Cultana Solar Farm:

Native Vegetation Clearance Report

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Version 3

Prepared by EBS Ecology for SIMEC ZEN Energy

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GLOSSARY AND ABBREVIATION OF TERMS

ALA	Atlas of Living Australia
BAM	Bushland Assessment Method
BDBSA	Biological Database of South Australia (maintained by DEW)
DEW	Department of Environment and Water
DotE	Department of the Environment
DotEE	Department of the Environment and Energy
EBS	EBS Ecology
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Golder	Golder Associates Pty Ltd
GPS	Global Positioning System
GWh	Gigawatt hours
ha	Hectare/s
IBRA	Interim Biogeographical Regionalisation of Australia
kV	Kilovolt
MW	Megawatt
NatureMaps	Initiative of DEW that provides a common access point to maps and geographic information about South Australia's natural resources in an interactive online mapping format
EP NRM	Eyre Peninsula Natural Resources Management region
NPW Act	*National Parks and Wildlife Act 1972*
NRM	Natural Resources Management
NVAP	Native Vegetation Assessment Panel
NV Act	*Native Vegetation Act 1991*
NVB	Native Vegetation Branch
NVC	Native Vegetation Council
NVMU	Native Vegetation Management Unit
Project	Development of the Cultana Solar Farm
Project area	The land containing the proposed Cultana Solar Farm and associated infrastructure, which is located approximately 5 km north of Whyalla, South Australia
SA	South Australia/South Australian
SEB	Significant Environmental Benefit (under the *Native Vegetation Act 1991*)

sp.	Species
spp.	Species (plural)
ssp.	Subspecies
RAM	Rangelands Assessment Method
TEC	Threatened Ecological Community
UIA	Unincorporated Area

EXECUTIVE SUMMARY

EBS Ecology was engaged by SIMEC ZEN Energy to conduct an ecological assessment within the proposed area for the development of the Cultana Solar Farm, which is located approximately 5 km north of Whyalla, South Australia.

The ecological assessment consisted of a desktop, vegetation and fauna assessment, with key objectives of the being to:

1. Determine the potential impacts of the proposed development on flora and fauna species, particularly those threatened at the national and state level; and
2. Calculate the Significant Environment Benefit (SEB) offset for the Project, which is required for approval to clear native vegetation under Division 5 of the *Native Vegetation Regulations 2017*.

Desktop assessment

A desktop assessment was completed to identify species of state and national conservation significance potentially occurring in the Project area and inform field survey requirements. The key results of desktop assessment include:

- Whilst Saltmarsh communities occur within the Project area, they are not considered to qualify as the Threatened Ecological Community, Subtropical and Temperate Coastal Saltmarsh, as the Project area falls outside the area of tidal influence (due to the Whyalla Saltworks);
- All nationally threatened flora species identified in the database searches were considered unlikely to occur within the Project area;
- One nationally threatened fauna species; the Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*), was considered to potentially occur within the Project area;
- Two migratory fauna species; the Fork-tailed Swift (*Apus pacificus*) and Osprey (*Pandion haliaetus*), have potential to occur within the Project area;
- No State threatened ecosystems were recorded during the vegetation assessment;
- The state vulnerable Sandalwood (*Santalum spicatum*) was identified to have potential to occur within the Project area prior to the field assessment. However, Sandalwood was not observed during the vegetation assessment and was subsequently downgraded to unlikely to occur; and
- Four state threatened fauna species could occur in the Project area:
    - Two State threatened species may possibly occur within the Project area, the White-bellied Sea Eagle (*Haliaeetus leucogaster*) and Osprey (*Pandion haliaetus*); and
    - Two State threatened species are considered likely to occur in the Project area, the Western Slender-billed Thornbill (*Acanthiza iredalei iredalei*) and the Elegant Parrot (*Neophema elegans*).

Vegetation assessment

The key results of the vegetation assessment include:

- A total of eight vegetation associations were mapped and assessed within Block A (northern property);
- A total of five vegetation associations were mapped and assessed within Block B (southern property);
- The species inventory from the vegetation assessment identified 42 native flora species and four weed species;
- Weeds were widespread over the Project area. Ward's Weed (*Carrichtera annua*), was widespread within Block A and Block B, while Common Iceplant (*Mesembryanthemum crystallinum*) was also common within Block B. Onion Weed (*Asphodelus fistulosus*) was abundant along the water pipeline within Block A and Block B;
- Two Weeds of National Significance listed under the EPBC Act were observed within the Project area, with few individuals of African Boxthorn (*Lycium ferocissimum*) present within Block B and isolated individuals of Prickly Pear (*Opuntia stricta*) present within Block A. Both WoNS are also declared under the NRM Act. The only other declared weed species observed over the Project area was Horehound (*Marrubium vulgare*), located as a group of few individuals in Block B; and
- With the Project area being assessed using the Rangelands Assessment Method, the total SEB points required for the vegetation clearance is 64,919.34, which equates to an SEB offset of 8,114.92 ha. Alternatively, the total payment into the Native Vegetation Fund required is $5,586,207.13, which includes the total administration fee of $291,224.09; and
- With the Project area being assessed using the Bushland Assessment Method, the total SEB points required for the vegetation clearance is 69,836.51, which equates to an SEB offset of 8,729.56 ha.

Fauna assessment

The key results of the vegetation assessment include:

- A total of 384 birds from 39 species were recorded during point counts and opportunistically within the Project area;
- One introduced bird species; the Common Starling (*Sturnus vulgaris*) was observed within the Project area;
- There were no Western Grasswrens observed in the Project area nor areas of their preferred habitat, due to the absence of minor drainage lines, which supported large spiny shrubs (>0.75 m) in high densities. However, there was 43.19 ha of potential habitat identified, where Blackbush (*Maireana pyramidata*) shrubs were dense and frequently greater than 50 cm in height;
- Six Red Kangaroos (*Macropus rufus*) and four Western Grey Kangaroos (*Macropus fuliginosus*) observed;

- The introduced Fox (*Vulpes vulpes*) and Rabbit (*Oryctolagus cuniculus*) were observed. A potentially active fox den and an in-active rabbit warren were also observed within the Project area;
- Five species of reptile were observed: the Crested Dragon (*Ctenophorus cristatus*); Spotted Ctenotus (*Ctenotus orientalis*); Yellow-faced Whipsnake (*Demansia psammophis*); Central Bearded Dragon (*Pogona vitticeps*); and Sleepy Lizard (*Tiliqua rugosa*); and
- No species of state of national significance recorded within the Project area.

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1 APPLICATION INFORMATION

The native vegetation clearance application information for the Cultana Solar Farm Project is provided in Table 1.

Table 1. Native vegetation clearance application information for the Cultana Solar Farm Project.

Applicant:	SIMEC Zen Energy		
Key contact:	**Rex Pong | Assistant Project Manager** Phone: +61 432 879 340 Email: rpong@zenenergy.com.au Website: www.zenenergy.com.au		
EBS Ecology contact:	**Mark Laws | NVC Accredited Ecologist** Phone: +61 478 013 895 Email: mark.laws@ebsecology.com.au		
Landowner:	**Block A (north):** GFG Liberty OneSteel **Block B (south):** Whyalla City Council		
Site address:	Lincoln Highway, Whyalla Barson SA 5715		
Local Government Area:	City of Whyalla, UIA Whyalla	Hundreds:	Cultana
Certificate of title:	**Block A** CT/6105/303 **Block B** CT/6144/358	Section/Allotment:	**Block A** D90705 A1 **Block B** D79748 A1000
Summary of application			
Proposed clearance area:	This application involves the clearance of approximately 1,100 ha of native vegetation comprising Chenopod (*Atriplex vesicaria*, *Maireana* spp.) Shrublands and Low Open Woodlands (*Casuarina pauper*, *Acacia papyrocarpa*).		
Applicable regulation and purpose of the clearance:	Regulation 12(34)—Infrastructure Clearance required for the development of a Solar Farm.		
Level of risk:	4 (Total Biodiversity Score >2500)		
Proposed SEB offset:	The proponent is considering and investigating potential on-ground SEB offsets. The SEB offset will likely be a combination of an on-ground SEB and an SEB payment.		

2 BACKGROUND

2.1 Purpose of the proposal

EBS Ecology (EBS) was engaged by SIMEC ZEN Energy to conduct a native vegetation and fauna assessment within the proposed area for the development of the Cultana Solar Farm (the Project), located near Whyalla, South Australia.

The Project boasts 600 GWh of energy generation per year, which will be drawn from 780,000 solar panels with 280 MW capacity. Construction of the Cultana Solar Farm is expected to be initiated in early 2019, employing approximately 350 workers during construction and providing greater energy security to the Whyalla Liberty OneSteel steelworks.

2.2 Objectives

The key objectives of the native vegetation and fauna assessments were to:

1. Determine the potential impacts of the proposed development on flora and fauna species, particularly those threatened at the national and state level; and
2. Calculate the Significant Environment Benefit (SEB) offset for the Project, which is required for approval to clear native vegetation under Division 5 of the *Native Vegetation Regulations 2017*.

2.3 Project area

The Project area is located approximately 5 km north of Whyalla, South Australia (Figure 1). The land containing the proposed Cultana Solar Farm and associated infrastructure is bisected by the Lincoln Highway, with the northern part of the Project area (hereafter 'Block A') located between the eastern side of the Lincoln Highway, below Kimberley Road, with the Whyalla Conservation Park (CP) to the northwest, and the Whyalla Saltfields to the southeast (Figure 1). The southern part of the Project area (hereafter 'Block B') is located on the western side of the Lincoln Highway in the industrial zone.

2.4 Land history

The land history of the Project area was distinctly different between Block A and Block B. Block A was purchased by BHP Billiton in the 1960s and subsequently has not been grazed by stock. Despite the absence of stock grazing for almost 60 years, Block A had suffered minor degradation from numerous vehicle tracks and native and introduced herbivores. The native vegetation within Block B suffered significant historical degradation due to the former operation of a dairy farm. At present, Block B continues to be degraded through illegal dumping of waste and the establishment of a dirt bike circuit, which is subject to frequent use.

Figure 1. Location of the proposed Cultana Solar Farm (Project area) showing Block A (Cultana North Boundary – in yellow), Block B (Cultana South Boundary – in red) and associated infrastructure.

2.5 Interim Biographical Regionalisation of Australia (IBRA)

The Interim Biogeographical Regionalisation of Australia (IBRA) identifies geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information, which is used to assess and plan for the protection of biodiversity (DotE 2012). The bioregions are further refined into subregions and environmental associations. Native vegetation remnancy figures for IBRA subregions and environmental associations are useful for setting regional landscape targets.

The Project area is located within the Gawler IBRA bioregion, the Myall Plains IBRA subregion and the Tregolana IBRA environmental association (Table 2). Approximately 97% (1,050,684 ha) of the Myall Plains IBRA subregion is mapped as remnant native vegetation, of which 8% (86,146 ha) is formally conserved.

Table 2. IBRA bioregion, subregion, and environmental association environmental landscape summary.

Gawler IBRA bioregion	
Semi-arid to arid, flat topped to broadly rounded hills of the Gawler Range Volcanics and Proterozoic sediments, low plateaux on sandstone and quartzite with an undulating surface of Aeolian sand or gibbers and rocky quartzite hills with colluvial footslopes, erosional and depositional plains and salt encrusted lake beds, with Black Oak (*Casuarina pauper*) and Myall (*Acacia papyrocarpa*) Low Open Woodlands, Open Mallee Scrub, Bluebush (*Maireana* spp.) / Saltbush (*Atriplex* spp.) Open Chenopod Shrublands and Mulga (*Acacia aneura*) Tall Shrublands on shallow loams, calcareous earths and hard red duplex soils.	
Myall Plains IBRA subregion	
Gently undulating calcrete plains and occasional quartzite or granite hills. Includes a zone of salt lakes and gypsum dunes at Lake Gillies and steep strike ranges at the Middleback Ranges. To the east out cropping conglomerate occurs with mangrove flats along the coastal margin. Myall / Black Oak Low Woodland is found on grey brown calcareous earths, red calcareous earths and dense brown loams on the plains. Rocky outcrops support Ridge-fruited Mallee (*Eucalyptus incrassate*) / Broom Honey-myrtle (*Melaleuca uncinata*) Open Scrub and Drooping Sheoak (*Allocasuarina verticillata*) Low Woodland on dense brown loams. The lowest areas support of Shrubby Saltwort (*Halosarcia halocnemoides*) Shrubland on grey calcareous loams. Light grazing occurs in most areas.	
Remnant vegetation	Approximately 97% (1,050,684 ha) of the subregion is mapped as remnant native vegetation, of which 8% (86,146 ha) is formally conserved.
Landform	Gently undulating calcrete plains and occasional hills. Includes a zone of salt lakes and gypsum dunes at Lake Gillies and steep strike ranges at the Middleback Ranges.
Geology	Calcrete development; gypsum dunes; play lakes with silt and clay deposits and evaporites.
Soil	Red calcareous earths, sandy soils with mottled yellow clayey subsoils.
Vegetation	Assumed native vegetation cover.
Conservation significance	59 species of threatened fauna, 40 species of threatened flora. 4 wetlands of national significance.
Tregolana IBRA environmental association	
Landscape	Erosional plain.
Landform	Undulating plain with occasional low sand dunes and pans, some samphire or mangrove flats.
Geology	Sand, gravel and alluvium.
Soil	Red calcareous earths, reddish sands, crusty red duplex soils and grey calcareous loams.
Vegetation	Low woodland of Myall and Black Oak, Saltbush, Bluebush and Samphire Chenopod Shrublands, low woodland of mangroves.

2.6 Administrative Boundaries

The Project area is located within the Whyalla and UIA Whyalla Local Government Areas (LGA), the Hundreds of Cultana and the Eyre Peninsula Natural Resource Management (EP NRM) region.

2.7 Climate

Climate data was sourced from the Whyalla Aero station (station no. 018120), located 6.7 km from the western boundary of the Project area. Whyalla has a Mediterranean climate characterised by cool winters and hot summers, with mean maximum temperatures ranging from 17°C in July to 30.2°C in January. The wettest months are June (28.3 mm), September (26.3 mm) and December (25.1 mm), and therefore, while rainfall is greatest in winter, there is low seasonal variability (Figure 2) (Commonwealth of Australia 2018).

A total of 170 mm of rain was recorded in the year prior to the vegetation and fauna assessment, which is substantially lower than the long-term mean annual rainfall of 267.1 mm (Figure 3). The scarcity of rain was most pronounced in the nine months prior to the assessment, with 70.2 mm of rain, which was 138.6 mm lower than the mean rainfall from February to October (208.8 mm).

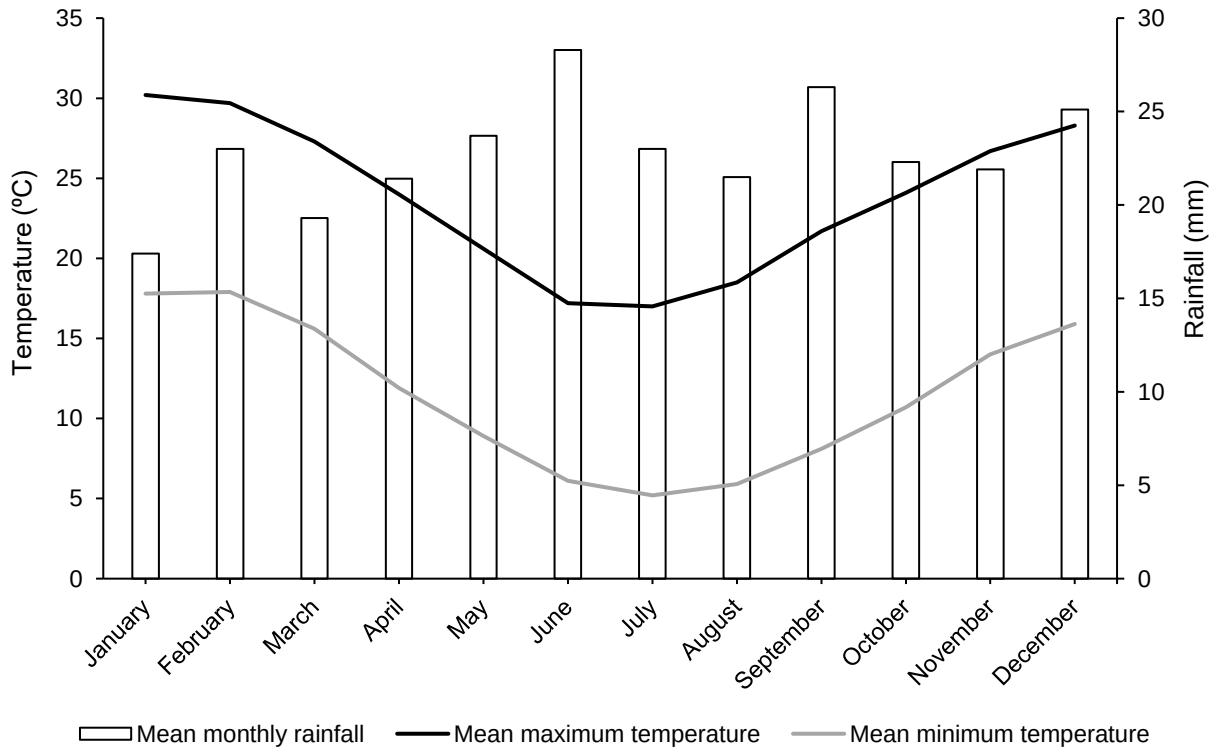


Figure 2. Mean maximum and minimum monthly temperatures and mean monthly rainfall recorded at Whyalla Aero Station (station no. 018120) from 1945 to 2018.

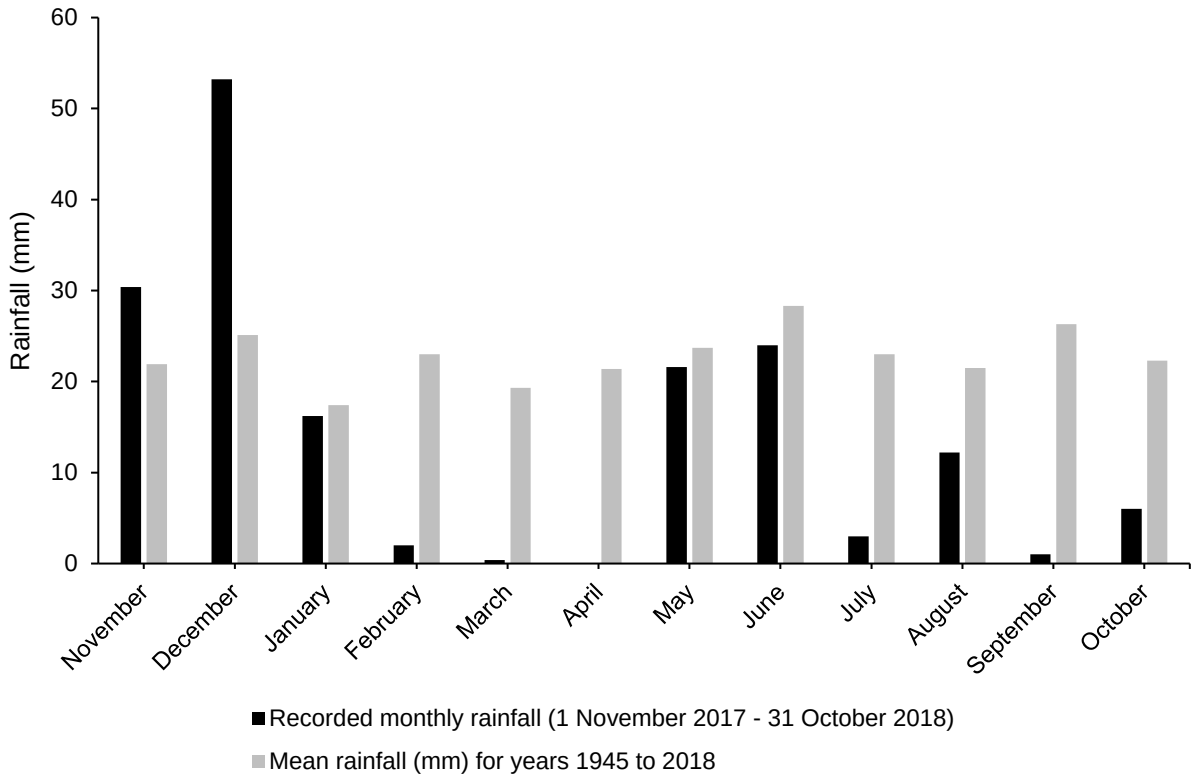


Figure 3. Recorded rainfall over the year prior to the field assessment (1 November 2017 - 31 October 2018) with respect to the long-term mean monthly rainfall recorded at Whyalla Aero Station (station no. 018120) from 1945 to 2018.

2.8 Legislative requirements

2.8.1 Native Vegetation Act 1991

The NV Act applies in the Project area. Therefore, native vegetation must not be cleared unless approval is granted by the Native Vegetation Council (NVC) in accordance with *Section 29* of the Act or it is permitted under Division 5 of the *Native Vegetation Regulations 2017*. The relevant Regulations require that clearance is undertaken in accordance with a Standard Operating Procedure (SOP) or a Management Plan that has been approved by the NVC. A net environmental benefit is generally conditional on an approval being granted.

Native vegetation refers to any naturally occurring local plant species that are indigenous to South Australia, from small ground covers and native grasses to large trees and water plants.

2.8.2 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Environment Protection and Biodiversity Conservation Regulations 2000* provide a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the Act as 'matters of national environmental significance'. One of which is of relevance to the Project: Listed threatened species and ecological communities.

Any action that has, will have, or is likely to have a significant impact on matters of national environmental significance requires referral under the EPBC Act. Substantial penalties apply for undertaking an action that has, will have or is likely to have significant impact on a matter of national environmental significance without approval.

2.8.3 National Parks and Wildlife Act 1972

Native plants and animals in South Australia are protected under the *National Parks and Wildlife Act 1972* (NPW Act). It is an offence to take a native plant or protected animal without approval. Threatened plant and animal species are listed in Schedules 7 (endangered species), 8 (vulnerable species) and 9 (rare species) of the Act.

Conservation rated flora and fauna species listed on Schedules 7, 8, or 9 of the NPW Act may occur within the Project area. Persons must comply with the conditions imposed upon permits and approvals.

2.8.4 Natural Resources Management Act 2004

Under the *Natural Resources Management Act 2004* (NRM Act) landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

Key components under the Act include the establishment of regional Natural Resource Management (NRM) Boards and development of regional NRM Plans; the ability to control water use through prescription, allocations and restrictions; requirement to control pest plants and animals and activities that might result in land degradation.

A ‘duty of care’ is a fundamental component of this Act, i.e. ensuring one’s environmental and civil obligation by taking reasonable steps to prevent land and water degradation. Persons can be prosecuted if they are considered negligent in meeting their obligations.

2.8.5 Past clearance approvals

There are no past clearance approvals relevant to the Project.

3 METHODS

3.1 Desktop assessment

Databases compiled and managed by the Department of the Environment and Energy (DotEE) and Department of Environment and Water (DEW) (South Australia) were analysed to determine threatened flora and fauna species known to occur or potentially occur within 10 km of the Project area. The aim of the desktop assessment was to determine whether any species or threatened ecological communities listed under the EPBC Act or NPW Act have potential to occur within the Project area.

3.1.1 EPBC Act Protected Matters Search Tool (PMST)

A Protected Matters Report was generated on 04 July 2018 to identify matters of national environmental significance under the EPBC Act. The online PMST, which is maintained by DotEE, was used to identify any flora and fauna species or ecological communities of national environmental significance under the EPBC Act that may occur or may have suitable habitat within the Project area. A 10 km buffer was applied to the search (DotEE 2018).

3.1.2 Biological Database of South Australia (BDBSA)

A data extraction from the Biological Database of South Australia (BDBSA), which is maintained by DEW, was obtained to identify flora and fauna species that have been recorded within 10 km of the Project area (DEW 2018a, accessed 09/07/2018, *Record set number DEWNRBDBSA180709-1*). The BDBSA is comprised of an integrated collection of species records from the South Australian (SA) Museum, conservation organisations, private consultancy companies, Birds SA, Birdlife Australia and the Australasian Wader Study Group, which meet DEW standards for data quality, integrity and maintenance.

3.1.3 Likelihood of occurrence assessment

An assessment to determine the likelihood of occurrence for threatened species, migratory species and threatened ecological communities (TECs) within the Project area was conducted. Each of the threatened species and TECs identified by the PMST and BDBSA were assigned a rating (highly likely, likely, possible and unlikely), which described their likelihood of occurrence with the Project area. The following criteria were considered when assigned a likelihood rating:

- Presence during the field survey;
- Presence of suitable habitat as informed by the field survey;
- Date of the most recent record (taking into consideration the date of the last surveys conducted in the area);
- Proximity of the records (i.e. distance to the Project area);
- Landscape, vegetation remnancy and vegetation type of the record location (taking into consideration the landscape, remnancy and vegetation type of the Project area, with higher likelihood assigned to species that were found in similar locations/condition/vegetation associations); and

- Knowledge of the species habitat preferences, causes of its decline, the conspicuousness of the species and local population trends.

3.1.4 Desktop assessment limitations

Flora and fauna records were sourced from the BDBSA. The BDBSA only includes verified flora and fauna records submitted to DEW or partner organisations. It is recognised that knowledge is poorly captured, and it is possible that significant species occur that are not reflected by database records. Although much of the BDBSA data has been through a variety of validation processes, the lists may contain errors and should be used with caution. DEW give no warranty that the data is accurate or fit for any particular purpose of the user or any person to whom the user discloses the information.

BDBSA flora and fauna records were limited to a 10 km buffer around the Project area. The reliability of the BDBSA data ranges from 100 m to over 100 km. Fauna species, especially birds, can traverse distances more than 10 km search buffer, and therefore, additional species may occur. It is also acknowledged that the presence of species may not be adequately represented by database records. Hence, the BDBSA results may not highlight all potential threatened flora and fauna species that may occur in the area, within a 10 km buffer.

The findings and conclusions expressed by EBS Ecology are based solely upon information in existence at the time of the assessment. The combination of field data, database records and background research have provided a solid baseline foundation for determining the likelihood of occurrence for threatened species within the Project area.

3.2 Vegetation assessment

The vegetation assessment was conducted by NVC accredited consultant Mark Laws between 29 October and 5 November 2018. The assessment was conducted in accordance with the both the Rangelands Assessment Method (RAM) (NVB 2017) and Bushland Assessment Method (BAM) (NVMU 2017). Justification for using the RAM in the EP NRM region, and a description of both methods are provided below.

3.2.1 Assessment method justification – RAM vs BAM

It is noted that using the RAM in agricultural Natural Resources Management (NRM) regions requires approval from the Native Vegetation Assessment Panel (NVAP). Approval is therefore sought to use the RAM in the EP NRM region.

The RAM is more suitable in this situation since the land use within and surrounding the Project area is, or has been, used for grazing rather than agriculture. Furthermore, the vegetation associations and condition within the Project area are reflective of rangeland associations and it is therefore difficult to assign suitable benchmark communities when using the BAM.

Should the NVAP not approve the use of the RAM to assess the vegetation within the Project area, a BAM was also conducted at each sample point and the results are presented within this report.

3.2.2 Rangelands Assessment Method (RAM)

The RAM is suitable for assessing vegetation systems within the South Australian Arid Lands and Alinytjara Wilurara NRM regions. This method aligns the assessment of vegetation (and land) condition with the method developed by Natural Resources South Australian Arid Lands for the rapid assessment of pastoral properties in sheep and cattle country, but is adapted for native vegetation assessments in arid rangelands throughout South Australia (NVB 2017).

When using the RAM, each area to be assessed (i.e. each application area) is termed a ‘Block’, which is divided into stratified ‘Sites’. Each Site relates to a vegetation association found within the Block. Vegetation associations are based on landform types, paddocks and at increasing distances from watering points (i.e. grazing gradient). In each Site, a number of ‘Sample Points’ are established by the accredited ecologist undertaking the assessment.

Three components of the biodiversity value of the Site are measured and scored (Table 3):

- Landscape context (1.00-1.25);
- Vegetation condition (24.00-80.00); and
- Conservation value (1.00-1.50).

The three component scores are combined to provide a ‘Unit Biodiversity Score’ (per hectare) and then multiplied by the size (hectares) of the Site to provide a ‘Total Biodiversity Score’ for each Site, and then the overall Block.

Table 3. Factors that influence the value of the three parameters used to calculate the total SEB area and value in the RAM (NVB 2017).

Parameter	Factors
Landscape context	• Number of land form features present; • Size of the area being affected; • Presence of wetland features; and • Level of protection of native vegetation in the geographic area.
Vegetation condition	• Utilisation of perennial species (Intact, Modified, Over-utilised); • Biotic and physical disturbance (e.g. presence of litter mats (positive influence), bare scalds (negative influence)); • Vegetation strata present and notably absent (i.e. removed); • Presence of declared plant species; and • Introduced plant species cover.
Conservation value	• Presence of Commonwealth or State listed threatened ecological communities, and their conservation rating; • Number of threatened plant species recorded (directly and historically), and their conservation rating; and • Number of threatened fauna species recorded (directly and historically), and their conservation rating, and potential habitat within the site.

3.2.3 RAM scoresheets

The conservation significance scores in the RAM scoresheets were calculated from direct and historical observations of flora and fauna species of conservation significance. Historical observations within 50 km of the Project area were obtained from the PMST and BDBSA. Only BDBSA records no more than 20 years old and with a locational reliability of <1 km were used. For the PMST, only species or species habitat known to occur within a 50 km buffer were included (as per the RAM manual sections 5.3.2 and 5.3.3; NVB 2017).

The mean annual rainfall factor of 261 mm within the RAM scoresheets was obtained using the 'Mean Annual Rainfall 1976-2005' layer selected in NatureMaps at a centralised point within the Project area (DEW 2018b).

3.2.4 Bushland Assessment Method (BAM)

As there is a risk that, should the NVAP not support the proposal to use the RAM to assess Project area, the assessment would need to be converted to the BAM. Therefore, all sample points were also assessed using the BAM. Both the RAM and BAM results for are provided in this report so the NVAP can assess the native vegetation clearance application regardless of their decision regarding the assessment method.

The BAM was developed by the Native Vegetation Management Unit (NVMU) to assess areas of native vegetation requiring clearance. The method was derived from the Nature Conservation Society of South Australia's Bushland Condition Monitoring methodology (Croft *et al.* 2005-2009) and endorsed by the NVC. The BAM requires quantitative on ground and desktop assessments of native vegetation and ecological values.

When using the BAM, each area to be assessed (i.e. each application area) is termed a 'Block', which is divided into stratified 'Sites'. Each Site relates to a vegetation association found within the Block. Vegetation associations are based on landform types, paddocks and at increasing distances from watering

points (i.e. grazing gradient). In each Site, a number of 'Sample Points' are established by the accredited ecologist undertaking the assessment (NVMU 2017).

Three components of the biodiversity value of the Site are measured and scored:

- Landscape context (1.00-1.25);
- Vegetation condition (max 80.00); and
- Conservation value (1.00-1.50).

The factors that influence each of these parameters are described in Table 4.

Table 4. Factors that influence the value of the three parameters used to calculate the total SEB area and value in the BAM (NVMU 2017).

Parameter	Factors
Landscape context	• Percentage vegetation cover within 5 km; • Block shape; • Distance to remnant of >50 ha; • Remnancy of IBRA Association; • Percentage of vegetation protected within the IBRA Association; and • The presence of riparian vegetation, swamps or wetlands.
Vegetation condition	• Native species diversity; • Number of native lifeforms and their cover; • Number of regenerating species; • Weed cover and the level of invasiveness of dominant species; • Cover of bare ground, fallen timber, exotic species in the understorey; and • Tree health and the number of individuals supporting hollows
Conservation significance score	• The presence of federal or state listed threatened ecological communities, and their conservation rating; • Number of threatened plant species recorded at the site, and their conservation rating; and • Number of threatened fauna species and their conservation rating or potential habitat occurs within the site.

3.2.5 BAM scoresheets

The conservation significance scores were calculated from direct observations of flora and direct and historical observations of fauna species of conservation significance. Historical fauna observations within 5 km of the Project area were obtained from the PMST and BDBSA. Only BDBSA records no more than 20 years old and with a locational reliability of <1 km were used. For the PMST, only species or species habitat known to occur within a 5 km buffer were included (as per the BAM manual sections 6.3.3; NVMU 2017).

The mean annual rainfall factor of 261 mm within the BAM scoresheets was obtained using the 'Mean Annual Rainfall 1976-2005' layer selected in NatureMaps at a centralised point within the Project area (DEW 2018b).

3.2.6 Vegetation assessment limitations

The vegetation assessment was undertaken in spring, which is considered an optimal time of the year for recording both flora and fauna species across the region. However, a number of flora species may not have been observed due to unsuitable conditions (e.g. dry conditions limiting annual or ephemeral species), concentrated or patchy distributions, and inconspicuousness of certain species. It should be noted though, that the number of species missing from the species inventory is expected to be low and data collected are considered adequate to make a reasonable assessment of potential impacts of the proposed works on native vegetation.

3.3 Fauna assessment

A fauna assessment was conducted between 29 October and 5 November 2018 to determine if any native fauna or fauna habitat may be impacted from the proposed works. This included the identification of any fauna of conservation significance state and national levels, and habitat for any fauna that may occur during other times of the year.

The fauna assessment was conducted whereby all fauna taxa observed within the Project area was recorded. As all threatened species considered to potentially occur within the Project area were birds, they were targeted within the fauna assessment.

3.3.1 Birds

Sixteen (16) point count sites were established over the Project area. Point count sites were located at all vegetation assessment sites, while an additional three sites were positioned along the proposed transmission line route. Each of the point count sites were surveyed for 30 minutes in the morning, with all surveys completed before 10:30 am to coincide with the times of peak bird activity. The observer recording all birds heard and observed within a 120 m radius of the centre of the (5 ha) site. If birds were heard or observed outside the 120 m search radius, they were recorded as 'off-site'. Bird activity (e.g. flying overhead, flying over circling, resting or foraging on tree/shrub/ground), number of individuals observed, distance from observer, and any other notable observations were recorded.

In addition to point count records, all birds opportunistically observed whilst traversing the Project area were also recorded. For each observation, the following was recorded:

- Species;
- Number of individuals;
- GPS location;
- Method, i.e. sight or sound; and
- Habitat.

A targeted Western Grasswren (*Amytornis textilis myall*) survey was conducted over the Project area, which comprised: (i) mapping areas of potential and/or suitable habitat; and (ii) actively searching for the species within the most suitable habitat available. Habitat suitability mapping was based upon the Black *et al.* (2009) study, which described suitable habitat as "*low-lying areas of Blackbush and spiny shrubs, particularly Australian Boxthorn, either as a shrubland or as an understorey of Western Myall low open woodland*". Furthermore, the "*presence of grasswrens could largely be predicted by the total cover of Blackbush, Australian Boxthorn, spiny shrubs, Ruby Saltbush and taller shrubs (over 0.75 m)*". As such, this study classed areas of 'suitable habitat' as those featuring spiny shrubs, especially Blackbush (*Maireana pyramidata*) and Australian Boxthorn (*Lycium australe*), that were greater than 0.75 m in height. Areas featuring spiny shrubs that were dense and frequently >0.5 m in height were classed as 'potential habitat'. Active searches were conducted within areas of habitat considered to be the most suitable for the presence of Western Grasswren. Overall, eight-person hours were spent actively searching for this species (excluding time spent at point count sites). Call play-back was used to help detect the Western Grasswren during each active search.

3.3.2 Other fauna

All other fauna taxa observed opportunistically or during point counts were recorded using the same methodology as described above.

3.3.3 Fauna assessment limitations

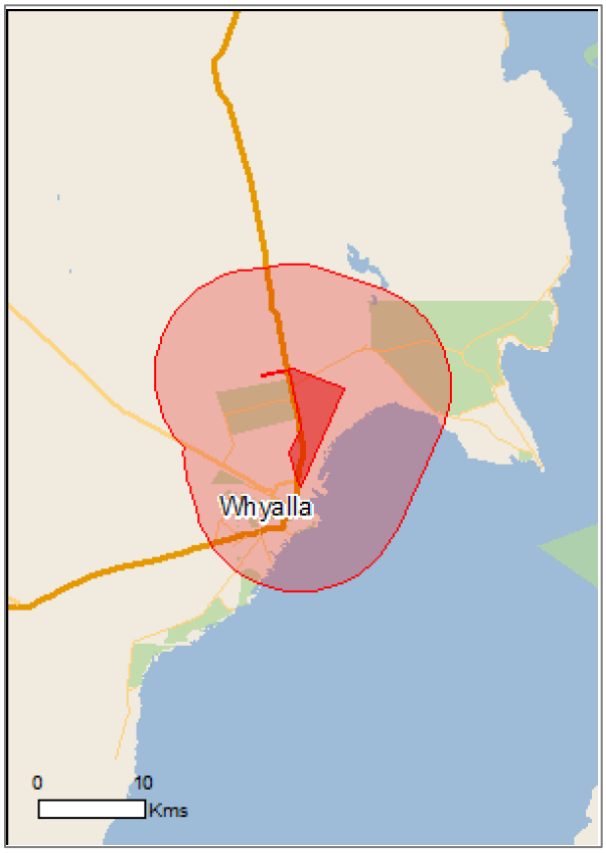
It is likely that not all fauna species present within the Project area were observed during the fauna assessment. Factors including low abundance, behaviour (e.g. avoidance, nocturnal birds etc.), distribution (e.g. isolated home range), movements (e.g. small home ranges), and climatic patterns and prevailing weather conditions can reduce the likelihood of detection. In regards to birds, a large proportion of the species within arid Australia are nomadic and transient, and move in response to rainfall and subsequent food resources (Read and Gillen 2013).

4 DESKTOP ASSESSMENT OUTCOMES

4.1 Matters of National Significance

The PMST identified one TEC, 33 threatened species and 44 listed migratory species, protected under the EPBC Act that may be relevant to the Project area. Any action that has, will have or is likely to have a significant impact on matters of national environmental significance requires referral under the EPBC Act. Table 5 summarises the results of the PMST report and the relevant matters of national environmental significance are discussed further below. Note that some of these matters are not impacted by or relevant to the Project (e.g. marine areas and listed marine species), and these matters are therefore not discussed further.

Table 5. Summary of the results of the PMST report (DotEE, 2018).

Search area (10 km buffer)	Matters of National Environment Significance under the EPBC Act 1999	Identified within the search area
 **Coordinates of search area:** - -32.93035 137.54408, -32.92701 137.57136, -32.93973 137.61624, -33.01018 137.57815, -33.0101 137.57668, -32.98649 137.56838, -32.96831 137.57929, -32.92845 137.56912, -32.93185 137.54475, -32.93035 137.54408	World Heritage Properties	None
	National Heritage Properties	None
	Wetlands of International Significance	None
	Great Barrier Reef Marine Park	None
	Commonwealth Marine Areas	None
	Threatened Ecological Communities	1
	Threatened Species	33
	Migratory Species	44
	Commonwealth Lands	6
	Commonwealth Heritage Places	None
	Listed Marine Species	76
	Whales and other Cetaceans	8
	Critical Habitats	None
	Commonwealth Reserves	None
	State and Territory Reserves	1
	Regional Forest Agreements	None
	Invasive Species	23
	Nationally Important Wetlands	1

4.1.1 Nationally important wetlands

The PMST identified one nationally important wetland as potentially occurring within the Project area (Table 5). The Upper Spencer Gulf area is listed as a Nationally Important Wetland under the EPBC Act. The eastern boundary of the Project area is approximately 400 m from the boundary of the Upper Spencer

Gulf area. The proposed development is not expected to impact on the Upper Spencer Gulf estuary if construction management measures to limit runoff are implemented.

4.1.2 Commonwealth lands

The PMST identified seven Commonwealth Lands as potentially occurring within the Project area (Table 5):

- Commonwealth Land – unspecified;
- Commonwealth Land – Australian National Railways Commission;
- Defence – Airtc Whyalla;
- Defence – Cultana Training Area;
- Defence – El Alamein, Port Augusta; and
- Defence – Whyalla Training Depot.

4.1.3 Threatened ecological communities

One TEC was identified by the PMST as potential occurring within the 10 km search buffer of the Project area (Table 5): Subtropical and Temperate Coastal Saltmarsh (DotEE 2018). Whilst Saltmarsh communities (Sites A6 and A7) occur within the Project area, they are not considered to qualify as a TEC as the Project area falls outside the area of tidal influence (due to the Whyalla Saltworks).

4.1.4 Nationally threatened flora

The PMST identified two nationally threatened flora species within the 10 km search buffer of the Project area (Table 5); Greencomb Spider-orchid (*Caladenia tensa*) and Braided Sea-heath (*Frankenia plicata*). The distributions of both species do no overlap with the Project area, and therefore, they are considered unlikely to occur within the Project area. Further detail on the likelihood of occurrence of these species in the Project area is provided in Table 6.

4.1.5 Nationally Threatened fauna

The PMST identified 31 threatened fauna species that have potential to occur within the 10 km search buffer of the Project area (Table 5). Eight of the species are aquatic marine, and therefore, have been excluded from this report as the Project area is located upon terrestrial land. One nationally threatened fauna species; the Western Grasswren (Gawler Ranges) (*Amytornis textilis myall*), was considered to potentially occur within the Project area. One additional nationally threatened species; the Western Whipbird (*Psophodes nigrogularis*) was identified by the BDBSA search; however, this species is considered unlikely to occur in the Project area. The rationale for their potential occurrence in the Project area is provided in Table 6.

The locations of nationally threatened fauna identified by the BDBSA search with records within 10 km of the Project area are presented in Figure 5.

4.1.6 Migratory fauna

The PMST identified 44 migratory fauna species (not including subspecies) that have potential to occur within the 10 km search buffer of the Project area (Table 5). Ten (10) of the 44 migratory fauna species, are aquatic marine species, and therefore, have been excluded from this report. The BDBSA search identified records for 11 species within 10 km of the Project area, including four species not identified by the PMST (Table 6). Overall, two migratory fauna species; the Fork-tailed Swift (*Apus pacificus*) and Osprey (*Pandion haliaetus*), have potential to occur within the Project area. Both species would be expected to be exclusively aerial; however, could on occasion use habitat features in the Project area. A further 20 migratory species may use the Whyalla Saltfields that are located adjacent to the Project area. These migratory species using the Whyalla Saltfields could fly-over the Project area during long distance and migratory flights. The migratory species that would only fly-over the Project area on long distance flights have been classed as unlikely to occur due to their inability to use habitat features in the Project area. The rational for the potential occurrence of each migratory fauna species is provided in Table 6.

The locations of migratory fauna identified by the BDBSA search with records within 10 km of the Project area are presented in Figure 5.

Table 6. Threatened flora and fauna, and migratory species potentially occurring within the Project area.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
PLANTAE	**Plants**						
Caladenia tensa	Greencomb Spider-orchid	EN		1		Unlikely	The Project area occurs outside the known distribution of *Caladenia tensa* (Greencomb Spider-orchid), which occurs within the upper south east of South Australia (TSSC 2016).
Frankenia plicata	Braided Sea-heath	EN	V	1		Unlikely	*Frankenia plicata* (Braided Sea-heath) is endemic to South Australia, with its distribution extending north of Port Augusta along the Stuart Highway to the Northern Territory border and from Port Augusta north-east to Marree. *Frankenia plicata* grows in a range of habitats, including on small hillside channels, which take the first run-off after rain (DEWHA 2008). As the distribution of *F. plicata* falls outside the Project area it is considered unlikely to occur.
Acacia rhigiophylla	Dagger-leaf Wattle		R	2	1983	Unlikely	*Acacia rhigiophylla* (Dagger-leaf Wattle) is distributed in two populations in South Australia; one near Monarto and Murray Bridge and the second located in the eastern Eyre Peninsula (ALA 2018). The extent of the eastern Eyre Peninsula population does not overlap with the Project area, and therefore, the species is unlikely to occur. Furthermore, A. *rhigiophylla* is associated with *Eucalyptus socialis* and *E. gracilis* mallee (SASCC 2018a), and therefore, no suitable habitat is expected to exist in the Project area.
Austrostipa plumigera	Hairy-bristle Spear-grass		R	2	1952	Unlikely	*Austrostipa plumigera* (Hairy-bristle Spear-grass) is distributed across western South Australia; however, there is an isolated historical record of the species near Whyalla (ALA 2018). Given the time since the last record of *A. plumigera*, it is considered unlikely to occur in the Project area.
Orobanche cernua var. australiana	Australian Broomrape		R	2	2016	Possible	*Orobanche cernua var. australiana* (Australian Broomrape) is scattered throughout the semi-arid and arid zone in South

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
							Australia, except for the far west of the state (ALA 2018). There are recent records near the Whyalla township (ALA 2018). Therefore, it may occur within the Project area due to the close proximity of recent records.
Santalum spicatum	Sandalwood		V	2	1998	Possible	*Santalum spicatum* (Sandalwood) is scattered throughout South Australia's semi-arid zone. The species grows on sands, sandy loams and clay soils of sand plains, watercourses and gravelly ridges, mainly in woodland communities (Kutsche and Lay 2003). The Western Myall (*A. papyrocarpa*) woodland in the Project area would comprise suitable habitat for this species.
AVES	**Birds**						
Acanthiza iredalei iredalei	Slender-billed Thornbill (western)		R	2	2016	Likely	The Slender-billed Thornbill (Western) (*Acanthiza iredalei iredalei*) is a passerine that inhabits chenopod shrublands that are dominated by samphires or *Maireana* and *Atriplex* associations (TSSC 2013). The species may also occur in acacia shrublands. As chenopod shrublands are widespread in the Project area and the species has been recently recorded within proximity of the Project area, the Slender-billed Thornbill (Western) is considered likely to occur.
Actitis hypoleucos	Common Sandpiper	Mi	R	1, 2	2016	Unlikely*	The Common Sandpiper (*Actitis hypoleucos*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). The species is expected to use the Whyalla Saltfields adjacent to the Project area, and therefore, may also occur as a fly-over in the Project area.
Amytornis textilis myall	Western Grasswren (Gawler Ranges)	VU		1, 2	2006	Highly Likely	The Western Grasswren (*Amytornis textilis myall*) is considered highly likely to occur within the Project area. This species was observed within 150 m of the proposed solar

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
							infrastructure by AECOM in 2010 (observed at 53 H 742454 E 6352101 N) (AECOM 2012). The pair of Western Grasswren were observed within sparse myall woodland over dense Blackbush (*Maireana pyramidata*), Pearl Bluebush (*Maireana sedifolia*), Bladder Saltbush (*Maireana vesicaria*) and copperburrs (*Sclerolaena spp.*) on red-brown clay-loam (AECOM 2012). Furthermore, the species has been recorded at numerous sites within the Whyalla Conservation Park (CP) (Black *et al.* 2009), the eastern boundary of which abuts the proposed transmission line. NatureMaps has identified that Western Myall (*Acacia papyrocarpa*) woodland and chenopod shrublands are located within the solar infrastructure area and therefore, the suitable habitat is expected to exist, if not, be widespread (DEW 2018b).
Apus pacificus	Fork-tailed Swift	Mi		1		Possible	The Fork-tailed Swift (*Apus pacificus*) is a non-breeding visitor to Australia, migrating from its breeding grounds, which extend from northern India to western Russia. The species is more common in coastal and sub-coastal areas; however, regularly occurs in inland Australia. Fork-tailed Swifts are nearly exclusively aerial in Australia and fly over a wide range of habitats, including open plains, forests and cities (Pizzey and Knight 2014; ALA 2018). As such, the location of the Project area matched with the habitats present within it, mean that the Fork-tailed Swift could potentially occur.
Ardea intermedia	Intermediate Egret		R	2	2001	Unlikely*	The Intermediate Egret (*Egretta intermedia*) is a large wading bird that inhabits wetlands, tidal mudflats and floodplains (Pizzey and Knight 2014). The species is expected to use the saltfields adjacent to the Project area, and therefore, may also occur as a fly- in the Project area.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Ardenna carneipes	Flesh-footed Shearwater	Mi	R	1		Unlikely	The Flesh-footed Shearwater (*Ardenna carneipes*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Arenaria interpres	Ruddy Turnstone	Mi	R	1		Unlikely*	The Ruddy Turnstone (*Arenaria interpres*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Biziura lobata	Musk Duck		R	2	2000	Unlikely*	The Musk Duck (*Biziura lobata*) is a diving duck species that inhabits fresh and brackish deep waterbodies, including wetlands, lakes (Pizzey and Knight 2014). This species could occur within the saltfields where deeper water (>30 cm) is available (Pers. Obs.). As such, this could enter the Project area when flying-over.
Calidris acuminata	Sharp-tailed Sandpiper	Mi		1, 2	2015	Unlikely*	The Sharp-tailed Sandpiper (*Calidris acuminata*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). The species is expected to use the saltfields adjacent to the Project area, and therefore, may also occur as a fly-over in the Project area.
Calidris alba	Sanderling	Mi	R	1		Unlikely	The Sanderling (*Calidris alba*) is not distributed in the upper Spence Gulf due to a lack of suitable habitat in open, sandy beaches.
Calidris canutus	Red Knot	EN, Mi		1		Unlikely*	The Red Knot (*Calidris canutus*) is a shorebird species that inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Calidris ferruginea	Curlew Sandpiper	CE, Mi		1, 2	1985	Unlikely*	The Curlew Sandpiper (*Calidris ferruginea*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Calidris melanotos	Pectoral Sandpiper	Mi	R	1		Unlikely*	The Pectoral Sandpiper (*Calidris melanotos*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Calidris ruficollis	Red-necked Stint	Mi		1, 2	1984	Unlikely*	The Red-necked Stint (*Calidris ruficollis*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Calidris tenuirostris	Great Knot	CE, Mi	R	1		Unlikely*	The Great Knot (*Calidris tenuirostris*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Charadrius leschenaultii	Greater Sand Plover	VU, Mi	R	1		Unlikely*	The Greater Sand Plover (*Charadrius leschenaultii*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Charadrius veredus	Oriental Plover	Mi		1		Unlikely*	The Oriental Plover (*Charadrius veredus*) is a shorebird species that inhabits coastal and inland environments (Pizzey and Knight 2014). The species occurs in inland plains, including clay pans, and marine environments, such as tidal mudflats. As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Cladorhynchus leucocephalus	Banded Stilt		V	2	2016	Unlikely*	The Banded Stilt (*Cladorhynchus leucocephalus*) is a shorebird species that inhabits shallow salt lakes, saltmarshes, tidal mudflats, saltfields, flooded claypans and shallow freshwater lakes and wetlands (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Corcorax melanorhamphos	White-winged Chough		R	2	2014	Unlikely	The White-winged Chough (*Corcorax melanorhamphos*) is a large passerine that inhabits the edges of eucalypt woodland and mallee remnants (Pizzey and Knight 2014; Pers. Obs.). As the Project area does not include any eucalypt associations, the species is considered unlikely to occur.
Diomedea antipodensis	Antipodean Albatross	VU, Mi		1		Unlikely	The Antipodean Albatross (*Diomedea antipodensis*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Diomedea epomophora	Southern Royal Albatross	VU, Mi	V	1		Unlikely	The Southern Royal Albatross (*Diomedea epomophora*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Diomedea exulans	Wandering Albatross	VU, Mi	V	1		Unlikely	The Wandering Albatross (*Diomedea exulans*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Diomedea sanfordi	Northern Royal Albatross	EN, Mi	E	1		Unlikely	The Northern Royal Albatross (*Diomedea sanfordi*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Egretta garzetta	Little Egret		R	2	2000	Unlikely*	The Little Egret (*Egretta garzetta*) is a large wading bird that inhabits tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds and saltfields (Pizzey and Knight 2014; Pers. Obs.). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Gallinago hardwickii	Latham's Snipe	Mi	R	1		Unlikely	The Latham's Snipe (*Gallinago hardwickii*) inhabits freshwater and brackish wetlands with extensive vegetation cover, such as samphire, reeds, rushes and grasses (Pizzey and Knight 2014), which are absent from the Project area. Furthermore, the species has not been recorded within the coastal upper Spencer Gulf region (ALA 2018).
Gallinago stenura	Pin-tailed Snipe	Mi		1		Unlikely	The Pin-tailed Snipe (*Gallinago stenura*) inhabits freshwater wetlands with extensive vegetation cover, such as reeds, rushes and grasses (DotE 2018), which are absent from the Project area. Furthermore, the species has never been recorded within South Australia (DotE 2018).
Haematopus fuliginosus	Sooty Oystercatcher		R	2	2016	Unlikely*	The Sooty Oystercatcher (*Haematopus fuliginosus*) is a species of shorebird that primarily inhabits rocky intertidal reefs and on occasion sandspits and tidal mudflats (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Haematopus longirostris	(Australian) Pied Oystercatcher		R	2	1983	Unlikely*	The (Australian) Pied Oystercatcher (*Haematopus longirostris*) is a species of shorebird that primarily inhabits sandy beaches and tidal mudflats and on occasion rocky reefs (Pizzey and

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
							Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Haliaeetus leucogaster	White-bellied Sea Eagle		E	2	2015	Possible	The White-bellied Sea-eagle (*Haliaeetus leucogaster*) is a species of raptor that occurs along the coast. This species very rarely occurs within the upper Spencer Gulf (ALA 2018); however, unpaired individuals may on occasion pass through the Project area.
Hydroprogne caspia	Caspian Tern	Mi		2	2017	Unlikely*	The Caspian Tern (*Hydroprogne caspia*) is a species of tern that inhabits coastal waters, mudflats, estuaries, beaches and saltfields (Pizzey and Knight 2014; Pers. Obs.). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Leipoa ocellata	Malleefowl	VU	V	1		Unlikely	The Malleefowl (*Leipoa ocellata*) inhabits Mallee associations which are absent from the Project area (DEW 2018b). All records of the species near Whyalla are old and have low spatial accuracy. Large expanses of Mallee, where the species occurs, are located approximately 35 km to the south of the Project area (ALA 2018).
Limosa lapponica baueri	Bar-tailed Godwit (baueri)	VU, Mi	R	1		Unlikely*	The Bar-tailed Godwit (baueri) (*Limosa lapponica baueri*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Limosa lapponica menzbieri	Bar-tailed Godwit (menzbieri)	CE, Mi		1		Unlikely*	The Bar-tailed Godwit (menzbieri) (*Limosa lapponica menzbieri*) is a shorebird species that inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
							occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over. This subspecies very rarely occurs in South Australia.
Limosa limosa	Black-tailed Godwit	Mi	R	2	1982	Unlikely*	The Black-tailed Godwit (*Limosa limosa*) is a shorebird species that inhabits coastal and inland environments including fresh and brackish lakes, beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Macronectes giganteus	Southern Giant Petrel	Mi	V	1		Unlikely	The Southern Giant Petrel (*Macronectes giganteus*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Macronectes halli	Northern Giant Petrel	EN, Mi		1		Unlikely	The Northern Giant Petrel (*Macronectes halli*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Motacilla cinerea	Grey Wagtail	Mi		1		Unlikely	The Grey Wagtail (*Motacilla cinerea*) is a vagrant to South Australia with very few records in the state (ALA 2018). The species inhabits wetlands and/or boggy vegetated areas, including irrigated lawns (Pizzey and Knight 2014), as such suitable habitat is absent from the Project area.
Motacilla flava	Yellow Wagtail	Mi		1		Unlikely	The Yellow Wagtail (*Motacilla flava*) is a vagrant to South Australia with very few records in the state. The species inhabits wetlands and/or boggy vegetated areas, including irrigated lawns (Pizzey and Knight 2014), as such suitable habitat is absent from the Project area.
Neophema elegans	Elegant Parrot		R	2	2006	Likely	The Elegant Parrot (*Neophema elegans*) is considered likely to occur in the Project area. Chenopod shrublands dominated by *M. pyramidata* (Blackbush) and *M. sedifolia* (Bluebush) and

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
							Western Myall woodland are all habitats suitable for the presence of the Elegant Parrot (Pizzey and Knight 2014).
Numenius madagascariensis	Far Eastern Curlew	CE, Mi	V	1, 2	1984	Unlikely*	The Far Eastern Curlew (*Numenius madagascariensis*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Numenius phaeopus	Whimbrel	Mi	R	2	1973	Unlikely*	The Whimbrel (*Numenius phaeopus*) is a shorebird species that inhabits estuaries, mangroves, tidal flats, sewage ponds and saltfields (Purnell *et al.* 2011; Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Oxyura australis	Blue-billed Duck		R	2	2016	Unlikely*	The Blue-billed Duck (*Oxyura australis*) is a diving duck species that inhabits fresh and brackish deep waterbodies, including wetlands, lakes (Pizzey and Knight 2014). This species could occur within the saltfields where deeper water (>30 cm) is available (Pers. Obs.). As such, this could enter the Project area when flying-over
Pachyptila turtur subantarctica	Fairy Prion (southern)	VU		1		Unlikely	The Fairy Prion (southern) (*Pachyptila turtur subantarctica*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Pandion haliaetus	Osprey	Mi	E	1		Possible	The Osprey (*Pandion haliaetus*) is a species of raptor that occurs along the coast. This species very rarely occurs within the upper Spencer Gulf (ALA 2018); however, unpaired individuals may on occasion pass through the Project area.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Petroica boodang boodang	Scarlet Robin (SE, MLR, FR, EP)		R	2	2016	Unlikely	The Scarlet Robin (*Petroica boodang boodang*) is a small passerine that inhabits eucalypt woodland and forest associations. As the distribution for the Scarlet Robin occurs outside of the Project area and no eucalypt associations are present (ALA 2018; DEW 2018b), it is unlikely that this species would occur.
Pezoporus occidentalis	Night Parrot	EN	E	1		Unlikely	The Night Parrot has not been regionally recorded and is considered to be regionally extinct (DotEE 2018).
Philomachus pugnax	Ruff (Reeve)	Mi	R	1		Unlikely*	The Ruff (*Philomachus pugnax*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Phoebetria fusca	Sooty Albatross	VU, Mi	E	1		Unlikely	The Sooty Albatross (*Phoebetria fusca*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Pluvialis squatarola	Grey Plover	Mi		2	2000	Unlikely*	The Grey Plover (*Pluvialis squatarola*) is a shorebird species, which inhabits coastal environments including beaches, tidal mudflats and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Psophodes nigrogularis	Western Whipbird	VU	E	2	2015	Unlikely	The Western Whipbird (*Psophodes nigrogularis*) is a small to medium sized passerine that is distribution in the southern extent of the Eyre Peninsula and Yorke Peninsula, and the Murray Mallee in South Australia (Pizzey and Knight 2014). As such, the Project area is outside the distribution for this species. Furthermore, the Western Whipbird inhabits dense thickets of heath and mallee (Pizzey and Knight 2014), and therefore, no suitable habitat is present within the Project area.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Rostratula australis	Australian Painted Snipe	EN	V	1		Unlikely	The Australian Painted Snipe (*Rostratula australis*) inhabits freshwater and brackish wetlands with extensive vegetation cover, such as samphire, reeds, rushes and grasses (Pizzey and Knight 2014), which are absent from the Project area. Furthermore, the species has not been recorded within the coastal upper Spencer Gulf region (ALA 2018).
Sternula nereis nereis	Australian Fairy Tern	VU	E	1, 2	2017	Unlikely*	The Australian Fairy Tern (*Sternula nereis nereis*) is a coastal bird species, which inhabits sheltered waters, including bays, inlets and saltfields (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Stictonetta naevosa	Freckled Duck		V	2	2003	Unlikely*	The Freckled Duck (*Stictonetta naevosa*) is a waterfowl species that inhabits fresh and brackish wetlands, lakes, dams and floodwaters (Pizzey and Knight 2014; Pers. Obs.). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Thalassarche cauta cauta	Shy Albatross	VU, Mi	V	1		Unlikely	The Shy Albatross (*Thalassarche cauta cauta*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Thalassarche cauta steadi	White-capped Albatross	VU, Mi	V	1		Unlikely	The White-capped Albatross (*Thalassarche cauta steadi*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Thalassarche impavida	Campbell Albatross	VU, Mi	V	1		Unlikely	The Campbell Albatross (*Thalassarche impavida*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.

Scientific name	Common name	Conservation status		Data source	Last sighting (year)	Likelihood of occurrence within Project area	Likelihood rationale
		Aus	SA				
Thalassarche melanophris	Black-browed Albatross	VU, Mi	V	1		Unlikely	The Black-browed Albatross (*Thalassarche melanophris*) is a marine pelagic seabird, and therefore suitable habitat is absent from the Project area.
Tringa nebularia	Common Greenshank	Mi		1, 2	2000	Unlikely*	The Common Greenshank (*Tringa nebularia*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.
Tringa stagnatilis	Marsh Sandpiper	Mi		1, 2	1985	Unlikely*	The Marsh Sandpiper (*Tringa stagnatilis*) is a shorebird species that inhabits coastal and inland environments, including fresh and saline lakes, wetlands and floodwaters (Pizzey and Knight 2014). As such, the species is expected to occur at the saltfields adjacent to the Project area and could enter the Project area when flying-over.

Conservation status

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

Source of Information

1. **EPBC Act Protected Matters Report (data extraction 04/07/2018) – 10 km buffer applied to Project area.**
2. **Biological Database of South Australia data extract (*Record set number DEWNRBDBSA180709-1*) - 10 km buffer applied to Project area.**

Likelihood of Occurrence

***: could occur within the saltfields, located directly adjacent to the Project area.**

4.2 Matters of state significance

4.2.1 Threatened ecosystems

No State threatened ecosystems were recorded during the vegetation assessment. Whilst there were patches of Bullock Bush (*Alectryon oleifolius* ssp. *canescens*) they were small and scattered amongst woodland associations in Block A (A1 and A2). As such, these patches did not qualify as *Alectryon oleifolius* ssp. *canescens* Tall Shrubland, which is listed as Vulnerable under provisional list of threatened ecosystems of SA (Neagle 2009).

4.2.2 Threatened flora

The BDBSA database search identified four State threatened flora species that have been recorded within 10 km of the Project area (Table 6). One flora species; Sandalwood (*Santalum spicatum*), was identified to have potential to occur within the Project area prior to the field assessment. Sandalwood was not observed during the vegetation assessment and subsequently has been downgraded to unlikely to occur, as this species is a small tree, and therefore, highly visible. Given this, it is unlikely to it would have remained undetected during the vegetation assessment. Further detail on the likelihood of occurrence of State threatened flora species in the Project area is provided in Table 6.

The locations of state threatened flora identified by the BDBSA search with records within 10 km of the Project area are presented in Figure 4.

4.2.3 Threatened fauna

The BDBSA database search identified a total of 19 State threatened fauna species that have been recorded within 10 km of the Project area (Table 6). The PMST identified an additional 23 state threatened species that are also listed as either nationally threatened or migratory. Overall four species could occur within the Project area:

- Two State threatened species may possibly occur within the Project area, the White-bellied Sea Eagle (*Haliaeetus leucogaster*) and Osprey (*Pandion haliaetus*).
- Two State threatened species are considered likely to occur in the Project area, the Western Slender-billed Thornbill (*Acanthiza iredalei iredalei*) and the Elegant Parrot (*Neophema elegans*).

The rational for the potential occurrence of each state threatened fauna species is provided in Table 6. The locations of state threatened fauna identified by the BDBSA search with records within 10 km of the Project area are presented in Figure 5.

Figure 4. BDBSA records of national and state threatened flora species within 10 km of the Project area.

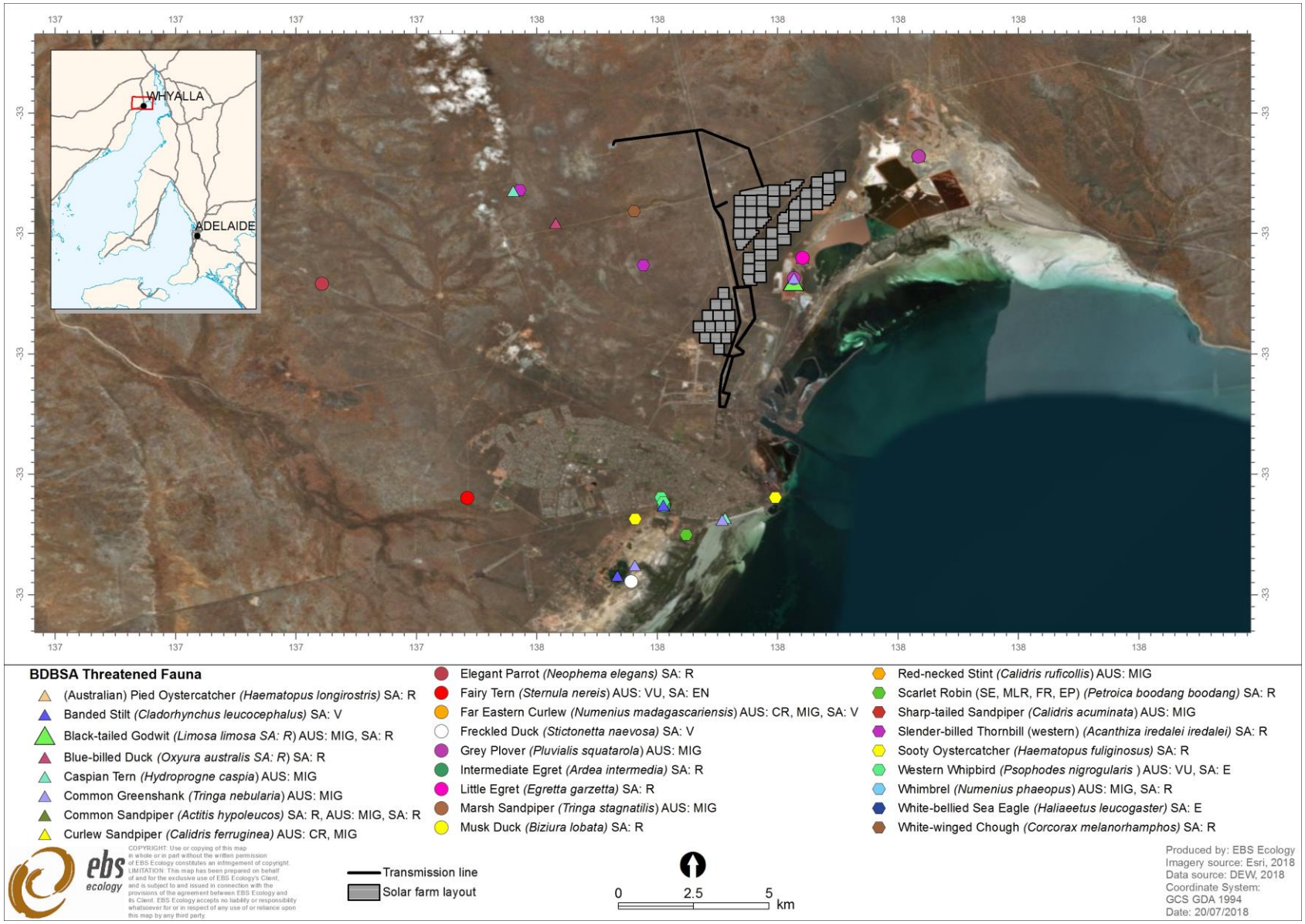


Figure 5. BDBSA records of national and state threatened fauna within 10 km of the Project area.

5 VEGETATION ASSESSMENT OUTCOMES

The Project area contained two Blocks (Block A and Block B), which were divided by the Lincoln Highway (Figure 1). A total of eight vegetation associations were mapped within Block A (Table 7) and a RAM / BAM sample point was established within all associations, except for A2, where two sample points were surveyed to account for differences in the density of overstorey species. The vegetation within the proposed transmission line route, on both sides of the Lincoln Highway, was of similar composition and condition to Block A. Therefore, this vegetation was mapped based on Block A.

In Block B, five associations (Table 7) were mapped and a RAM / BAM sample point was established within each. Each of the vegetation associations in Block A and Block B are mapped in Figure 6 and Figure 7, respectively, and summarised in Table 8 to Table 21. See Attachments 1-28 for the RAM and BAM scoresheets that provide further information on landscape features, dominant and less common species, weed species, and perennial species' grazing utilisation for each Site.

The species inventory from the vegetation assessment identified 42 native flora species and four weed species (Appendix 1). The Project area is likely to contain additional species that were located outside the one-hectare assessment areas or that are ephemeral and inconspicuous flora species, which are only likely to be present for short periods following large rainfall events. No flora species that are threatened at national or state levels were observed during the vegetation assessment.

Weeds were widespread over the Project area. Only one weed species, Ward's Weed (*Carrichtera annua*), was widespread within Block A, while Common Iceplant (*Mesembryanthemum crystallinum*) was also common within Block B. Onion Weed (*Asphodelus fistulosus*) was abundant along the water pipeline within Block A and Block B. Areas of high disturbance, such as the water pipeline, the former dairy and along tracks contained the greatest abundance and diversity of weed species in the Project area.

Two Weeds of National Significant (WoNS) listed under the EPBC Act were observed within the Project area, with few individuals of African Boxthorn (*Lycium ferocissimum*) present within Block B and isolated individuals of Prickly Pear (*Opuntia stricta*) present within Block A. Both WoNS are also declared under the NRM Act. The only other declared weed species observed over the Project area was Horehound (*Marrubium vulgare*), located as a group of few individuals in Block B.

The vegetation within the Project area showed signs of long-term minor grazing from kangaroos and rabbits. Whilst no palatable shrubs, such as *Maireana sedifolia* (Pearl Bluebush), were over-utilised, they on occasion had modified growth forms. Due to the absence of stock grazing, the soil crusts within Block A and Block B were typically intact except for areas disturbed by the former dairy, vehicles, infrastructure and illegal dumping.

Table 7. Sites stratified by the two Blocks (A and B) of land and vegetation associations, within the Project area.

Site	Association	Area (ha)
A1	*Atriplex vesicaria* / *Maireana pyramidata* Low Shrubland	71.32
A2	*Casuarina pauper* / *Acacia papyrocarpa* / *Myoporum platycarpum* Low Open Woodland over *Maireana sedifolia* +/- *Atriplex vesicaria* +/- *Maireana pyramidata*	478.39
A3	*Atriplex vesicaria* Low Shrubland	131.07
A4	*Atriplex vesicaria* / *Maireana sedifolia* +/- *Maireana pyramidata* Low Shrubland	72.23
A5	*Casuarina pauper* / *Acacia papyrocarpa* / *Myoporum platycarpum* Low Forest over *Atriplex vesicaria* / *Maireana sedifolia* +/- *Maireana pyramidata*	36.00
A6	*Tecticornia pergranulata ssp. pergranulata* Low Shrubland	6.97
A7	*Tecticornia pruinosa* / *Tecticornia halocnemoides ssp. halocnemoides* / *Tecticornia indica ssp. leiostachya* Low Open Shrubland	25.29
A8	*Casuarina pauper* / *Myoporum platycarpum* Very Open Woodland over *Atriplex vesicaria* / *Maireana pyramidata*	49.41
B1	*Acacia papyrocarpa* Low Open Woodland over *Atriplex vesicaria* / *Maireana sedifolia* / *Maireana pyramidata*	98.17
B2	*Maireana sedifolia* / *Atriplex vesicaria* Low Shrubland +/- *Maireana pyramidata*	48.47
B3	*Maireana pyramidata* Low Shrubland	41.48
B4	*Maireana brevifolia* /*Maireana pyramidata* Low Open Shrubland	25.55
B5	*Acacia papyrocarpa* Low Very Open Woodland over *Maireana pyramidata*	14.06

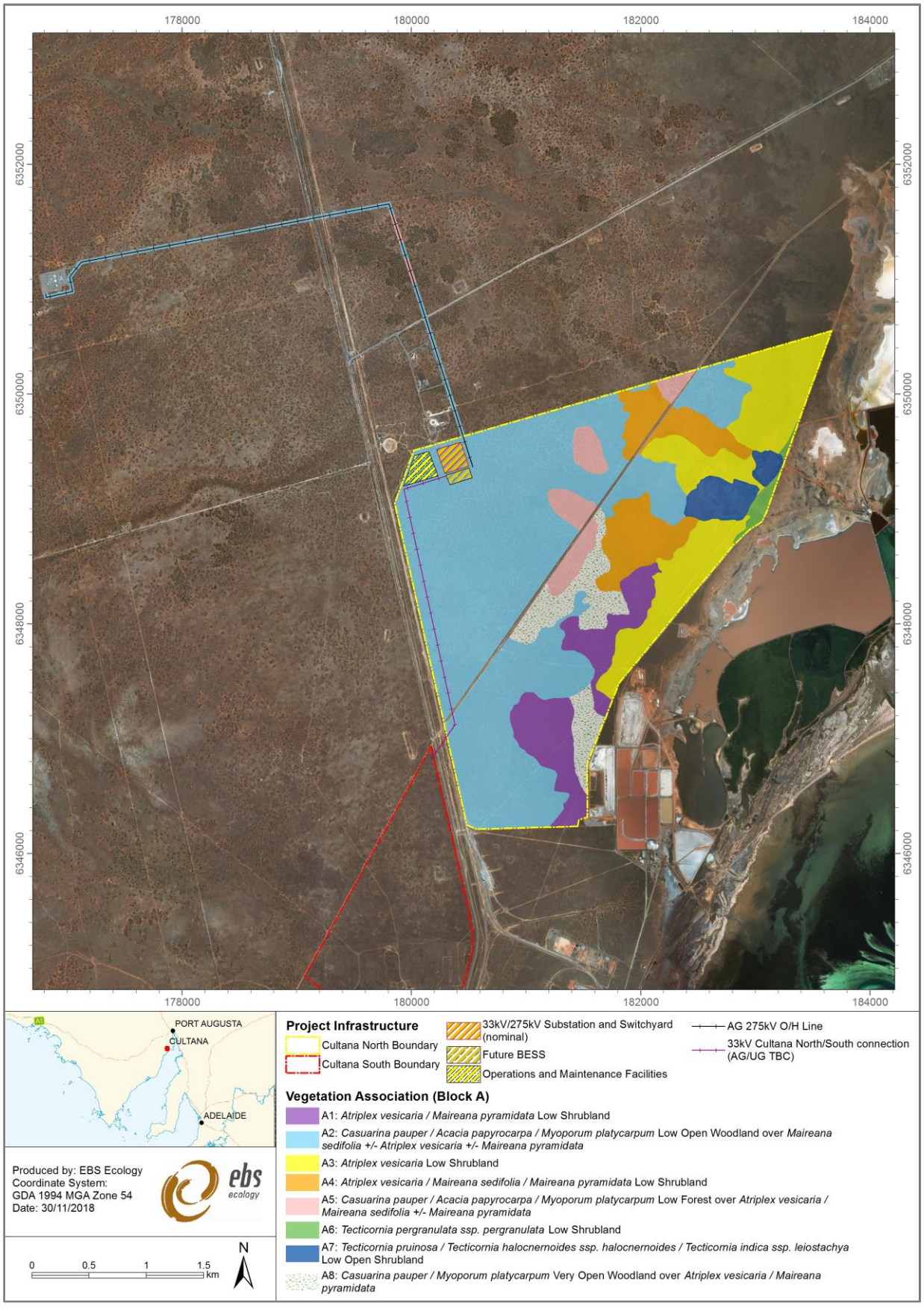


Figure 6. Vegetation associations (Sites) within Block A of the Project area.

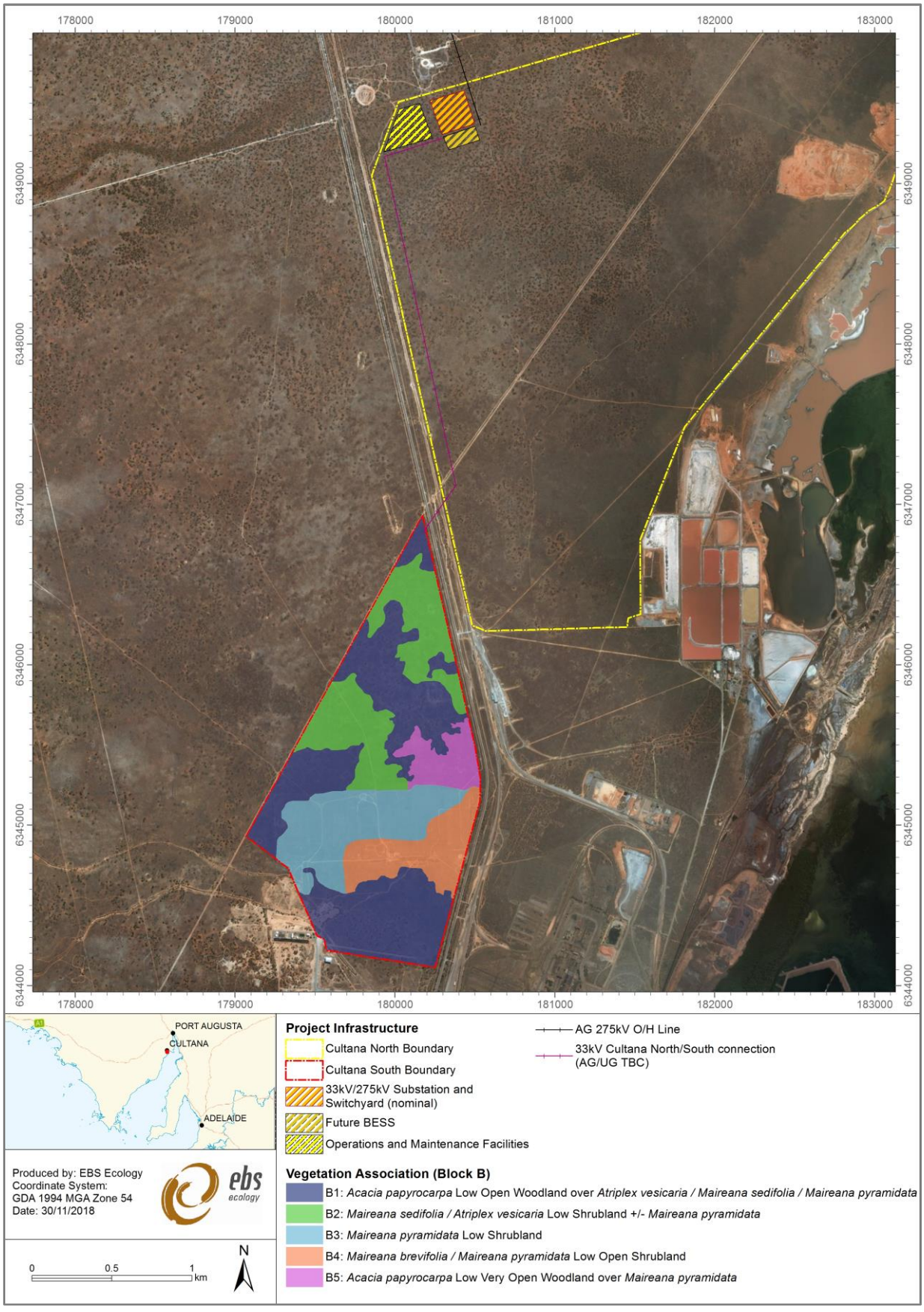


Figure 7. Vegetation associations (Sites) within Block B of the Project area.

5.1.1 Site A1

Site A1 was *Atriplex vesicaria* / *Maireana pyramidata* Low Shrubland, which covered an area of 71.32 ha. Nine native flora species observed within the Site, with one weed species, Ward's Weed (*Carrichtera annua*), also observed in very sparse cover (<5%).

The Site lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity. There was minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A1, and a site photo, are provided in Table 8. Refer to Attachments 1 and 2 for the RAM and BAM scoresheets, respectively.

Table 8. Summary of RAM and BAM scores for Site A1.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	45.00	49.20
Conservation significance score	1.04	1.04
Unit biodiversity score	50.08	58.33
Total biodiversity score	**3,571.42**	**4,160.20**

5.1.2 Site A2

Site A2 was *Casuarina pauper* / *Acacia papyrocarpa* / *Myoporum platycarpum* Low Open Woodland over *Maireana sedifolia* +/- *Atriplex vesicaria* +/- *Maireana pyramidata*, which covered an area of 478.39 ha. Two sample points were assessed based on varying overstorey cover, with Sample Point A2a approaching 25% cover and Sample Point A2b covering <10%. Fourteen (14) and 16 native flora species were observed at Sample Points A2a and A2b, respectively.

Both sample points had a dominant (>50%) presence of palatable shrubs or perennial grasses and litter mats under the canopies of trees and shrubs >3 m, minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface, very sparse cover of the introduced Ward's Weed present (<5% cover), and three vegetation stratums present: (i) trees/shrubs >3 m; (ii) shrubs 1-3 m; and (iii) low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Sample Points A2a and A2b, and a site photos, are provided in Table 9 and Table 10, respectively. Refer to Attachments 3-6 for the RAM and BAM scoresheets.

Table 9. Summary of RAM and BAM scores for Site A2a.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	58.09	60.00
Conservation significance score	1.02	1.02
Unit biodiversity score	63.40	69.77
Total biodiversity score	**30,330.13**	**33,376.31**

Table 10. Summary of RAM and BAM scores for Site A2b.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	57.05	61.50
Conservation significance score	1.02	1.02
Unit biodiversity score	62.27	71.51
Total biodiversity score	**29,787.74**	**34,210.72**

5.1.3 Site A3

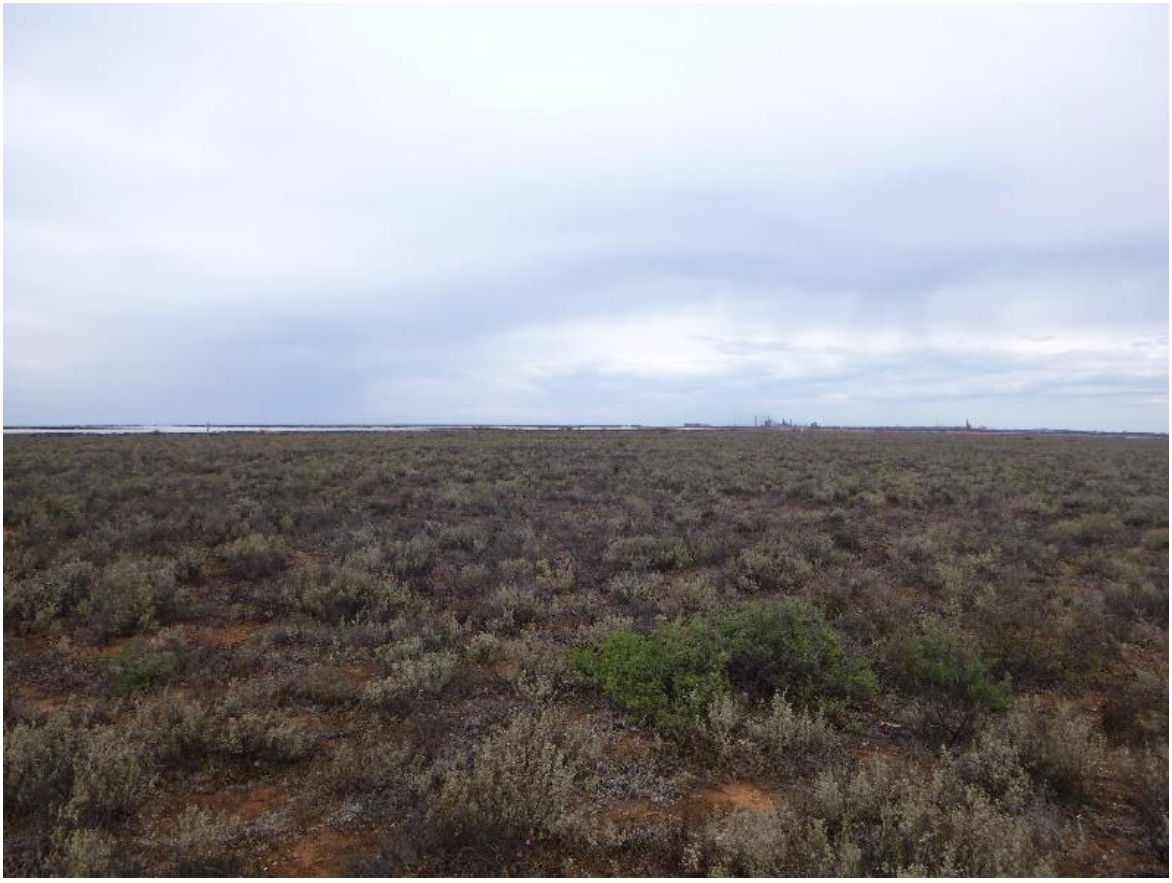
Site A3 was *Atriplex vesicaria* Low Shrubland, which covered an area of 131.07 ha. Six native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in very sparse cover (<5%).

The Site lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity. There was minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A3, and a site photo, are provided in Table 11. Refer to Attachments 7 and 8 for the RAM and BAM scoresheets, respectively.

Table 11. Summary of RAM and BAM scores for Site A3.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	45.13	38.13
Conservation significance score	1.04	1.04
Unit biodiversity score	50.22	45.21
Total biodiversity score	**6,581.69**	**5,925.27**



5.1.4 Site A4

Site A4 was *Atriplex vesicaria* / *Maireana sedifolia* +/- *Maireana pyramidata* Low Shrubland, which covered an area of 72.23 ha. Eight native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in very sparse cover (<5%).

The Site lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity. There was minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A4, and a site photo, are provided in Table 12. Refer to Attachments 9 and 10 for the RAM and BAM scoresheets, respectively.

Table 12. Summary of RAM and BAM scores for Site A4.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	43.38	41.21
Conservation significance score	1.04	1.04
Unit biodiversity score	48.27	48.85
Total biodiversity score	**3,485.89**	**3,528.63**

5.1.5 Site A5

Site A5 was *Casuarina pauper* / *Acacia papyrocarpa* / *Myoporum platycarpum* Low Forest over *Atriplex vesicaria* / *Maireana sedifolia* +/- *Maireana pyramidata*, which covered an area of 36.00 ha. Nineteen (19) native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in very sparse cover (<5%).

The Site had a dominant (>50%) presence of palatable shrubs or perennial grasses and litter mats under the canopies of trees and shrubs >3 m, lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity, had minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface, and had three vegetation stratums present: (i) trees/shrubs >3 m; (ii) shrubs 1-3 m; and (iii) low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A5, and a site photo, are provided in Table 13. Refer to Attachments 11 and 12 for the RAM and BAM scoresheets, respectively.

Table 13. Summary of RAM and BAM scores for Site A5.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	57.10	63.50
Conservation significance score	1.02	1.02
Unit biodiversity score	62.32	73.84
Total biodiversity score	**2,243.54**	**2,658.16**

5.1.6 Site A6

Site A6 was *Tecticornia pergranulata ssp. pergranulata* Low Shrubland, which covered an area of 6.97 ha. Seven native flora species were observed within the Site.

The Site lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity. There was minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A6, and a site photo, are provided in Table 14. Refer to Attachments 13 and 14 for the RAM and BAM scoresheets, respectively.

Table 14. Summary of RAM and BAM scores for Site A6.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	47.50	46.74
Conservation significance score	1.04	1.04
Unit biodiversity score	52.86	55.41
Total biodiversity score	**368.42**	**386.24**

5.1.7 Site A7

Site A6 was *Tecticornia pruinosa* / *Tecticornia halocnemoides ssp. halocnemoides* / *Tecticornia indica ssp. leiostachya* Low Open Shrubland, which covered an area of 25.29 ha. This Site was characterised by samphire shrubs that had recolonised two borrow pit areas. Seven native flora species were observed within the Site.

The Site had dominant (>50%) presence of large patches of bare soil (>5x5 m), which showed no signs of productive capacity, and dominant (>50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A7, and a site photo, are provided in Table 15. Refer to Attachments 15 and 16 for the RAM and BAM scoresheets, respectively.

Table 15. Summary of RAM and BAM scores for Site A7.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	40.53	38.05
Conservation significance score	1.00	1.00
Unit biodiversity score	43.36	43.38
Total biodiversity score	**1,096.62**	**1,097.09**

5.1.8 Site A8

Site A8 was *Casuarina pauper* / *Myoporum platycarpum* Very Open Woodland over *Atriplex vesicaria* / *Maireana pyramidata*, which covered an area of 49.41 ha. Ten (10) native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in very sparse cover (<5%).

The Site had a minor (<50%) presence of palatable shrubs or perennial grasses and litter mats under the canopies of trees and shrubs >3 m, lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity, had minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface, and had two vegetation stratums present: (i) trees/shrubs >3 m; and (iii) low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site A8, and a site photo, are provided in Table 16. Refer to Attachments 17 and 18 for the RAM and BAM scoresheets, respectively.

Table 16. Summary of RAM and BAM scores for Site A8.

	RAM Site scores	BAM Site scores
Landscape context score	1.07	1.14
Vegetation condition score	46.78	40.49
Conservation significance score	1.04	1.04
Unit biodiversity score	52.06	48.00
Total biodiversity score	**2,572.19**	**2,371.78**

5.1.9 Site B1

Site B1 was *Acacia papyrocarpa* Low Open Woodland over *Atriplex vesicaria* / *Maireana sedifolia* / *Maireana pyramidata*, which covered an area of 98.17 ha. Thirteen (13) native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in moderate cover (5-50%).

The Site had a dominant (>50%) presence of palatable shrubs or perennial grasses and litter mats under the canopies of trees and shrubs >3 m, lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity, had minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface, and had three vegetation stratums present: (i) trees/shrubs >3 m; (ii) shrubs 1-3 m; and (iii) low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site B1, and a site photos, are provided in Table 17. Refer to Attachments 19 and 20 for the RAM and BAM scoresheets, respectively.

Table 17. Summary of RAM and BAM scores for Site B1.

	RAM Site scores	BAM Site scores
Landscape context score	1.06	1.14
Vegetation condition score	56.43	46.68
Conservation significance score	1.02	1.02
Unit biodiversity score	61.01	54.28
Total biodiversity score	**5,989.62**	**5,328.76**

5.1.10 Site B2

Site B2 was *Maireana sedifolia* / *Atriplex vesicaria* Low Shrubland +/- *Maireana pyramidata*, which covered an area of 48.47 ha. Twelve (12) native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in moderate cover (5-50%).

The Site lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity. There was minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site B2, and a site photo, are provided in Table 18. Refer to Attachments 21 and 22 for the RAM and BAM scoresheets, respectively.

Table 18. Summary of RAM and BAM scores for Site B2.

	RAM Site scores	BAM Site scores
Landscape context score	1.06	1.14
Vegetation condition score	41.15	49.77
Conservation significance score	1.04	1.04
Unit biodiversity score	45.36	59.01
Total biodiversity score	**2,198.56**	**2,860.02**

5.1.11 Site B3

Site B3 was *Maireana pyramidata* Low Shrubland, which covered an area of 41.48 ha. Twelve (12) native flora species were observed within the Site, with two weed species, Ward's Weed and Common Iceplant (*Mesembryanthemum crystallinum*), also observed in moderate cover (5-50%).

The Site lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity. There was minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site B3, and a site photo, are provided in Table 19. Refer to Attachments 23 and 24 for the RAM and BAM scoresheets, respectively.

Table 19. Summary of RAM and BAM scores for Site B3.

	RAM Site scores	BAM Site scores
Landscape context score	1.06	1.14
Vegetation condition score	45.22	50.16
Conservation significance score	1.02	1.02
Unit biodiversity score	48.89	58.33
Total biodiversity score	**2,028.13**	**2,419.41**

5.1.12 Site B4

Site B4 was *Maireana brevifolia* / *Maireana pyramidata* Low Open Shrubland, which covered an area of 25.55 ha. Eleven (11) native flora species were observed within the Site, with four weed species, Ward's Weed, Common Iceplant, Match-head Plant (*Psilocaulon granulicaule*), and the declared African Boxthorn (*Lycium ferocissimum*) also observed in moderate cover (5-50%).

The Site was highly degraded with minor (<50%) presence of patches of bare soil (>5x5 m) that showed no signs of productive capacity, and major (>50%) evidence of animal and vehicle tracks, and other physical disturbance such as infrastructure ruins, rubbish piles and tires, to the natural land surface. The only vegetation stratum present was low shrubs <1 m and hummock grasses. Exotic trees (not protected under the NV Act) had been planted along access road verges and a small section, adjacent to the Lincoln Highway within this Site.

A summary of the RAM and BAM scores for Site B4, and a site photo, are provided in Table 20. Refer to Attachments 25 and 26 for the RAM and BAM scoresheets, respectively.

Table 20. Summary of RAM and BAM scores for Site B4.

	RAM Site scores	BAM Site scores
Landscape context score	1.06	1.14
Vegetation condition score	31.00	42.65
Conservation significance score	1.00	1.00
Unit biodiversity score	32.86	48.62
Total biodiversity score	**839.57**	**1,242.27**

5.1.13 Site B5

Site B5 was *Acacia papyrocarpa* Low Very Open Woodland over *Maireana pyramidata*, which covered an area of 14.06 ha. Fourteen (14) native flora species were observed within the Site, with one weed species, Ward's Weed, also observed in moderate cover (5-50%).

The Site had a dominant (>50%) presence of palatable shrubs or perennial grasses and litter mats under the canopies of trees and shrubs >3 m, lacked large patches of bare soil (>5x5 m) that showed no signs of productive capacity, had minor (<50%) evidence of animal and vehicle track disturbance to the natural land surface, and had two vegetation stratums present: (i) trees/shrubs >3 m; and (ii) low shrubs <1 m and hummock grasses.

A summary of the RAM and BAM scores for Site B5, and a site photos, are provided in Table 21. Refer to Attachments 27 and 28 for the RAM and BAM scoresheets, respectively.

Table 21. Summary of RAM and BAM scores for Site B5.

	RAM Site scores	BAM Site scores
Landscape context score	1.06	1.14
Vegetation condition score	50.89	45.24
Conservation significance score	1.02	1.02
Unit biodiversity score	55.02	52.60
Total biodiversity score	**773.56**	**739.59**

6 FAUNA ASSESSMENT OUTCOMES

6.1 Birds

A total of 384 birds from 39 species were recorded during point counts and opportunistically within the Project area (Appendix 1 and Appendix 2). The families of birds with the greatest representation were Meliphagidae (Honeyeaters; six species), Acanthizidae (Australian Warblers; five species) and Artamidae (Currawongs, Butcherbirds, Magpies, Woodswallows; four species). The 16-point count sites recorded 33 bird species (Appendix 2). Overall, the most abundant species were the White-browed Babbler (*Pomatostomus superciliosus*; 34 individuals), Spiney-cheeked Honeyeater (*Acanthagenys rufogularis*; 31 individuals) and Variegated Fairywren (*Malurus lamberti*; 19 individuals). There were no species of state of national significance recorded within the Project area. One introduced bird species; the Common Starling (*Sturnus vulgaris*) was observed within the Project area.

There were no Western Grasswrens observed in the Project area nor areas of their preferred habitat, due to the absence of minor drainage lines which supported large spiny shrubs (>0.75 m) in high densities. However, there were 43.19 ha of potential habitat identified, where *Maireana pyramidata* (Blackbush) shrubs were dense and frequently greater than 50 cm in height, and present in either shrubland or within open *Acacia papyrocarpa* (Western Myall) and/or *Casuarina pauper* (Black Oak) woodland. All other habitat within the Project area would be atypical for the species.

6.2 Mammals

Four mammal species were recorded over the Project area, which was comprised of two indigenous and two introduced species. The two indigenous species were macropods, with six Red Kangaroos (*Macropus rufus*) and four Western Grey Kangaroos (*Macropus fuliginosus*) observed. The introduced species recorded were two foxes (*Vulpes vulpes*) and a single rabbit (*Oryctolagus cuniculus*). A potentially active fox den and an in-active rabbit warrens were also observed within the Project area.

6.3 Reptiles

Five reptile species were observed over the Project area. The five species observed were the Crested Dragon (*Ctenophorus cristatus*), Spotted Ctenotus (*Ctenotus orientalis*), Yellow-faced Whipsnake (*Demansia psammophis*), Central Bearded Dragon (*Pogona vitticeps*) and Sleepy Lizard (*Tiliqua rugosa*). The Sleep Lizard and Central Bearded Dragon were the most commonly observed species, with six and three individuals recorded, respectively, while all other reptile species were represented by a lone individual.

Figure 8. Location of suitable habitat within the Project area. No suitable habitat was observed in Block B.

7 REQUIREMENTS OF THE REGULATION

7.1 Regulation under which the clearance is applicable

An assessment against the Native Vegetation Clearance Principles is not required as the clearance associated with the Project is exempt under the following regulation:

Regulation 12(34)—Infrastructure

(1) Clearance of vegetation—

(a) incidental to the construction or expansion of a building or infrastructure where the Minister has, by instrument in writing, declared that the Minister is satisfied that the clearance is in the public interest; or

(b) required in connection with the provision of infrastructure or services to a building or proposed building, or to any place,

provided that any development authorisation required by or under the *Development Act 1993* has been obtained.

The requirements of the proponent to undertake clearance for the provision of infrastructure include:

- Application to the NVC;
- Provision of sufficient information for the NVC to assess the level of risk to biodiversity;
- Development of a SEB Management Plan to be approved by the NVC if providing an on ground SEB; and
- Provision of a SEB in accordance with the Management Plan or payment into the Native Vegetation Fund.

If an NVC-approved Standard Operating Procedure (SOP) exists, the application, assessment, approval and SEB processes will occur in accordance with the SOP.

7.2 Risk assessment

The proposed Project involves level 4 clearance since the Total Biodiversity Score for the Project area (RAM = 61,827.92. BAM = 66,510.94) is greater than 2,500. The proposed clearance is not 'Seriously at Variance' with Principles of Clearance 1(b), 1(c) or 1(d), as summarised below for each Principle.

7.2.1 Principle (b) It has significance as a habitat for wildlife

Each Site in the Project area has a threatened fauna score ranging from 0-0.04 and therefore clearance is not 'At Variance' with Principle (b).

7.2.2 Principle (c) It includes plants of a rare, vulnerable or endangered species

All Sites within the Project area have a threatened flora score of 0 and therefore clearance is not 'At Variance' with Principle (c).

7.2.3 Principle (d) The vegetation comprises the whole, or part, of a plant community that is Rare, Vulnerable or Endangered

No Rare, Vulnerable or Endangered plant communities are present in the Project area and therefore clearance of vegetation is not 'At Variance' with Principle (d).

8 MITIGATION HIERARCHY

Measures to avoid clearance of native vegetation, minimise the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent, and rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance for certain aspects of Project area discussed below.

8.1 Borrow pits

8.1.1 Vegetation Impact

Vegetation cover within the borrow pits areas (Site A7) is currently quite low. Pending economic evaluations, it is intended to avoid construction or any impact in these areas. The borrow pits are intended to be left to naturally rehabilitate over time but can be actively rehabilitated by direct-seeding.

8.1.2 Justification

- These sites are not ideal for a solar farm. Natural rehabilitation may be the most favourable option with regards to economics and vegetation impact; and
- Due to the lack of vegetation in these areas, the location will be particularly sensitive to disturbance with regards to dust-borne pollution.

8.2 Dense Myall Woodlands

8.2.1 Vegetation Impact

There is dense Myall (*Acacia papyrocarpa*) Woodland vegetation in the central parts, and a small section near the northern boundary, of the Block A (Site A5). It is recognised that construction in the dense areas may be difficult. As such, the Project is considering leaving these areas undeveloped.

8.2.2 Justification

- These sites are not ideal for a solar farm. Natural conservation is a favourable option with regards to economics and vegetation impact; and
- The dense vegetation is recognised as slow-growing and comparatively valuable from an ecological perspective. Retention of the dense vegetation will reduce impact on fauna.

8.3 Low density trees in chenopod shrubland

8.3.1 Vegetation Impact

Occasional trees and larger shrubs exist across both Block A and Block B. Where these trees or shrubs can be managed in height and do not present any issues with construction, they will be left as-is. Where vegetation removal is necessary, the intent is to remove only the part of the vegetation above the natural ground level and leave the root system and soil structure in-situ. Complete removal of trees and their roots will be carried out by exception where there are no other economical alternatives.

Generally, shrubs with trunk diameters less than 100mm will be able to be rolled or have their heights managed during construction. For the operational life of the Solar Farm, these shrubs will be managed actively based on their height. Shrubs and trees with diameters greater than 150mm are sparsely scattered across the development site and are intended to be assessed and addressed on a case-by-case basis.

It is recognized that any vegetation to be kept on site within the main development areas will need to be maintained at a height of approximately 500mm within the central zones. Where vegetation does not impact production or operation of the Solar Farm, the vegetation will be left as-is.

8.3.2 Justification

- The most economical approach coincides with minimising the environmental footprint of construction. Most of the impacted vegetation during construction is anticipated to fully recover over time;
- Encouragement of native vegetation on site will inherently discourage rising of the salt table;
- Vegetation height management activities are anticipated to occur on an as-required basis; and
- Where trees or vegetation is removed, impacted areas will be rehabilitated either by direct seeding or natural dispersion of adjacent vegetation.

8.4 General chenopod shrubland

8.4.1 Vegetation Impact

Nominally, it is anticipated the minimum clearance from the solar panels (at their lowest positions) to the ground is 500 mm. The entirety of the development area will be maintained and managed as-required.

8.4.2 Justification

- Encouragement of native vegetation on site will inherently discourage rising of the salt table;
- Vegetation under panels will reduce reflection of heat underneath panels and stabilize/reduce operating temperatures, thereby improving reliability of the Solar Farm; and
- Vegetation will reduce the severity of windblown dust and dirt onto the solar panels.

8.5 High voltage overhead powerlines (275kV)

8.5.1 Vegetation Impact

The proposed route for the high voltage powerline that connects the Solar Farm to the grid runs through relatively dense Myall Woodland. Where possible, existing access tracks will be used to reduce impact. Where new access tracks are required, consideration is being given to using a roller to crush the vegetation to provide vehicular access. Occasional vehicular movement will then maintain vegetation heights and growth.

Vegetation below the powerlines will be trimmed and managed as per Attachment 29. Where possible, trees and tall shrubs will have vegetation heights maintained in preference to clearance. Removal of trees

or tall shrubs will be carried out only where no economical alternative is available. Low lying shrubs will not be impacted. All vegetation impacted will remain on site.

To install the powerline towers, the footprints underneath the towers will be totally cleared. Cleared vegetation will remain onsite in an adjacent area. Mulching/chipping of the vegetation will be considered.

To connect the Solar Farm to the grid, approximately 6 km of overhead powerlines are required. Approximately 3.1 km of these lines will run alongside existing overhead powerlines and share common access roads and easements. The remaining 2.9 km will require new access roads.

Along the 3.1 km stretch, there will be an approximately 15 m wide impact (vegetation height management) required. Along the 2.9 km stretch, there will be an additional 30 m wide impact (vegetation height management) required in addition to the establishment of a new accessway.

At the preliminary design stages, it is aniticipated that 15 towers will be required, spaced approximately 400 m apart. This is approximately 3.75 ha of land clearance.

Vegetation management surrounding the powerlines will be minimal. Management of vegetation for access will accommodate off-road vehicles (i.e. two rows of cleared vegetation for wheel tracks with vegetation between the rows to be kept approximately 300 mm high). Management of vegetation for fire risk/powerline access will be maintained according to Attachment 29.

8.5.2 Justification

- Minimal impact is required for overhead powerlines. The most economical approach coincides with minimising the environmental footprint of construction;
- Most of the impacted vegetation during construction is anticipated to fully recover over time;
- Occasional surveying and rare maintenance activities are required for these overhead lines. The access roads are not thoroughfares. As such, traffic is anticipated to be minimal; and
- Vegetation height management activities are anticipated to occur on an as-required basis.

8.6 Perimeter access roadways

8.6.1 Vegetation Impact

Vegetation in perimeter access roadways is to be totally cleared and replaced with rubble, mulch or suitable alternative. The cleared vegetation will be kept on site and be used as mulch. Roadways will be approximately 24.6 km, at 5 m nominal road width, giving an approximate impacted area of 12.3 ha. Some of the roadway will coincide with maintaining necessary right-of-way access to easements of services. Roadways will run around entirety of site and around the areas designated as not-for-development to mitigate any unintended access.

8.6.2 Justification

- These roadways, combined with the east-west roadways, are part of the arterial access network, reducing traffic within the remainder of the site and net traffic impact on the land;

- There are no vegetation species capable of surviving the anticipated traffic throughout construction and operation of the Solar Farm. Rubble, mulch or similar will be used, and maintained, to prevent creation of dust-borne and particulate pollution; and
- Road surface and material will be maintained to avoid impacting natural surface water drainage.

8.7 East-west access roadways

8.7.1 Vegetation Impact

Vegetation in the east-west access roadways is to be totally cleared and replaced with rubble, mulch or suitable alternative. The cleared vegetation will be kept on site and be used as mulch. Approximately 16 roads will run parallel in an east-west direction, running between the perimeter roadways. These roadways will total 17.6 km, at 5 m nominal road width, with an approximate impacted area of 88 ha.

These roadways are required to provide access to install, maintain and inspect the inverter stations. In addition, designated accessways minimise impact on the other parts of the site.

8.7.2 Justification

- These roadways, combined with the perimeter roadways, are part of the arterial access network, reducing traffic within the remainder of the site and net traffic impact on the land;
- There are no vegetation species capable of surviving the anticipated traffic throughout construction and operation of the Solar Farm. Rubble, mulch or similar will be used, and maintained, to prevent creation of dust-borne and particulate pollution; and
- Road surface and material will be maintained to avoid impacting natural surface water drainage.

8.8 North-south accessways

The north-south accessways between the rows of solar panels are treated very differently from construction to operation. During construction, full vehicle access is required to install the infrastructure. Once in operation, access will only be required on occasion by light vehicles only.

As such, the use and impact on vegetation is discussed separately.

8.8.1 North-south accessways (construction)

Vegetation impact

During construction, consideration is being given to vegetation rolling and crushing. It is understood that most vegetation on site will survive and recover over time with this method. Based on preliminary site tests, the soil crust and lichens were largely unaffected by rolling over by a 20T smooth drum roller.

Vegetation impacted will be left in-situ, except where the crushed vegetation presents a safety risk and will be chipped/mulched in-situ. Vehicular movement will maintain vegetation height and growth throughout construction. Only every second row of solar panels will be impacted reduce the net impact to the wider environment.

Most of the traffic on these accessways will be light vehicle traffic. During the peak of traffic and construction in the area, there will be regular equipment deliveries via trucks. Regular watering of the impacted areas will assist survival of the adjacent species and mitigate erosion from construction activities.

These accessways are used to allow vehicle access to install the primary infrastructure (piles, tracking equipment, solar panels, cabling, etc.). Although they are not intended for general thoroughfare, traffic will be intense for a brief period, associated with the installation and commissioning of the infrastructure.

The north-south accessways run between every second row of panels. These are designed to provide access to panels on both sides of the accessway. To reach two rows of solar panels at a time, the crushed vegetation will be 6.8 m wide. Crushed vegetation accessways will be no more than approximately 370 m in length (distance between the east-west access roadways). Every row of crushed vegetation accessway is separated by 5.2 m of largely unaffected vegetation.

The constructability of rolling vegetation across the full scale of the site will need further consideration and trialling, but remains the preference for the Project. In any case, there remains a strong focus to minimise vegetation impact and generation of dust throughout construction (and subsequent operation of the facility).

Justification

- The arterial access network reduces traffic along these routes. As such, the intense period of impact is minimised by accessing these tracks only as necessary;
- The rows of unaffected vegetation will assist with reducing effect of wind-related erosion and generation of dust on site;
- There are no vegetation species capable of surviving the anticipated intensity of traffic during construction. Rolling minimises the permanent damage on the land;
- Suppression of dust-borne pollution will be mitigated by a combination of watering (as required), polymer-based surface treatment and re-seeding of native vegetation species;
- At the later stages of construction, additional effort to assist with rehabilitation will take place via re-seeding and possible polymer-based surface treatment to improve soil crust resilience; and
- Based on preliminary site tests, the soil crust and lichens were largely unaffected by rolling over by a 20T smooth drum roller.

8.8.2 North-south accessways (pperation)

Vegetation impact

At the conclusion of construction, it is anticipated that much of the onsite vegetation will recover over time. To accelerate rehabilitation, direct-seeding of locally-native species will occur as soon as anticipated traffic in the accessways reduce.

Direct-seeding efforts focus on fast-germinating and resilient species suited to the climatic and environmental conditions of the Project area. A mix of perennial and annual species will be used to allow the areas to most effectively re-establish the natural balance of vegetation species post-construction whilst suppressing establishment of weed species. Watering and the use of polymer-based surface treatments

will be employed to aid water retention of the soil, improve germination rates and recovery of existing vegetation.

Occasional light vehicle traffic will maintain vegetation height and growth. It is anticipated that occasional maintenance will be required to trim and maintain vegetation heights.

The 6.8 m wide footprint created during construction is anticipated to largely recover and rehabilitate over time when the Solar Farm is in its operation phase. The long-term vegetation footprint is anticipated to follow standard vehicle tracks, with approximately 300 mm high vegetation between the wheel tracks. Outside of the wheel tracks, vegetation will be maintained at a height of 500 mm.

The north-south accessways run between every second row of panels. These are designed to provide access to panels on both sides of the accessway. A total of 500.3 km of access will be required. The cleared vegetation equates to approximately 50 ha. Between each row of crushed vegetation accessway, there will be 5.2 m of largely unaffected vegetation (maintained at a height of approximately 500 mm). If deemed required post-construction, suppression of dust-borne pollution will be mitigated by regular treatment of polymer-based surface treatment as required.

8.8.3 Justification

- The arterial access network reduces traffic along these routes. As such, the intense period of impact is minimised by accessing these tracks only as necessary;
- The rows of unaffected vegetation will assist with reducing effect of wind-related erosion and generation of dust on site;
- Most vegetation species will be able to recover and be managed naturally by vehicle movements, with occasional height maintenance on an as-required basis;
- Vegetation will be maintained at an approximate height of 500 mm;
- Minimising impact on every second row will encourage the spread and re-growth of lichens and ground covers;
- Accelerating the rehabilitation and restoration of vegetation species reduces the severity of windblown dust and dirt onto the solar panels;
- Encouragement of native vegetation on site will inherently discourage rising of the salt table; and
- Vegetation under panels will reduce reflection of heat underneath panels and stabilize/reduce operating temperatures, thereby improving reliability of the Solar Farm.

8.9 Offset

Any adverse impact on native vegetation or ecosystems that cannot be avoided or minimised should be offset by implementing an SEB that outweighs that impact. Biodiversity offsets address any residual impacts after prevention and mitigation measures have been implemented.

For information regarding the Project's SEB offset calculation and how it will be achieved, see Section 9 (below).

9 SIGNIFICANT ENVIRONMENTAL BENEFIT (SEB)

An 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.

9.1 Determination of the SEB obligation

The required SEB has been calculated twice based on the possibility that the NVAP will not approve using the RAM in the EP NRM region (refer to Section 3.2.1) The SEB requirements for the 726.18 ha Project area based on both approaches are summarised in Table 22.

The SEB Payment calculations obtained when using the BAM for Sites within the N&Y NRM region were inflated relative to those obtained using the RAM in the same Sites. For this reason, the values have been excluded from this report. The inflated SEB Payment values using the BAM is likely because the land use, vegetation associations and condition within all Sites in the Project area are reflective of a rangelands system, and it was difficult to assign suitable benchmark communities. Furthermore, the agricultural zone economies of scale factor is less appropriate than the arid zone economies of scale factor in this situation (discussed further in Section 10.1).

9.1.1 RAM

With the Project area being assessed using the RAM, the total SEB points required for the vegetation clearance is 64,919.34, which equates to an SEB offset of 8,114.92 ha (Table 22). Alternatively, the total payment into the Native Vegetation Fund required is $5,586,207.13, which includes the total administration fee of $291,224.09. See Table 23 for the breakdown of the assessment of clearance for each Site.

9.1.2 BAM

With the Project area being assessed using the BAM, the total SEB points required for the vegetation clearance is 69,836.51, which equates to an SEB offset of 8,729.56 ha (Table 22). See Table 24 for the breakdown of the assessment of clearance for each Site.

Table 22. Summary of the SEB requirements for the Project based on the RAM and BAM.

Assessment method	SEB points required	SEB offset area required (ha)	Native Vegetation Fund payment required ($)	Included administration fee ($)
RAM	64,919.34	8,114.92	5,586,207.13	291,224.09
BAM	69,836.51	8,729.56	n/a	n/a

Table 23. SEB calculations using the RAM.

Site	Area of clearance (ha)	SEB points of loss	SEB points required	Hectares required	Site mean annual rainfall (mm)	Native Vegetation Fund Payment ($)	Administration fee ($)	Total ($)
A1	71.32	3,571.42	3,749.99	468.75		305,858.67	16,822.23	322,680.90
A2a		30,369.68	31,888.16	3,986.02		2,600,878.39	143,048.31	2,743,926.70
A2b	478.39	29,787.74	31,277.13	3,909.64		2,551,040.65	140,307.24	2,691,347.89
A2 (mean)		30078.71	31582.645	3947.83		2,575,959.52	141,677.78	2,717,637.30
A3	131.07	6,581.69	6,910.78	863.85		563,660.32	31,001.32	594,661.64
A4	72.23	3,485.89	3,660.19	457.52		298,534.08	16,419.37	314,953.45
A5	36.00	2,243.54	2,355.72	294.47		192,138.44	10,567.61	202,706.05
A6	6.97	368.42	386.84	48.36	261	31,551.74	1,735.35	33,287.09
A7	25.29	1,096.62	1,151.45	143.93		93,915.11	5,165.33	99,080.44
A8	49.41	2,572.19	2,700.80	337.6		220,284.34	12,115.64	232,399.98
B1	98.17	5,989.62	6,289.10	786.14		512,954.66	28,212.51	541,167.17
B2	48.47	2,198.56	2,308.49	288.56		188,285.95	10,355.73	198,641.68
B3	41.48	2,028.13	2,129.54	266.19		173,690.68	9,552.99	183,243.67
B4	25.55	839.57	881.55	110.19		71,901.56	3,954.59	75,856.15
B5	14.06	773.56	812.24	101.53		66,247.97	3,643.64	69,891.61
Total	**1098.41**	**61,827.92**	**64,919.34**	**8,114.92**	**261**	**5,294,983.04**	**291,224.09**	**5,586,207.13**

Table 24. SEB calculations using the BAM.

Site	Area of clearance (ha)	SEB points of loss	SEB points required	Hectares required	Site mean annual rainfall (mm)
A1	71.32	4,160.20	4,368.21	546.03	
A2a	478.39	33,376.31	35,045.13	4,380.64	
A2b		34,210.72	35,921.26	4,490.16	
A2 (mean)		33,793.52	35,483.20	4,435.40	
A3	131.07	5,925.27	6,221.54	777.69	
A4	72.23	3,528.63	3,705.06	463.13	
A5	36.00	2,658.16	2,791.07	348.88	
A6	6.97	386.24	405.55	50.69	261
A7	25.29	1,097.09	1,151.95	143.99	
A8	49.41	2,371.78	2,490.37	311.30	
B1	98.17	5,328.76	5,595.20	699.40	
B2	48.47	2,860.02	3,003.02	375.38	
B3	41.48	2,419.41	2,540.38	317.55	
B4	25.55	1,242.27	1,304.39	163.05	
B5	14.06	739.59	776.57	97.07	
Total	**1098.41**	**66,510.94**	**69,836.51**	**8,729.56**	**261**

10 DISCUSSION

10.1 Flora assessment

The flora assessment determined that Block A is in better condition than Block B. This is as expected given that Block B was degraded heavily during the dairy was operating there. Furthermore, this Block continues to be degraded by the illegal dumping of rubbish and operation of motorbikes.

The woodland areas scored highest out of all the Sites and are considered to be of high ecological value in terms of habitat. The proponent has indicated in the mitigation hierarchy that these areas will be avoided where possible.

The SEB Payment calculations using the BAM were substantially greater than those calculated using the RAM. This is likely due to the economies of scale factor and the difficulty in selecting an appropriate benchmark community to assess the vegetation associations against.

The economies of scale factor moderates the management cost in recognition that management becomes cheaper with larger sites. The higher SEB Payment calculation using the BAM is a result of a smaller economies of scale factor being applied to account for the generally higher levels of fragmentation in the agricultural zone. However, the Project area is quite large and lacks fragmentation, suggesting the arid zone economies of scale is more appropriate.

The Chenopod Shrubland associations within the Project area were assessed against the 'EP 9.2 Chenopod Open Shrublands' benchmark community, which is most likely suitable. However, there was no 'Woodland over Chenopod Shrubs' benchmark community within the BAM scoresheet. The 'EP 10.1 Open Woodlands with Open Sclerophyll Shrub Understorey on Heavy Soil Plains' benchmark community was used. This was based on this benchmark community having plant species diversity, weed, native plant life form, and regeneration values similar to those expected in a Myall / Black Oak Woodland over Chenopod Shrubs.

10.2 Fauna assessment

10.2.1 Nationally threatened species

Western Grasswren (*Amytornis textilis myall*)

The failed detection of Western Grasswrens and their preferred habitat during the fauna assessment suggest that the Project area does not support important habitat for the species. This is likely due to the location of the Project area outside of the Myall Ck and Pine Ck catchments, which support major concentrations of Western Grasswren (Black *et al.* 2009). As the Project area falls outside of the catchments, there was an absence of drainage lines, where their preferred habitat is largely confined (Black *et al.* 2009).

Despite the absence of preferred habitat for Western Grasswrens within the Project area, an area of 43.19 ha of potential habitat was identified within Block A (Figure 8). There were no Western Grasswrens observed within this patch of potential habitat, following substantial search effort, however, this may have been in response to the prevailing drought conditions. The fauna assessment was conducted during

drought conditions with 70.2 mm of rainfall in the nine months prior to the assessment (May to October), which is 138.6 mm lower than the long-term mean (1945 - 2018) (Commonwealth of Australia 2018) (Figure 3). As such, Western Grasswren populations may have contracted in to refuge areas of optimal habitat (Black *et al.* 2009).

The possibility for Western Grasswrens to use the patch of potential habitat in Block A is supported by the observation of the species on the boundary of the Project area and likewise the mapped area of potential habitat by AECOM in 2010 (observed at 53 H 742454 E 6352101 N) (AECOM 2012). The AECOM assessment was conducted in December 2010 when conditions were good due to well above average rainfall over the preceding six months. The recorded rainfall in six months prior to the assessment was 230 mm, while the long-term mean for these months (July - December) is 138 mm. Therefore, it is possible that Western Grasswrens may use the Project area during periods of above average rainfall when populations expand from areas of refuge habitat.

Areas of *Maireana pyramidata* (Black Bluebush) shrubland in Block B were not considered to be potential habitat for the Western Grasswren as it was heavily degraded due to its historical use as a dairy as well as the current illegal dumping and its frequent use by dirt bikes. Furthermore, the height and density of *Maireana pyramidata* (Black Bluebush) were inadequate to qualify as potential habitat, as such, it is considered atypical habitat.

10.2.2 Migratory species

Fork-tailed (Pacific) Swift (*Apus pacificus*)

The Fork-tailed Swift (*Apus pacificus*) migrates from its breeding grounds, which extend from northern India to western Russia, to Australia, where it spends its non-breeding season. The species arrives in October and departs in mid-April. While present in Australia, the Fork-tailed Swift is almost exclusively aerial. As such, while it may occur within the Project area, it is likely that the species would only be recorded as a fly-over, and as such, has not been included on the RAM scoresheets.

10.2.3 State threatened species

(Western) Slender-billed Thornbill (*Acanthiza iredalei iredalei*)

The (Western) Slender-billed Thornbill was not observed on the fauna assessment, however, has widespread habitat within the Project area. The core habitats of this subspecies are chenopod shrublands that are dominated by samphire (*Tecticornia sp.*), bluebush (*Maireana sp.*) or saltbush (*Atriplex sp.*) (TSSC 2008). As such, the (Western) Slender-billed Thornbill is expected to occur in all chenopod shrubland vegetation associations excluding those which are heavily degraded and very open (Table 7).

Elegant Parrot (*Neophema elegans*)

The Elegant Parrot (*Neophema elegans*) was not observed on the fauna assessment, however, the species is expected to irregularly use the Project area for foraging and roosting. Habitat suitable for the presence of the Elegant Parrot is widespread, as the species inhabits open woodlands, chenopod shrubs and samphire shrublands. Therefore, the Elegant Parrot has been included on the RAM scoresheets for all assessment areas, except for those which were highly degraded (Table 7). Highly degraded habitats would have low habitat value for the Elegant Parrot and have not been included in the RAM scoresheet.

Table 25. RAM sites that support suitable habitat for the Western Slender-billed Thornbill (SBTB) and Elegant Parrot (EP).

Site	Association	SBTB	EP
A1	*Atriplex vesicaria* / *Maireana pyramidata* Low Shrubland	✓	✓
A2	*Casuarina pauper* / *Acacia papyrocarpa* / *Myoporum platycarpum* Low Open Woodland over *Maireana sedifolia* +/- *Atriplex vesicaria* +/- *Maireana pyramidata*		✓
A3	*Atriplex vesicaria* Low Shrubland	✓	✓
A4	*Atriplex vesicaria* / *Maireana sedifolia* +/- *Maireana pyramidata* Low Shrubland	✓	✓
A5	*Casuarina pauper* / *Acacia papyrocarpa* / *Myoporum platycarpum* Low Forest over *Atriplex vesicaria* / *Maireana sedifolia* +/- *Maireana pyramidata*		✓
A6	*Tecticornia pergranulata ssp. pergranulata* Low Shrubland	✓	✓
A7	*Tecticornia pruinosa* / *Tecticornia halocnemoides ssp. halocnemoides* / *Tecticornia indica ssp. leiostachya* Low Open Shrubland		
A8	*Casuarina pauper* / *Myoporum platycarpum* Very Open Woodland over *Atriplex vesicaria* / *Maireana pyramidata*	✓	✓
B1	*Acacia papyrocarpa* Low Open Woodland over *Atriplex vesicaria* / *Maireana sedifolia* / *Maireana pyramidata*		✓
B2	*Maireana sedifolia* / *Atriplex vesicaria* Low Shrubland +/- *Maireana pyramidata*		✓
B3	*Maireana pyramidata* Low Shrubland		✓
B4	*Maireana brevifolia* /*Maireana pyramidata* Low Open Shrubland		
B5	*Acacia papyrocarpa* Low Very Open Woodland over *Maireana pyramidata*		✓

11 RECOMMENDATIONS

EBS recommends the following based on the desktop, vegetation and fauna assessments.

11.1 Legislative approvals

11.1.1 EPBC Act referral

It is recommended that if Western Grasswrens are detected within the Project area an EPBC Self-Assessment should be conducted to determine whether a Significant Impact on the species attributed to the Project could occur and subsequently whether an EPBC referral in required.

11.1.2 Native vegetation clearance

Native vegetation must not be cleared unless approval is granted by the NVC in accordance with *Section 29* of the *Native Vegetation Act 1991* or it is permitted under the *Native Vegetation Regulations 2017*. The relevant Regulations require that clearance is undertaken in accordance with a Standard Operating Procedure (SOP) or a Management Plan that has been approved by the NVC.

Once the Project is completed, the extent of vegetation removal can to be updated to determine if the SEB offset was appropriate, or requires updating. The provision of an SEB can be undertaken in several forms including managing and conserving areas of native vegetation, undertaking native vegetation restoration activities or making a payment into the Native Vegetation Fund. Potential opportunities to achieve an SEB offset within or surrounding the Project area should be identified.

11.2 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 proponent addressing the mitigation hierarchy. The NVC will assess the measures taken to avoid and minimise impacts on biodiversity and rare or threatened species or ecological communities within the property or immediate vicinity of the development.

11.2.1 Avoidance

Measures must be taken to avoid clearance of native vegetation such as making adjustments to the location, design, size or scale of the activity in order to reduce the impact. It is recommended that woodland areas and habitat for the Western Grasswren is avoided.

11.2.2 Minimisation

If clearance cannot be avoided, measures must be taken to minimise the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent.

- It is recommended vehicles utilise existing tracks where possible and the number of new roads should be kept to a minimum;
- Access should be limited to a core number of designated tracks to minimise disturbance to flora and fauna;

- Vehicles should stay on these tracks at all times to reduce impacts on vegetation and consequently fauna habitat;

- The construction footprint should be kept to a minimum for least impact on flora and fauna. Management strategies for the construction phase of the Project need to be developed and incorporated into an environmental management plan;

- The Project should minimise situations that may assist the survival and /or proliferation of introduced flora and fauna, i.e. keeping artificial water sources to a minimum and maintaining bores and pipelines to ensure that they do not leak; and

- Rubbish areas and any other potential food sources should be contained so that they are not accessible to any introduced fauna.

11.2.3 Offset

Any adverse impact on native vegetation or ecosystems that cannot be avoided or minimised should be offset by implementing a Significant Environmental Benefit that outweighs that impact (see above). Biodiversity offsets address any residual impacts after prevention and mitigation measures have been implemented.

The NVC will only approve clearances if these steps have been fulfilled. Offsetting is only considered by the NVC when a proponent has identified and documented appropriate measures to avoid and minimise negative impacts (direct or indirect) on biodiversity. Biodiversity offsets are only appropriate for projects that have rigorously applied the Mitigation Hierarchy to the fullest extent. Offsets must never be used to circumvent responsibilities to avoid and minimise damage to biodiversity and the NVC will consider this when determining whether the clearance can proceed.

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13 APPENDICES

Appendix 1. Flora species recorded at each of the RAM / BAM sample points within the Project area.

*	Scientific Name	Common Name	A1	A2a	A2b	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	Grand Total
	Acacia papyrocarpa	Western Myall		✓	✓			✓				✓				✓	5
	Alectryon oleifolius ssp. canescens	Bullock Bush			✓			✓									2
	Amyema quandang var. quandang	Grey Mistletoe						✓									1
	Atriplex vesicaria	Bladder Saltbush	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	14
	Austrostipa sp.	Spear-grass								✓							1
*	*Carrichtera annua*	Ward's Weed	✓	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓	11
	Casuarina pauper	Black Oak						✓			✓						2
	Chenopodium curvispicatum	Cottony Goosefoot													✓	✓	2
	Chenopodium desertorum ssp.	Desert Goosefoot			✓			✓				✓		✓		✓	5
	Cratystylis conocephala	Bluebush Daisy		✓				✓									2
	Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface				✓			✓								2
	Dissocarpus paradoxus	Ball Bindyi													✓		1
	Enchylaena tomentosa var.	Ruby Saltbush	✓	✓	✓			✓			✓	✓	✓	✓	✓	✓	10
	Eremophila scoparia	Broom Emubush		✓	✓												2
	Exocarpos aphyllus	Leafless Cherry						✓									1
	Frankenia serpyllifolia	Thyme Sea-heath				✓			✓	✓							3
	Lycium australe	Australian Boxthorn		✓	✓			✓			✓						4
*	*Lycium ferocissimum*	African Boxthorn													✓		1
	Maireana appressa	Pale-fruit Bluebush						✓	✓		✓						3
	Maireana brevifolia	Short-leaf Bluebush												✓	✓	✓	3
	Maireana integra	Entire-wing Bluebush											✓		✓		2
	Maireana pyramidata	Black Bluebush	✓		✓	✓	✓				✓	✓	✓	✓	✓	✓	10
	Maireana sedifolia	Bluebush	✓	✓	✓		✓	✓				✓	✓	✓		✓	9
	Maireana trichoptera	Hairy-fruit Bluebush										✓					1
	Maireana turbinata	Top-fruit Bluebush	✓		✓		✓	✓			✓	✓	✓	✓	✓	✓	10

*	*Mesembryanthemum crystallinum*	Common Iceplant												✓	✓		2
	Minuria cunninghamii	Bush Minuria							✓							✓	2
	Myoporum platycarpum ssp.	False Sandalwood		✓	✓			✓			✓	✓		✓			6
	Nitraria billardierei	Nitre-bush	✓			✓	✓										3
	Olearia calcarea	Crinkle-leaf Daisy-bush	✓	✓			✓	✓									4
*	*Psilocaulon granulicaule*	Match-head Plant													✓		1
	Ptilotus obovatus	Silver Mulla Mulla											✓			✓	2
	Rhagodia spinescens	Spiny Saltbush	✓	✓	✓			✓			✓	✓		✓	✓	✓	9
	Rhagodia ulicina	Intricate Saltbush		✓	✓			✓									3
	Salsola australis	Buckbush											✓	✓	✓	✓	4
	Sclerolaena diacantha	Grey Bindyi			✓		✓										2
	Sclerolaena divaricata	Tangled Bindyi		✓				✓									2
	Sclerolaena obliquicuspis	Oblique-spined Bindyi	✓	✓	✓		✓				✓	✓	✓	✓	✓	✓	10
	Senecio pinnatifolius var. maritimus	Coast Groundsel							✓								1
	Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna		✓				✓				✓	✓	✓			5
	Solanum petrophilum	Rock Nightshade			✓							✓	✓				3
	Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire								✓							1
	Tecticornia indica ssp. leiostachya	Brown-head Samphire								✓							1
	Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire							✓								1
	Tecticornia pruinosa	Bluish Samphire								✓							1
	Thysanotus baueri	Mallee Fringe-lily											✓				1
	Grand Total		**10**	**15**	**17**	**5**	**9**	**20**	**7**	**6**	**11**	**14**	**13**	**14**	**15**	**15**	**171**

Appendix 2. Fauna species recorded during the field assessment within the Project area. * = introduced species.

*	Scientific name	Common name	Conservation status		Number Recorded
			Aus	SA	
	AVES	**Birds**			
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater			38
	Acanthiza apicalis	Inland Thornbill			4
	Acanthiza uropygialis	Chestnut-rumped Thornbill			15
	Anthochaera carunculata	Red Wattlebird			3
	Anthus australis	Australian Pipit			15
	Aphelocephala leucopsis	Southern Whiteface			10
	Artamus cinereus	Black-faced Woodswallow			14
	Artamus cyanopterus	Dusky Woodswallow			1
	Calamanthus (Calamanthus) campestris	Rufous Fieldwren			8
	Circus assimilis	Spotted Harrier			1
	Colluricincla harmonica	Grey Shrikethrush			1
	Coracina novaehollandiae	Black-faced Cuckooshrike			2
	Corvus coronoides	Australian Raven			21
	Coturnix pectoralis	Stubble Quail			1
	Cracticus torquatus	Grey Butcherbird			7
	Dicaeum hirundinaceum	Mistletoebird			3
	Eolophus roseicapilla	Galah			13
	Epthianura albifrons	White-fronted Chat			1
	Epthianura aurifrons	Orange Chat			1
	Falco cenchroides	Nankeen Kestrel			3
	Gavicalis virescens	Singing Honeyeater			8
	Gymnorhina tibicen	Australian Magpie			5
	Hirundo neoxena	Welcome Swallow			5
	Lalage tricolor	White-winged Triller			9
	Malurus lamberti	Variegated Fairywren			21
	Malurus leucopterus	White-winged Fairywren			26
	Malurus splendens	Splendid Fairywren			9
	Manorina flavigula	Yellow-throated Miner			3
	Northiella haematogaster haematogaster	Eastern Bluebonnet (eastern and central SA)			12
	Ocyphaps lophotes	Crested Pigeon			31
	Oreoica gutturalis	Crested Bellbird			5
	Pachycephala rufiventris	Rufous Whistler			3
	Petroica goodenovii	Red-capped Robin			6
	Pomatostomus superciliosus	White-browed Babbler			66
	Psephotellus varius	Mulga Parrot			5
	Pyrrholaemus brunneus	Redthroat			2
	Rhipidura leucophrys	Willie Wagtail			2
*	*Sturnus vulgaris*	Common Starling			3
	Threskiornis spinicollis	Straw-necked Ibis			1
	MAMMALIA	**Mammals**			
	Macropus fuliginosus	Western Grey Kangaroo			4
	Macropus rufus	Red Kangaroo			6
*	*Oryctolagus cuniculus*	Rabbit (European Rabbit)			1
*	*Vulpes vulpes*	Fox (Red Fox)			2
	REPTILIA	**Reptiles**			
	Ctenophorus cristatus	Crested Dragon			1
	Ctenotus orientalis	Spotted Ctenotus			1

*	Scientific name	Common name	Conservation status		Number Recorded
			Aus	SA	
	Demansia psammophis	Yellow-faced Whipsnake			1
	Pogona vitticeps	Central Bearded Dragon			3
	Tiliqua rugosa	Sleepy Lizard			6

Appendix 3. Fauna species recorded at each of the point count sites over the Project area.

Species Type	Scientific Name	Common Name	A1	A2a	A2b	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	Site 1	Site 2	Site 3	Grand Total
Aves	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater		1								1	10		4	14	1			31
	Acanthiza apicalis	Inland Thornbill															1		2	3
	Acanthiza uropygialis	Chestnut-rumped Thornbill			2			5										3	5	15
	Anthochaera carunculata	Red Wattlebird											3							3
	Anthus australis	Australian Pipit	1				1		1	2			3		2	1				11
	Aphelocephala leucopsis	Southern Whiteface	1								2		2				3			8
	Artamus cinereus	Black-faced Woodswallow		2							3					1	1			7
	Artamus cyanopterus	Dusky Woodswallow															1			1
	Calamanthus (Calamanthus) campestris	Rufous Fieldwren	1			1	1		1		1									5
	Corvus coronoides	Australian Raven	9	1								3	2							15
	Coturnix pectoralis	Stubble Quail							1											1
	Cracticus torquatus	Grey Butcherbird						2							2					4
	Dicaeum hirundinaceum	Mistletoebird		1															1	2
	Eolophus roseicapilla	Galah													9	2				11
	Epthianura albifrons	White-fronted Chat							1											1
	Epthianura aurifrons	Orange Chat								1										1
	Gavicalis virescens	Singing Honeyeater		2							1	1					3			7
	Gymnorhina tibicen	Australian Magpie								1				1						2
	Hirundo neoxena	Welcome Swallow									4						1			5
	Lalage tricolor	White-winged Triller			2						6									8

	Malurus lamberti	Variegated Fairywren		1	4		2				2	2				2	3	3		19
	Malurus leucopterus	White-winged Fairywren	3			1	5		1		3			3	1					17
	Malurus splendens	Splendid Fairywren			1		2				2									5
	Northiella haematogaster haematogaster	Eastern Bluebonnet (eastern and central SA)													2	4				6
	Ocyphaps lophotes	Crested Pigeon	1		2		1	4					5	2						15
	Oreoica gutturalis	Crested Bellbird						1											1	2
	Pachycephala rufiventris	Rufous Whistler																	2	2
	Petroica goodenovii	Red-capped Robin		1													2		3	6
	Pomatostomus superciliosus	White-browed Babbler					2	5			6		5		5		5	6		34
	Psephotellus varius	Mulga Parrot										2					3			5
	Pyrrholaemus brunneus	Redthroat															2			2
	*Sturnus vulgaris**	Common Starling*													1		2			3
	Threskiornis spinicollis	Straw-necked Ibis													1					1
Mammalia	*Macropus fuliginosus*	Western Grey Kangaroo			1															1
Reptilia	*Demansia psammophis*	Yellow-faced Whip Snake													1					1
Grand Total			**16**	**9**	**12**	**2**	**14**	**17**	**5**			**9**	**30**	**6**	**28**	**24**	**28**	**12**	**14**	**260**

***: introduced species**

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