
- *Eragrostis lacunaria* (Purple Love-grass) (Rare);
- *Frankenia cupularis* (Rare);
- *Gilesia biniflora* (Western Tar-vine) (Rare);
- *Goodenia chambersii* (Rare);
- *Maireana melanocarpa* (Black-fruit Bluebush) (Rare);
- *Nicotiana truncata* (Rare);
- *Ptilotus barkeri* (Barker's Mulla Mulla) (Rare);
- *Roepera crassissima* (Thick Twinleaf) (Rare);
- *Roepera humillima* (Small-fruit Twinleaf) (Rare);
- *Roepera hybrida* (Rare);
- *Sclerolaena blackiana* (Black's Bindyi) (Rare);
- *Senecio gypsicola* (Gypsum Groundsel) (Rare);
- *Stemodia* sp. *Haegii* Haegi's Stemodia (Rare);
- *Swainsona minutiflora* (Small-flower Swainson-pea) (Vulnerable);
- *Swainsona oligophylla* (Rare);
- *Swainsona vestita* (Vulnerable);
- *Tecticornia cupuliformis* (Rare);
- *Typhonium alismifolium* (Rare); and
- *Wurmbea stellata* (Star Nancy) (Rare).

Three threatened species were observed during the field survey, *Atriplex eichleri* (Eichler's Saltbush), *Frankenia cupularis* and *Swainsona oligophylla*.

A full list of flora species observed during the field survey is provided in Appendix 2 and the locations of flora species identified in the BDBSA 50 km search is provided in Appendix 4.

**Table 15. Likelihood of occurrence of threatened species identified in the desktop assessment. The data source and threat levels are described in the table footer.**

Species (common name)	NP&W Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
<b>Aves</b>						
<i>Actitis hypoleucos</i> (Common Sandpiper)		Mi	1		Occurs in wetland habitats.	Unlikely – no suitable habitat within the Project Area.
<i>Anhinga novaehollandiae novaehollandiae</i> (Australasian Darter)	R		2	2005	Habitat is lakes, rivers, swamps; rarely coastal.	Unlikely – There is no suitable habitat in the Project Area.
<i>Amytornis modestus</i> (Thick-billed Grasswren)		VU	1,2	2016	The Thick-billed Grasswren occurs in chenopod shrublands (which occur in the arid and semi-arid zones), especially shrublands dominated by saltbush <i>Atriplex</i> spp. and bluebush <i>Maireana</i> spp., sometimes with widely scattered trees. During a survey of the Mount Eba and Millers Creek Stations, South Australia, the subspecies was recorded in chenopod shrubland with gilgais supporting large chenopods such as <i>Oodnadatta</i> Saltbush <i>Atriplex nummularia omissa</i> , Blackbush <i>Maireana pyramidata</i> , and Spiny Saltbush <i>Rhagodia spinescens</i> Threatened Species Scientific Committee (2016).	Highly likely – There are records within 10 years and some vegetation within the Project Area is suitable for the species.
<i>Aphelocephala pectoralis</i> (Chestnut-breasted Whiteface)	R		2	2012	Tablelands with bare ground and gibber, sparsely vegetated with <i>Maireana</i> spp., <i>Acacia tetragonophylla</i> , <i>Eremophila</i> spp. and <i>Acacia aneura</i> (Pizzey & Knight, 2013).	Likely – There are records within 10 years and habitat in the Project Area is suitable for the species.
<i>Apus pacificus</i> (Fork-tailed Swift)		Mi	1		Aerial species. The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia	Unlikely – no suitable habitat in Project Area, possible flyover.
<i>Ardeotis australis</i> (Australian Bustard)	V		2	2016	Mainly occurs in inland Australia and is now scarce or absent from southern and south-eastern Australia. Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams.	Known – species was observed at Raspberry Creek.

<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		Mi	1		Occurs in wetland habitats.	Unlikely – no suitable habitat within the Project Area.
<i>Calidris ferruginea</i> (Curlew Sandpiper)		Mi	1		Occurs in wetland habitats.	Unlikely – no suitable wetland habitat within the Project Area.
<i>Calidris melanotos</i> (Pectoral Sandpiper)		Mi	1		Occurs in wetland habitats.	Unlikely – no suitable habitat within the Project Area.
<i>Charadrius veredus</i> (Oriental Plover)		Mi	1		Occurs in wetland habitats.	Unlikely – no suitable habitat within the Project Area.
<i>Emblema pictum</i> (Painted Finch)	R		2	2000	Distributed across Northern and Central Australia. From as far north as Derby with noted habitats in Dampier they extend from this point through to Central West Queensland. Preferred habitat is Spinifex covered, rocky landscapes.	Unlikely – There is no suitable habitat in the Project Area.
<i>Falco hypoleucos</i> (Grey Falcon)	R	VU	1, 2	2010	The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia (Marchant and Higgins 1993). The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread, although it is essentially confined to the arid and semi-arid zones at all times (Schoenjahn 2018). The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter Threatened Species Scientific Committee (2020).	Possible – There is some vegetation in the Project Area is suitable for the species, however this species is sparsely distributed.
<i>Falco peregrinus macropus</i> (Peregrine Falcon)	R		2	2020	This species prefers open habitats such as grasslands, tundra and meadows and nests on cliff faces and in crevices. It has an extremely large range and is found world-wide except for rainforests and cold, dry Arctic regions. This species has increasingly been observed inhabiting urban areas.	Possible - There are records within 10 years and habitat in the Project Area is suitable for the species.

<i>Falco subniger</i> (Black Falcon)	R		2	2016	This species is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas (BirdLife Australia, n.d.).	Possible – There are records within 10 years and habitat in the Project Area is suitable for the species.
<i>Hamirostra melanosternon</i> (Black-breasted Buzzard)	R		2	2016	Found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts. Grasslands. (NSW Government Environment and Heritage 2017)	Possible - There are records within 10 years and habitat in the Project Area is suitable for the species.
<i>Hieraaetus morphnoides</i> (Little Eagle)	V		2	2005	The Little Eagle is widespread in mainland Australia, central and eastern New Guinea. It is seen over woodland and forested lands and open country, extending into the arid zone. It tends to avoid rainforest and heavy forest (BirdLife Australia, n.d.).	Possible - There are records within 10 years and habitat in the Project Area is suitable for the species, although it was not recorded during surveys.
<i>Motacilla cinerea</i> (Grey Wagtail)		Mi	1		European and asian species. Migrates south in winter, usually to Indonesia and NG. Rarely reaches Australia, but when it does, favours habitat near freshwater streams, also mown grass, ploughed land or near sewage ponds.	Unlikely – vagrant to SA, not within natural distribution.
<i>Motacilla flava</i> (Yellow Wagtail)		Mi	1		Open country near swamps, salt marshes, sewage ponds, grassed surrounds to airfields, bare ground. Occasionally on drier inland plans. Rare but regular visitor around Aust coast especially the NW coast Broome to Darwin.	Unlikely – vagrant to SA, not within natural distribution.
<i>Myiagra inquieta</i> (Restless Flycatcher)	R		2	2016	Found in open forests and woodlands and is frequently seen in farmland (BirdLife Australia n.d.).	Unlikely – There is no suitable habitat in the Project Area.
<i>Pedionomus torquatus</i> (Plains-Wanderer)		CR	1		The Plains-wanderer occurs at scattered sites in Queensland, NSW, Victoria and SA. Inhabits sparse, treeless, lowland native grasslands with approximately 50% bare ground, most vegetation less than 5 cm in height, with some widely-spaced plants up to 30 cm high.	Unlikely – There is no suitable habitat in the Project Area.

<i>Pezoporus occidentalis</i> (Night Parrot)		EN	1		Inhabits arid and semi-arid areas that are characterised by having dense, low vegetation. Based on the few accepted records within the past 50 years, the habitat of the Night Parrot consists of <i>Triodia</i> grasslands in stony or sandy environments, and of samphire and chenopod shrublands, including genera such as <i>Atriplex</i> , <i>Bassia</i> and <i>Maireana</i> , on floodplains and claypans, and on the margins of saltlakes, creeks or other sources of water (DAWE, 2022)	Unlikely – There is no suitable <i>Triodia</i> dominated habitat in the Project Area.
<i>Phaps histrionica</i> (Flock Bronzewing)	R		2	2013	Inhabiting grassy plains, saltbush, spinifex, and open mulga. Its preferred habitat is tussock grassland, particularly Mitchell grassland.	Likely - There are records within 10 years and habitat in the Project Area is suitable for the species.
<i>Polytelis alexandrae</i> (Princess Parrot)		EN	1		The Princess Parrot is confined to arid regions of Western Australia, the Northern Territory, and South Australia. The Princess Parrot inhabits sand dunes and sand flats in the arid zone of western and central Australia. It occurs in open savanna woodlands and shrublands that usually consist of scattered stands of <i>Eucalyptus</i> , <i>Casuarina</i> or <i>Allocasuarina</i> trees; an understorey of shrubs such as <i>Acacia</i> (especially <i>A. aneura</i> ), <i>Cassia</i> , <i>Eremophila</i> , <i>Grevillea</i> , <i>Hakea</i> and <i>Senna</i> ; and a ground cover dominated by <i>Triodia</i> species. It also frequents <i>Eucalyptus</i> or <i>Allocasuarina</i> trees in riverine or littoral areas (DAWE, 2022).	Unlikely – There is no suitable habitat in the Project Area.
<b>Mammalia</b>						
<i>Notomys fuscus</i> (Dusky Hopping-mouse)		VU	1		This species inhabits arid areas of Australia with sand dunes or sand plains with hummocks and water nearby. The species is predominantly restricted to the dune crests with only a few observations of the species in the surrounding gibber areas (which are utilised by Fawn Hopping-mouse ( <i>N. cervinus</i> )) or inter-dune swales and scalded areas. The Dusky Hopping-mouse does move across inter-dune clay flats within their home range (Moseby et al. 1999). <i>Nitraria billarderei</i> and Sandhill Cane-grass ( <i>Zygochloa paradoxa</i> ) may be important in supporting persistent populations. After seasons of good rainfall the species may occur in atypical habitat such as	Unlikely – There is no suitable dune or <i>Triodia</i> habitat in the Project Area.

					chenopod (e.g. Black Bluebush ( <i>Maireana pyramidata</i> )) shrubland on gibber plains, acacia shrubland and sandy creek lines (Val et al. 2012; Waudby & How 2008). In SA, the species is found in areas of continuous sand dune habitat. At Montecollina Bore, Cobbler Dunes predominate with <i>Nitraria billardieri</i> the dominant plant species. The area was formerly vegetated with stands of Sandhill Cane-grass but was removed by historical overgrazing.	
<i>Pseudomys australis</i> (Plains Mouse)	V	VU	1,2	2012	Primarily found in gibber plains and mid slopes with boulders, small stones and gilgais, with vegetation dominated by <i>Atriplex</i> - <i>Maireana</i> open shrubland. In years of very good rainfall, this species occurs on adjoining sandy plains. During poor conditions, core refuge areas may occur on low-lying gilgais and watercourses of gibber plains, with populations maintained in drainage depressions and areas of cracking clays (DAWE, 2022).	Likely - There are records within 10 years and habitat in the Project Area is suitable for the species.
<i>Tringa nebularia</i> (Common Greenshank)		Mi	1		Occurs on coastal shores and mudflats.	Unlikely – No suitable habitat within the Project Area.
<b>Reptilia</b>						
<i>Ophidiocephalus taeniatus</i> (Bronze Snake-lizard)	R	EN	1, 2	2015	Within South Australia, the species has been recorded in the leaf litter of several different plant species, including Gidgee ( <i>Acacia cambagei</i> ), Mulga ( <i>Acacia aneura</i> ), Dead Finish ( <i>Acacia tetragonophylla</i> ), Western Myall ( <i>Acacia papyrocarpa</i> ) and Leafless Exocarpus ( <i>Exocarpus aphylla</i> ) in drainage lines flowing out of stony tablelands and breakaways (Pedler 2009).	Possible - There are records within 10 years and some vegetation within the Project Area may be suitable for the species.
<b>Plantae</b>						
<i>Aristida arida</i>	R		2	2022	In SA, occurs in LE, FR, EA. Recorded in disturbed sites, temporarily wet areas, rocky sites and associated with calcareous soils. Open woodland, shrubland in hills and plains (Jessop et al, 2006).	Possible – some suitable vegetation within the Project Area.
<i>Atriplex eichleri</i> (Eichler's Saltbush)	R		2	1996	SA: LE, FR, EA. Grows on Dam banks. Grey clay soil. Herbland	Possible – some suitable habitat within the Project Area.

<i>Atriplex humifusa</i>	V		2	2013	SA: Lake Eyre. Recorded from scorched-looking gypseous dust flats and slopes, and associated with deeply cracking clays.	Possible – suitable habitat within the Project Area.
<i>Austrostipa nullanulla</i> (Club Spear-grass)	V		2	1998	SA: GT EP MU YP. Club Spear-grass is found from NSW and west into South Australia (Vickery et al. 1986). It occurs on crests, slopes and spurs often on the western to north-western side of large lunettes of flour gypsum (Kopi), or in sandy loam soils, and most often around salt lakes associated with chenopod shrubland, and mixed-species grassland, through to grassland dominated by Club Spear-grass (DAWE 2022).	Possible – some suitable habitat within the Project Area.
<i>Austrostipa vickeryana</i> (Vickery's Spear-grass)	V		2	1998	SA: NU, GT, EP and LE. Also from WA. Recorded on sand and associates with limestone and gypsum in inland saline areas.	Possible – some suitable habitat within the Project Area.
<i>Cyperus bifax</i> (Downs Flat-sedge)	R		2	1996	Grows on floodplains on heavy clay soils.	Possible – suitable habitat within the Project Area.
<i>Eleocharis papillosa</i> (Dwarf Desert Spike-rush)	R	VU	1, 2	2003	The species is known the NT, SA and WA from scattered disjunct populations. The species is more often associated with ephemeral (temporary) wetlands, predominantly freshwater and semi-saline swamps, and growing in plant communities dominated by Coolabah ( <i>Eucalyptus coolabah</i> ), Samphire ( <i>Halosarcia spp.</i> ), Northern Bluebush ( <i>Chenopodium auricomum</i> ) and <i>Eragrostis spp.</i> including Swamp Canegrass ( <i>E. australasica</i> ) and <i>Cyperus spp.</i> and <i>Acacia stenophylla</i> (SA DEH, 2007).	Possible – There is some suitable habitat in the Project Area.
<i>Embadium johnstonii</i> (Johnston's Slipper-plant)	R		2	2010	Occurs to the north and south of the Project Area in shrubland and grassland.	Possible – suitable vegetation within the Project Area.
<i>Embadium stagnense</i> (Arcoona Slipper-plant)	R		2	2001	In SA, occurs in the GT and Lake Eyre regions. Known habitats are flat dusty gypseous clay plain and rocky gully. Red clay loam. Grassland. No grazing.	Possible – suitable habitat within the Project Area.
<i>Eragrostis lacunaria</i> (Purple Love-grass)	R		2	2000	Widespread on clay soils.	Possible – suitable habitat within the Project Area.



<i>Frankenia cupularis</i>				2010	Grows on sand flats and salt pans, in semi-arid districts.	Possible – suitable habitat within the Project Area.
<i>Frankenia plicata</i> (Sea Heath)	V	EN	1		Occurs in SA, from north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Maree. Likely that the species has been under reported due to difficulty of identification of <i>Frankenia spp.</i> The species is found in a wide range of vegetation communities that have good drainage including on small hillside channels, which take the first run-off after rain and swales of loamy sands to clay in the Simpson Desert (DEWHA, 2008).	Possible – Although no suitable hillside channel habitats were identified within the Project Area.
<i>Gilesia biniflora</i> (Western Tarvine)	R		2	2000	Record near Oodnadatta.	Possible – nearby records, although records scattered and sparse in this area.
<i>Goodenia chambersii</i>	R		2	2017	On stony slopes and watercourses.	Possible – some suitable habitat within Project Area.
<i>Maireana melanocarpa</i> (Black-fruit Bluebush)	R		2	2021	Found on sandy rises around salt lakes. SA: LE FR EA.	Possible – nearby records, although no suitable habitat within the Project Area.
<i>Nicotiana truncata</i>	E		2	2010	Occurs in the LE region of SA. Seasonally abundant along arid streamlines on the gibber plains between Coober Pedy and Oodnadatta in northern SA. Site possibly sub-saline and gypseous.	Possible – suitable habitat within the Project Area.
<i>Olearia arckaringensis</i> (Arckaringa Daisy)	E	EN	1, 2	2017	Occurs in association with low, very open woodland of Western Myall ( <i>Acacia papyrocarpa</i> ) and/or Beaked Red Mallee ( <i>Eucalyptus socialis ssp. Socialis</i> ) with sparse Dead Finish ( <i>Acacia tetragonophylla</i> ) shrubs. It is typically found in the soft, eroding slopes of the breakaway escarpment in powdery, white gypseous substrate.	Possible – however, no suitable vegetation types occur within the Project Area.
<i>Ptilotus barkeri</i> (Barker's Mulla Mulla)	R		2	2017	Nearby records to the north in <i>Acacia sp.</i> woodland and chenopod vegetation.	Possible – nearby records and suitable

						vegetation within the Project Area.
<i>Roepera crassissima</i> (Thick Twinleaf)	R		2	2017	Recorded on gypseous flats and rocky rises. SA: NW LE GT.	Possible – Records approximately 40 km from Project Area, suitable habitat present.
<i>Roepera humillima</i> (Small-fruit Twinleaf)	R		2	1996	SA: NW LE FR. Recorded on red-brown cracking clay and sandy loam with gypsum.	Possible – suitable habitat within the Project Area and nearby records along road.
<i>Roepera hybrida</i>	R		2	1996	Limited distribution information. Nearby records in chenopod shrubland and along drainage lines	Possible – suitable habitat within the Project Area and nearby records along road.
<i>Sclerolaena blackiana</i> (Black's Bindyi)	R		2	2008	Limited habitat information, occurs in shrubland vegetation along Kempe Road near Project Areas.	Possible – suitable habitat within the Project Area and nearby records along road.
<i>Senecio gypsicola</i> (Gypsum Groundsel)	R		2	2010	Limited habitat information, occurs in shrubland vegetation near the Breakaways Conservation Park.	Possible – nearby records and suitable habitat within the Project Area.
<i>Stemodia sp. Haegii</i> (Haegi's Stemodia)	R		2	2010	Endemic to SA. Recorded from four locations between Coober Pedy to the south and the Oodnadatta – Marla Road to the north, extending both east and west of the main Coober Pedy – Oodnadatta Road but not as far east as Lake Cadibarrawirracanna. The species is confined to the Moon Plain, Baltana and Oodnadatta Land Systems, occurring on plains dissected by numerous ephemeral drainage channels and several major creeks, usually along watercourses and in shallow clay pans on the plains.	Possible – nearby records and suitable habitat within the Project Area.

<i>Swainsona minutiflora</i> (Small-flower Swainson-pea)	V		2	2010	Limited habitat information for this species. Nearby records to the north and south of the Project Area in chenopod shrublands.	Possible – suitable habitat within the Project Area and nearby records.
<i>Swainsona oligophylla</i>	R		2	2005	Usually on clay-loam soils in well-watered areas, especially on floodplains	Known – species observed in Project Area.
<i>Swainsona vestita</i>	V		2	2010	Limited habitat information for this species. Nearby records for this species occur between Coober Pedy and Marla in chenopod shrubland.	Possible – suitable habitat within Project Area, although nearby records are south and east of the Project Area.
<i>Tecticornia cupuliformis</i>	R		2	2010	Limited habitat information for this species. Records for this species occur along drainage lines	Possible – nearby records and suitable habitat.
<i>Typhonium alismifolium</i>	R		2	2010	Limited habitat information in this area. Record adjacent to road at Mt Andrews Creek.	Highly likely – record at Mt Andrews Creek. Species may have been present but dormant.
<i>Wurmbea stellata</i> (Star Nancy)	R		2	1991	<i>Wurmbea stellata</i> is endemic to SA, in arid and semi-arid areas westward from the Flinders Ranges to the Great Victoria Desert and south to the Gawler Ranges, growing in red clay soils on plains or rocky hills, often in exposed sites free of other vegetation. Plants are slender and grow to 10 cm high. They have distinct purplish-green tinted leaves and stem, closely spaced upper leaves and a single star like bicoloured flower (Bates 1995).	Possible – records along Nilkinina Creek nearby, suitable habitat within Project Area.

Source; 1- Protected matters search tool, 2 - BDBSA, 3 – NatureMaps, 4 – Observed during field survey  
NP&W Act; E= Endangered, V = Vulnerable, R= Rare  
EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable

### 4.3. Cumulative impacts

*When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.*

Direct impacts of the proposal include the complete removal of native vegetation (up to 63.81 ha).

All construction access and earthworks fall within the works extent of the Project Area.

Potential indirect impacts of the proposal include:

- Dust generation during construction, which may impact surrounding vegetation;
- Noise generation, both during construction and from traffic, which may impact fauna species in the area; and
- Changes to flow regimes, which may impact surrounding vegetation.

### 4.4. Addressing the Mitigation Hierarchy

*When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.*

#### **a) Avoidance – outline measures taken to avoid clearance of native vegetation**

The upgrades are required to meet the minimum standards for an unsealed road classified as PBS Level 4 (for use by Triple Road train) including minimum carriageway width, appropriately graded swale drains and scour protection. The upgrades must occur along the existing roadway, in which native vegetation cannot be avoided.

#### **b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).**

The impacts have been reduced to the minimum possible to achieve safety standards and drainage requirements. The road width requirements will continue to be reviewed and reduced where possible. The resheeting and upgrade of the floodways aims to reduce the impact of heavy rainfall events on the surface of the road. As such this aims to reduce the need to create diversions or grade larger areas of road which will mean the bank and levy area will have less disturbance in the long term. Previously disturbed areas will be used wherever possible, and pre-existing borrow pits have been proposed for expansion rather than establishing new areas of clearance within the Project Area. The contractor undertaking the clearance will implement a Construction Environmental Management Plan to ensure impacts to non-target vegetation is minimised.

#### **c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.**

The proposed works for the road upgrades are permanent land clearance and it is unlikely that this area will be rehabilitated or restored. However, under current plans, outside of the current road base dirt will be piled on top

of existing vegetation to create a levy, as such this area will not be paved, allowing vegetation to naturally recolonise where possible.

**d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.**

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

The adverse impacts to native vegetation that cannot be avoided or minimised will be offset through the achievement of a SEB that outweighs the proposed impact.

## 4.5. Principles of Clearance (Schedule 1, Native Vegetation Act 1991)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

**Table 16. Assessment against the Principles of Clearance.**

Principle of clearance	Considerations
<p><b>Principle 1(b) – significance as a habitat for wildlife</b></p>	<p><u>Relevant information</u></p> <p>There was a low diversity among fauna species with 31 native fauna species (29 birds, one reptile and one mammal) recorded in the Project Area during the fauna assessment. No EPBC listed threatened species were observed within the Project Area, one NPW listed threatened species (Australian Bustard) was observed within the Project Area at Raspberry Creek.</p> <p>A number of EPBC Act and NPW Act listed fauna species were assessed as possibly, likely, or highly likely/known to occur in the Project Area based on known distributions, and suitability of habitat and / or presence of recent records within 50 km of the Project Area:</p> <p><b><u>Highly Likely/Known:</u></b></p> <ul style="list-style-type: none"> <li>• <i>Amytornis modestus</i> (Thick-billed Grasswren) (EPBC Act: VU); and</li> <li>• <i>Ardeotis australis</i> (Australian Bustard) (NPW Act V).</li> </ul> <p><b><u>Likely:</u></b></p> <ul style="list-style-type: none"> <li>• <i>Aphelocephala pectoralis</i> (Chestnut-breasted Whiteface) (NPW Act: R);</li> <li>• <i>Phaps histrionica</i> (Flock Bronzewing) (NPW Act: R); and</li> <li>• <i>Pseudomys australis</i> (Plains Mouse) (EPBC Act: VU; NPW Act: V).</li> </ul> <p><b><u>Possible:</u></b></p> <ul style="list-style-type: none"> <li>• <i>Falco hypoleucos</i> (Grey Falcon) (EPBC Act: VU; NPW Act: R);</li> <li>• <i>Falco peregrinus macropus</i> (Peregrine Falcon) (NPW Act: R);</li> <li>• <i>Falco subniger</i> (Black Falcon) (NPW Act: R);</li> <li>• <i>Hamirostra melanosternon</i> (Black-breasted Buzzard) (NPW Act: R);</li> <li>• <i>Hieraaetus morphnoides</i> (Little Eagle) (NPW Act: V); and</li> </ul>

Principle of clearance	Considerations
	<ul style="list-style-type: none"> <li>• <i>Ophidiocephalus taeniatus</i> (Bronze Snake-lizard) (EPBC Act: EN; NPW Act: R).</li> </ul> <p>Vegetation Associations Threatened Fauna score: 0.1 Unit biodiversity Scores:</p> <ul style="list-style-type: none"> <li>• MTA2 (DL1) – 69.48</li> <li>• MTA2 (UP1) – 73.60</li> <li>• COO5 (UP1) – 76.88</li> <li>• COO5 (DL1) – 73.60</li> <li>• CAM1 (DL1) – 66.35</li> <li>• CAM1 (UP1) – 64.91</li> <li>• ALO1 (DL1) – 86.08</li> <li>• ARC1&amp;2 (DL1) – 66.92</li> <li>• RAS2 (DL1) – 69.49</li> <li>• NIL2 (DL1) – 67.36</li> <li>• ALC2 (DL1) – 73.53</li> <li>• ALC2 (UP1) – 50.96</li> <li>• LOR1 (DL1) – 72.07</li> <li>• LOR2 (DL1) – 73.38</li> <li>• LOR2 (UP1) – 66.25</li> <li>• A (5) – 53.57</li> <li>• A (7) – 62.36</li> <li>• B (2) – 87.14</li> <li>• B (4) – 71.14</li> <li>• B (5) – 66.75</li> <li>• B (7) – 57.06</li> <li>• C (7) – 66.84</li> <li>• Pit 19 – 45.21</li> <li>• Pit B – 57.92</li> <li>• Pit C – 57.10</li> </ul>
	<p><u>Assessment against the principles</u> <u>Seriously at Variance</u> All Sites</p>
	<p><u>Moderating factors that may be considered by the NVC</u> <u>Impact significance</u> Impact to EPBC listed species Thick-billed Grasswren, Plains Mouse, Grey Falcon and Bronzeback snake-lizard have been assessed as unlikely to be significant due to the small size of the clearance of habitat relative to the available habitat for these species in the wider area; and the thin, linear nature of the clearance which will still allow individuals to cross between the two sides of the road. More specifically, limited vegetation within the Project Area was considered suitable habitat for Thick-billed Grasswrens as such the impact to habitat suitable for this species is likely to be minimal. Of the 63.81 ha proposed for clearance, 38 ha is suitable for Plains Mouse. Plains Mouse are primarily found in gibber plains with their preferred vegetation being predominantly chenopod of saltbush (<i>Atriplex spp.</i>) and bluebush (<i>Maireana spp.</i>) open shrubland on gibber and gypseous cracking clay plains dominated by low <i>Sclerolaena</i> shrubs. This vegetation type is the most</p>

Principle of clearance	Considerations
	<p>common type in the broader area. As such the 38 ha of this vegetation type proposed for clearance is minimal compared to the presence of that habitat within the broader landscape.</p> <p>The vegetation within the Project Area is not considered critical habitat for the Grey Falcon as it is an itinerant species that covers large area of land.</p> <p>Bronzeback snake-lizards occur in wooded areas with a deep leaf litter layer, typically around the Lake Eyre Region. There is some habitat within the Project Area that may be suitable (around the floodways), however, generally these areas do not contain deep leaf litter due to seasonal flooding. As such given the small area of clearance of suitable habitat relative to the presence of wooded drainage lines within the area, the proposed clearance is unlikely to be considered significant for this species.</p> <p>For the above species, due to the narrow linear nature of the proposed clearance and the small amount of clearance relative to the presence of similar habitat in the broader landscape, the proposed clearance of native vegetation is unlikely to fragment existing populations, lead to a long-term decrease in the size of a population, reduce the area of occupancy or adversely affect habitat critical to the survival of a species.</p> <p>Similarly, impacts to State listed threatened species are unlikely to be significant as the vegetation proposed for clearance is not specialist habitat for any of the State listed threatened species and due to the small area of clearance relative to the availability of those vegetation associations in the wider area.</p> <p><u>Common species</u></p> <p>All species recorded in the Project Area by fauna surveys are species that are commonly found in low, semi-arid or arid shrublands. This habitat is widespread throughout the surrounding landscape. The Project Area does not include any habitat features essential for maintaining local populations of threatened species in the long-term.</p>
<p><b>Principle 1(c)</b>  <b>– plants of a rare, vulnerable or endangered species</b></p>	<p><u>Relevant information</u></p> <p>No EPBC Act or NPW Act listed threatened flora species have been recorded by EBS Ecology during any survey undertaken in the Project Area.</p> <p>Several EPBC Act and NPW Act listed flora species were assessed as potentially occurring in the Project Area based on known distributions, and suitability of habitat and / or presence of recent records within 50km of the Project Area:</p> <p><b><u>Highly likely/Known:</u></b></p> <ul style="list-style-type: none"> <li>• <i>Swainsona oligophylla</i> (NPW Act: V);</li> <li>• <i>Typhonium alismifolium</i> (NPW Act: V);</li> <li>• <i>Atriplex eichleri</i> (Eichler's Saltbush) (NPW Act: R); and</li> <li>• <i>Frankenia cupularis</i> (NPW Act: R).</li> </ul> <p><b><u>Possible:</u></b></p> <ul style="list-style-type: none"> <li>• <i>Aristida arida</i> (NPW Act: R);</li> <li>• <i>Atriplex humifusa</i> (NPW Act: V);</li> <li>• <i>Austrostipa nullanulla</i> (Club Spear-grass) (NPW Act: V);</li> <li>• <i>Austrostipa vickeryana</i> (Vickery's Spear-grass) (NPW Act: V);</li> <li>• <i>Cyperus bifax</i> Downs Flat-sedge (NPW Act: R);</li> <li>• <i>Eleocharis papillosa</i> (NPW Act: V);</li> </ul>

Principle of clearance	Considerations
	<ul style="list-style-type: none"> <li>• <i>Embadium johnstonii</i> (Johnston's Slipper-plant) (NPW Act: R);</li> <li>• <i>Embadium stagnense</i> (Arcoona Slipper-plant) (NPW Act: R);</li> <li>• <i>Eragrostis lacunaria</i> (Purple Love-grass) (NPW Act: R);</li> <li>• <i>Frankenia plicata</i> (Sea Heath) (Endangered, SA: Vulnerable); and</li> <li>• <i>Gilesia biniflora</i> (Western Tar-vine) (NPW Act: R);</li> <li>• <i>Goodenia chambersii</i> (NPW Act: R);</li> <li>• <i>Maireana melanocarpa</i> (Black-fruit Bluebush) (NPW Act: R);</li> <li>• <i>Nicotiana truncata</i> (NPW Act: R);</li> <li>• <i>Olearia arckaringensis</i> (Arckaringa Daisy) (Endangered, SA: Endangered).</li> <li>• <i>Ptilotus barkeri</i> (Barker's Mulla Mulla) (NPW Act: R);</li> <li>• <i>Roepera crassissima</i> (Thick Twinleaf) (NPW Act: R);</li> <li>• <i>Roepera humillima</i> (Small-fruit Twinleaf) (NPW Act: R);</li> <li>• <i>Roepera hybrida</i> (NPW Act: R);</li> <li>• <i>Sclerolaena blackiana</i> (Black's Bindyi) (NPW Act: R);</li> <li>• <i>Senecio gypsicola</i> (Gypsum Groundsel) (NPW Act: R);</li> <li>• <i>Stemodia sp. Haegii Haegi's Stemodia</i> (NPW Act: R);</li> <li>• <i>Swainsona minutiflora</i> (Small-flower Swainson-pea) (NPW Act: V);</li> <li>• <i>Swainsona vestita</i> (NPW Act: V);</li> <li>• <i>Tecticornia cupuliformis</i> (NPW Act: R); and</li> <li>• <i>Wurmbea stellata</i> (Star Nancy) (NPW Act: R).</li> </ul> <p>Vegetation Associations: Threatened Flora Score – 0.2 (all sites)</p> <p><u>Seriously at Variance</u> All sites</p> <p><u>Moderating factors that may be considered by the NVC</u> A number of EPBC Act and NPW Act listed threatened flora species were assessed as possible or highly likely/known to occur in the Project Area. Refer to section 4.2.3 for the assessment of these species. Given the size and location of the proposed clearance footprint within the Project Area, clearance is unlikely to reduce the occupancy or lead to the fragmentation of these species. State listed threatened species may occur within the proposed clearance area, however, as the clearance is restricted to expanding the current roadside and is linear, the proposed clearance is unlikely to significantly impact these species.</p>
<b>Principle 1(d)</b> <b>– the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered</b>	<p><u>Relevant information</u> No threatened communities under the EPBC Act or threatened ecosystems under the Department of Environment and Water Provisional list of threatened ecosystems are present in the Project Area.</p> <p>Threatened Community Score – 1 (all sites)</p> <p><u>Assessment against the principles</u> <u>Not at Variance</u></p> <p><u>Moderating factors that may be considered by the NVC</u> N/A</p>



## 4.6. Risk assessment

The level of risk associated with the application

Table 17. Summary of the level of risk associated with the application.

<b>Total clearance</b>	No. of trees	-
	Area (ha)	63.81
	Total biodiversity Score	4064.57
<b>Seriously at variance with principle 1(b), 1(c) or 1 (d)</b>		1(b), 1(c)
<b>Risk assessment outcome</b>		Level 4

# 5. Clearance summary

## Clearance Area(s) Summary table

There are no loading or reductions applied.

Block	Site	Threatened	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity Score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
MTA2	DL1	1	0.2	0.1	69.48	0.42	29.18	1			30.64	1,686.01	92.73
MTA2	UP1	1	0.2	0.1	73.60	0.21	15.46	1			16.23	888.13	48.85
COO5	UP1	1	0.2	0.1	76.88	0.38	29.21	1			30.67	1,669.71	91.83
COO5	DL1	1	0.2	0.1	73.60	0.17	12.51	1			13.14	715.10	39.33
CAM1	DL1	1	0.2	0.1	66.35	0.10	6.63	1			6.97	362.83	19.96
CAM1	UP1	1	0.2	0.1	64.91	0.14	9.09	1			9.54	496.94	27.33
ALO1	DL1	1	0.2	0.1	86.08	0.40	34.43	1			36.16	1,882.95	103.56
ARC1 &2	DL1	1	0.2	0.1	66.92	3.17	212.14	1			222.74	11,338.51	623.62
RAS2	DL1	1	0.2	0.1	69.49	0.32	22.24	1			23.35	1,188.53	65.37
NIL2	DL1	1	0.2	0.1	67.36	0.49	33.01	1			34.66	1,733.63	95.35
ALC2	DL1	1	0.2	0.1	73.53	0.22	16.18	1			16.98	849.59	46.73
ALC2	UP1	1	0.2	0.1	50.96	0.21	10.85	1			11.40	570.09	31.35
LOR1	DL1	1	0.2	0.1	72.07	1.38	99.46	1			104.43	5,162.27	283.92
LOR2	DL1	1	0.2	0.1	73.38	0.09	6.60	1			6.93	340.75	18.74
LOR2	UP1	1	0.2	0.1	66.25	1.32	87.45	1			91.82	4,511.79	248.15
A	5	1	0.2	0.1	53.57	6.08	325.70	1			341.98	16,521.76	908.70
A	7	1	0.2	0.1	62.36	0.28	17.46	1			18.33	890.17	48.96
B	2	1	0.2	0.1	87.14	0.35	30.50	1			32.02	1,535.91	84.48
B	4	1	0.2	0.1	71.14	6.47	460.25	1			483.27	22,324.35	1227.84
B	5	1	0.2	0.1	66.75	24.2	1618.1	1			1698.97	80,584.27	4432.14
B	6	1	0.2	0.1	57.06	1.45	82.73	1			86.87	4,134.60	227.41
C	4	1	0.2	0.1	66.84	1.23	82.22	1			86.33	3987.71	219.32
C	7	1	0.2	0.1	53.57	6.08	325.70	1			341.98	16,521.76	908.70
	Pit19	1	0.2	0.1	45.21	1.68	75.95	1			79.75	4,059.30	223.26
	Pit B	1	0.2	0.1	57.92	5.42	313.90	1			329.59	15,807.51	869.41
	Pit C	1	0.2	0.1	57.10	7.59	433.36	1			455.03	21,823.31	1,200.28
<b>Mean</b>						<b>63.81</b>	<b>4064.57</b>				<b>4267.80</b>	<b>\$292,990.59</b>	<b>\$11,278.62</b>

**Totals summary table**

	<b>Total Biodiversity score</b>	<b>Total SEB points required</b>	<b>SEB Payment</b>	<b>Admin Fee</b>	<b>Total Payment</b>
<b>Application</b>	4064.57	4267.80	\$292,990.59	\$11,278.62	\$304,269.21

<b>Economies of Scale Factor</b>	0.11
<b>Rainfall (mm)</b>	Various

# 6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

## **ACHIEVING AN SEB**

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

- Establish a new SEB Area on land owned by the proponent.
- Use SEB Credit that the proponent has established.
- Apply to have SEB Credit assigned from another person or body.
- Apply to have an SEB to be delivered by a Third Party.
- Pay into the Native Vegetation Fund.

## **PAYMENT SEB**

The proponent proposes to achieve the SEB by paying into the Native Vegetation Fund. The total SEB payment required for the clearance of 63.81 ha of native vegetation is \$304,269.21, which includes an administration fee of \$11,278.62.

# 7. References

- Bates, RJ (1995). "The species of *Wurmbea* (Liliaceae) in South Australia". *Journal of the Adelaide Botanic Gardens*. 16: 33–53.
- Birdlife Australia (n.d.) Australia, accessed June 2022, <https://birdlife.org.au/>
- Department for Environment and Water (DEW) (2020) NatureMaps. Available at: <http://data.environment.as.gov.au/NatureMaps/Pages/default.aspx> [Accessed 1/2/2022].
- Department of Agriculture, Water and the Environment (DAWE) (2020) Protected Matters Search Tool. Available at: <https://www.environment.gov.au/epbc/protected-matters-search-tool> [Accessed June 2022].
- Department of Agriculture, Water and the Environment (DAWE) (2022) Species profile and Threats Data. Available at: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl> [Accessed June 2022].
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Approved Conservation Advice for *Frankenia plicata*. Canberra: Department of the Environment, Water, Heritage and the Arts.
- J.Jessop, G.R.M.Dashorst, F.M.James (2006) *Grasses of South Australia*, 328, Fig. 261
- Native Vegetation Council (NVC) (2020) Rangelands Assessment Manual July 2020. Native Vegetation Council, Adelaide. Available at: <https://www.environment.sa.gov.au/topics/native-vegetation/clearing/vegetation-assessments>.
- NSW Government Environment and Heritage (2017) Australia, accessed June 2022, <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10395>
- Pedler, R.D. (2009). *Unpublished Data - Coober Pedy Community Opal Shaft Fauna Monitoring Project*, administered by the South Australian Arid Lands NRM Board.
- Pizzey, G., Knight, F., & Pizzey, S. (2013) *Field Guide to the birds of Australia 9th Edition*. HarperCollins Australia.
- South Australian Arid Lands Natural Resources Management Board (NRMB) (2018) Arckaringa Daisy (*Olearia arckaringensis*) Survey Report. South Australian Arid Lands Natural Resources Management Board, Port Augusta.
- South Australia Department of Environment and Heritage (SA DEH) (2007). Species information sheet on *Eleocharis papillosa*. Report provided to the Commonwealth Department of Environment and Heritage.
- Threatened Species Scientific Committee (2008) *Frankenia plicata* (Sea Heath) *Conservation Advice*. Canberra: Department of Agriculture, Water and the Environment.
- Threatened Species Scientific Committee (2016) *Conservation Advice Amytornis modestus* thick-billed grasswren. Canberra: Department of the Environment.
- Threatened Species Scientific Committee (2020) *Conservation Advice Falco hypoleucos* Grey Falcon. Canberra: Department of Agriculture, Water and the Environment.

# 8. Appendices

**Appendix 1:** Fauna species list observed during the 2022 field survey.

	Species name	Common name	Conservation listing	Introduced
1	<i>Artamus cinereus</i>	Black-faced Woodswallow		
2	<i>Artamus personatus</i>	Masked Woodswallow		
3	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike		
4	<i>Corvus benetti</i>	Little Crow		
5	<i>Corvus coronoides</i>	Australian Raven		
6	<i>Dromaius novaehollandiae</i>	Emu		
7	<i>Eolophus roseicapilla</i>	Galah		
8	<i>Falco berigora</i>	Brown Falcon		
9	<i>Falco cenchroides</i>	Nankeen Kestrel		
10	<i>Geopelia cuneata</i>	Diamond Dove		
11	<i>Grallina cyanoleuca</i>	Magpielark		
12	<i>Gymnorhina tibicen</i>	Australian Magpie		
13	<i>Macropus rufus</i>	Red Kangaroo		
14	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck		
15	<i>Malurus lamberti</i>	Variiegated Fairywren		
16	<i>Malurus leucopterus</i>	White-winged Fairywren		
17	<i>Malurus splendens</i>	Splendid Fairywren		
18	<i>Manorina flavigula</i>	Yellow-throated Miner		
19	<i>Melopsittacus undulatus</i>	Budgerigar		
20	<i>Microeca fascinans</i>	Jacky Winter		
21	<i>Milvus migrans</i>	Black Kite		
22	<i>Neopsephotus bourkii</i>	Bourke's Parrot		
23	<i>Ocyphaps lophotes</i>	Crested Pigeon		
24	<i>Pachycephala rufiventris</i>	Rufous Whistler		
25	<i>Petrochelidon nigricans</i>	Tree Martin		
26	<i>Psephotellus varius</i>	Mulga Parrot		
27	<i>Pseudonaja sp.</i>	Brown Snake		
28	<i>Rhipidura leucophrys</i>	Willie Wagtail		
29	<i>Taeniopygia guttata</i>	Zebra Finch		
30	<i>Todiramphus pyrrophygius</i>	Red-backed Kingfisher		
31	<i>Turnix velox</i>	Little Buttonquail		

**Appendix 2:** Flora species list observed during the 2022 field survey

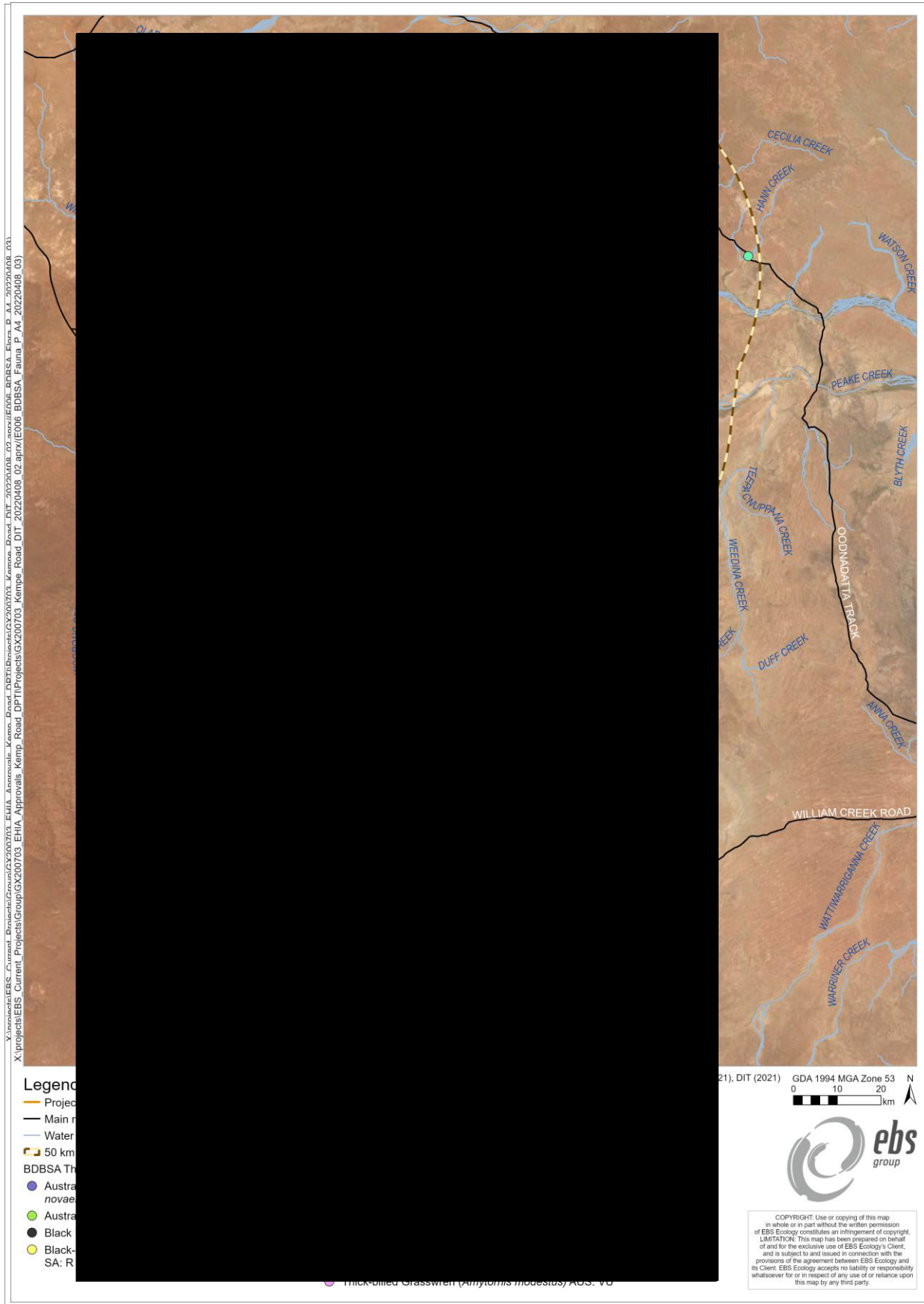
Species Name	Common name	Introduced
<i>Abutilon leucopetalum</i>	Desert Lantern-bush	
<i>Abutilon sp.</i>	Lantern-bush	
<i>Acacia ligulata</i>	Umbrella Bush	
<i>Acacia salicina</i>	Willow Wattle	
<i>Acacia sp.</i>	Wattle	
<i>Acacia tetragonophylla</i>	Dead Finish	
<i>Aeschynomene indica</i>	Budda Pea	
<i>Alternanthera angustifolia</i>	Narrow-leaf Joyweed	
<i>Amyema mirabilis ssp. boormanii</i>	Fleshy Mistletoe	
<i>Aristida contorta</i>	Curly Wire-grass	
<i>Artemisia sp.</i>	Wormwood	*
<i>Astrebla pectinata</i>	Barley Mitchell-grass	
<i>Astrebla sp.</i>	Mitchell-grass	
<i>Atriplex eichleri</i> (SA: R)	Eichler's Saltbush	
<i>Atriplex holocarpa</i>	Pop Saltbush	
<i>Atriplex nummularia</i>	Old-man Saltbush	
<i>Atriplex stipitata</i>	Bitter Saltbush	
<i>Atriplex vesicaria</i>	Bladder Saltbush	
<i>Austrostipa elegantissima</i>	Feather Spear-grass	
<i>Austrostipa platychaeta</i>	Flat-awn Spear-grass	
<i>Austrostipa sp.</i>	Spear-grass	
<i>Boerhavia dominii</i>	Tar-vine	
<i>Brassica sp.</i>		*
<i>Calotis hispidula</i>	Hairy Burr-daisy	
<i>Chenopodium auricomum</i>	Golden Goosefoot	
<i>Chenopodium curvispicatum</i>	Cottony Goosefoot	
<i>Chenopodium nitriaceum</i>	Nitre Goosefoot	
<i>Convolvulus sp.</i>	Bindweed	
<i>Cullen australasicum</i>	Tall Scurf-pea	
<i>Cyperus bulbosus</i>	Bulbous Flat-Sedge	
<i>Dactyloctenium radulans</i>	Button-grass	
<i>Dissocarpus fontinalis</i>		
<i>Dissocarpus paradoxus</i>	Ball Bindyi	
<i>Duma florulenta</i>	Lignum	
<i>Einadia nutans ssp.</i>	Climbing Saltbush	
<i>Enchylaena tomentosa</i>	Ruby Saltbush	
<i>Enneapogon avenaceus</i>	Common Bottle-washers	
<i>Enneapogon polyphyllus</i>	Leafy Bottle-washers	
<i>Enteropogon ramosus</i>	Umbrella Grass	
<i>Eragrostis dielsii</i>	Mulka	
<i>Eragrostis setifolia</i>	Bristly Love-grass	
<i>Eremophila freelingii</i>	Rock Emubush	
<i>Eucalyptus coolabah</i>	Coolibah	
<i>Euphorbia drummondii group</i>		
<i>Euphorbia stevenii</i>	Bottletree Spurge	

Species Name	Common name	Introduced
<i>Flaveria trinervia</i>	Speedy Weed	*
<i>Frankenia serpyllifolia</i>	Thyme Sea-heath	
<i>Geranium sp.</i>		
<i>Gnephosis arachnoidea</i>	Spidery Button-flower	
<i>Goodenia lunata</i>	Stiff Goodenia	
<i>Hakea leucoptera ssp. leucoptera</i>	Silver Needlewood	
<i>Iseilema membranaceum</i>	Small Flinders-grass	
<i>Maireana aphylla</i>	Cotton-bush	
<i>Maireana appressa</i>	Pale-fruit Bluebush	
<i>Maireana georgei</i>	Satiny Bluebush	
<i>Malvastrum americanum var. americanum</i>	Malvastrum	
<i>Marsilea costulifera</i>	Narrow-leaf Nardoo	
<i>Minuria integerrima</i>	Smooth Minuria	
<i>Muehlenbeckia sp.</i>	Lignum	
<i>Osteocarpum dipterocarpum</i>	Two-wing Bonefruit	
<i>Oxalis sp.</i>	Sorrel	
<i>Panicum decompositum var. decompositum</i>	Native Millet	
<i>Portulaca oleracea</i>	Common Purslane	
<i>Phalaris canariensis</i>	Canary-grass	*
<i>Pterocaulon sphacelatum</i>	Apple-bush	
<i>Ptilotus obovatus</i>	Silver Mulla Mulla	
<i>Rhagodia parabolica</i>	Mealy Saltbush	
<i>Rhagodia ulicina</i>	Intricate Saltbush	
<i>Salsola australis</i>	Buckbush	
<i>Sclerolaena bicornis var. bicornis</i>	Goat-head Bindyi	
<i>Sclerolaena bicuspis</i>	Two-spine Bindyi	
<i>Sclerolaena brachyptera</i>	Short-wing Bindyi	
<i>Sclerolaena calcarata</i>	Redburr Bindyi	
<i>Sclerolaena cuneata</i>	Tangled Bindyi	
<i>Sclerolaena diacantha</i>	Grey Bindyi	
<i>Sclerolaena divaricata</i>	Tangled Bindyi	
<i>Sclerolaena muricata var. muricata</i>	Five-spine Bindyi	
<i>Sclerolaena sp.</i>	Bindyi	
<i>Sclerolaena uniflora</i>	Small-spine Bindyi	
<i>Senna artemisioides ssp. artemisioides x ssp. coriacea</i>	Desert Senna	
<i>Sida intricata</i>	Twiggy Sida	
<i>Sida sp.</i>	Sida	
<i>Solanum esuriale</i>	Quena	
<i>Solanum oligacanthum</i>	Desert Nightshade	
<i>Solanum sp.</i>	Nightshade	
<i>Solanum sturtianum</i>	Sturt's Nightshade	
<i>Stemodia florulenta</i>	Bluerod	
<i>Swainsona oligophylla (SA: R)</i>		
<i>Swainsona sp.</i>	Swainson-pea	
<i>Tecticornia sp.</i>	Samphire	
<i>Teucrium racemosum</i>	Grey Germander	
<i>Trianthema triquetrum</i>	Red Spinach	



Species Name	Common name	Introduced
<i>Tribulus eichlerianus</i>	Eichler's Caltrop	
<i>Tribulus sp.</i>	Caltrop	
<i>Tripogonella loliiformis</i>	Five-minute Grass	
<i>Vittadinia arida</i>		
<i>Vittadinia sp.</i>	New Holland Daisy	
<i>Zaleya galericulata ssp. australis</i>		

**Appendix 3: BDBSA search results of threatened fauna species within 50 km of the Project Area.**



**Appendix 4: BDBSA search results of threatened flora species within 50 km of the Project Area.**



*EBS Ecology*  
*112 Hayward Avenue*  
*Torrensville, SA 5031*  
*[www.ebsecology.com.au](http://www.ebsecology.com.au)*  
*t. 08 7127 5607*