Native Vegetation Clearance

Southern Launch Whalers Way Data Report

Clearance under the *Native Vegetation Regulations 2017*

22/02/2020

Prepared by Ecosphere Ecological Solutions

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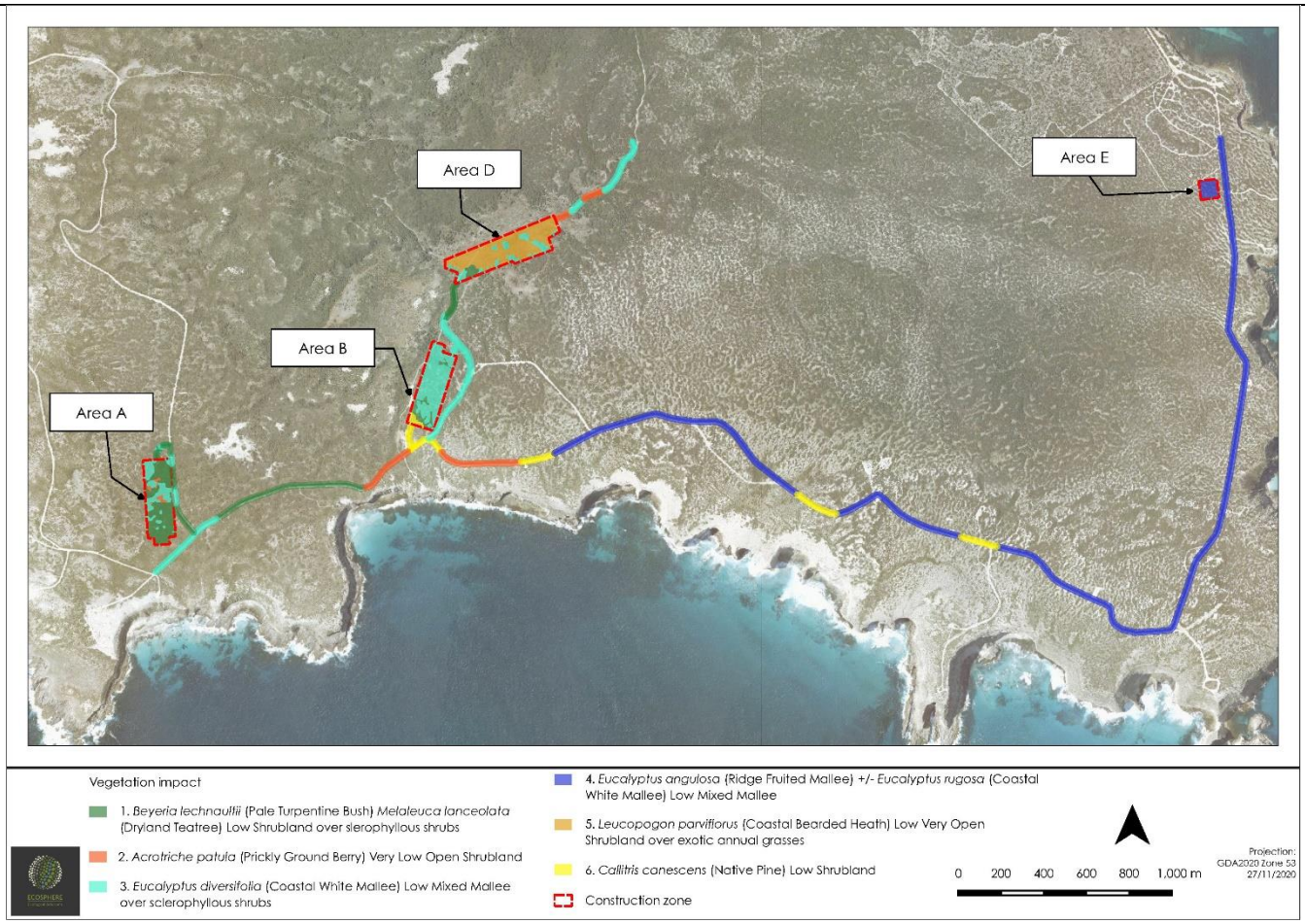
1. Application information

Application Details

Applicant:	Southern Launch Pty Ltd Level 8, 70 Pirie Street, Adelaide, South Australia 5000		
Key contact:	Andrew Curran		
Landowner:	Theakstone Property Pty Ltd		
Site Address:	Sleaford		
Local Government Area:	The District Council of the Lower Eyre Peninsula	Hundred:	Sleaford
Title ID:	CT/5993/374	Parcel ID	Sec D71437 A101

Summary of proposed clearance

Purpose of clearance	Southern Launch is proposing to construct the Whalers Way Orbital Launch Complex. The Project consists of the design and delivery of two separate types of facilities including supporting infrastructure. The two separate facilities will constitute the initial development of the Whalers Way Orbital Launch Complex (WWOLC). The site will need to be prepared to accept the facility including appropriate supporting infrastructure
Native Vegetation Regulation	Regulation 12(27) – Major projects,
Description of the vegetation under application	Coastal heath and Low Mallee. All project sites are located within low coastal mixed mallee with average canopy heights between 0.5 and 2m tall. Soils are grey sand and limestone. Cover ranges from 50% to 90%. Known habitat for nationally threatened fauna species Southern Emu-wren and Western Whip bird.
Total proposed clearance - area (ha) and number of trees	23.73 hectares including the following: Launch Site A, Launch Site B, Infrastructure Site D and Range Control Site E and associated access tracks – 18.54 ha. Whalers Way Road Upgrade – 5.19 ha.
Level of clearance	Level 4
Overlay (Planning and Design Code)	Native Vegetation Overlay or State Significant Native Vegetation Overlay



Mitigation hierarchy	Avoidance of vegetation wherever possible has occurred within the engineering constraints of a highly technical project. Reduction of the footprint as far as practicable to avoid clearing native vegetation with the size of the Project Area reduced in size from 70.58 ha to 23.73 ha from concept design. The clearance footprints have been minimized to the minimum area possible and located adjacent to existing roads where possible. Existing access roads are being utilised to ensure minimum disturbance and implementing a CEMP and OEMP to manage direct and indirect impacts • Resizing and shapes of infrastructure areas refined to limit impact. • Areas minimised and located in areas of lower condition. • Future reductions in footprint are being sought. • Proposed access tracks have been aligned with existing tracks where possible. Southern Launch are enthusiastic about incorporating the restoration and conservation of the Whalers Way area as a critical part of the project. Mitigating impacts is at the forefront of the company ethos. Some measures that are in planning phases include: • Predator Proof fencing and eradication of predators including cats and foxes from the Whalers Way HA. • Firebreaks incorporated along fences to protect and mitigate one of the primary threats to EPBC listed species present. • Weed control and ongoing management.

	• Ongoing studies into risks associated with the project which have no precedent and lack of published literature such as funding PhD studies in association with state universities.
SEB Offset proposal	Payment into the fund

2. Purpose of clearance

2.1 Description

Southern Launch intend to establish infrastructure that will support the launch of domestic and international launch vehicles providing the safest and most cost-effective orbital launch site in the world servicing the growing demand for Polar and Sun Synchronous Orbit satellite insertion.

Southern Launch currently have a number of customers who will be ready to launch from the proposed facility from early 2021. The current development proposal for the Launch Complex is anticipated to be undertaken in five phases across up to four locations on the subject site between 2020 and 2024.

The indicative staging is as follows:

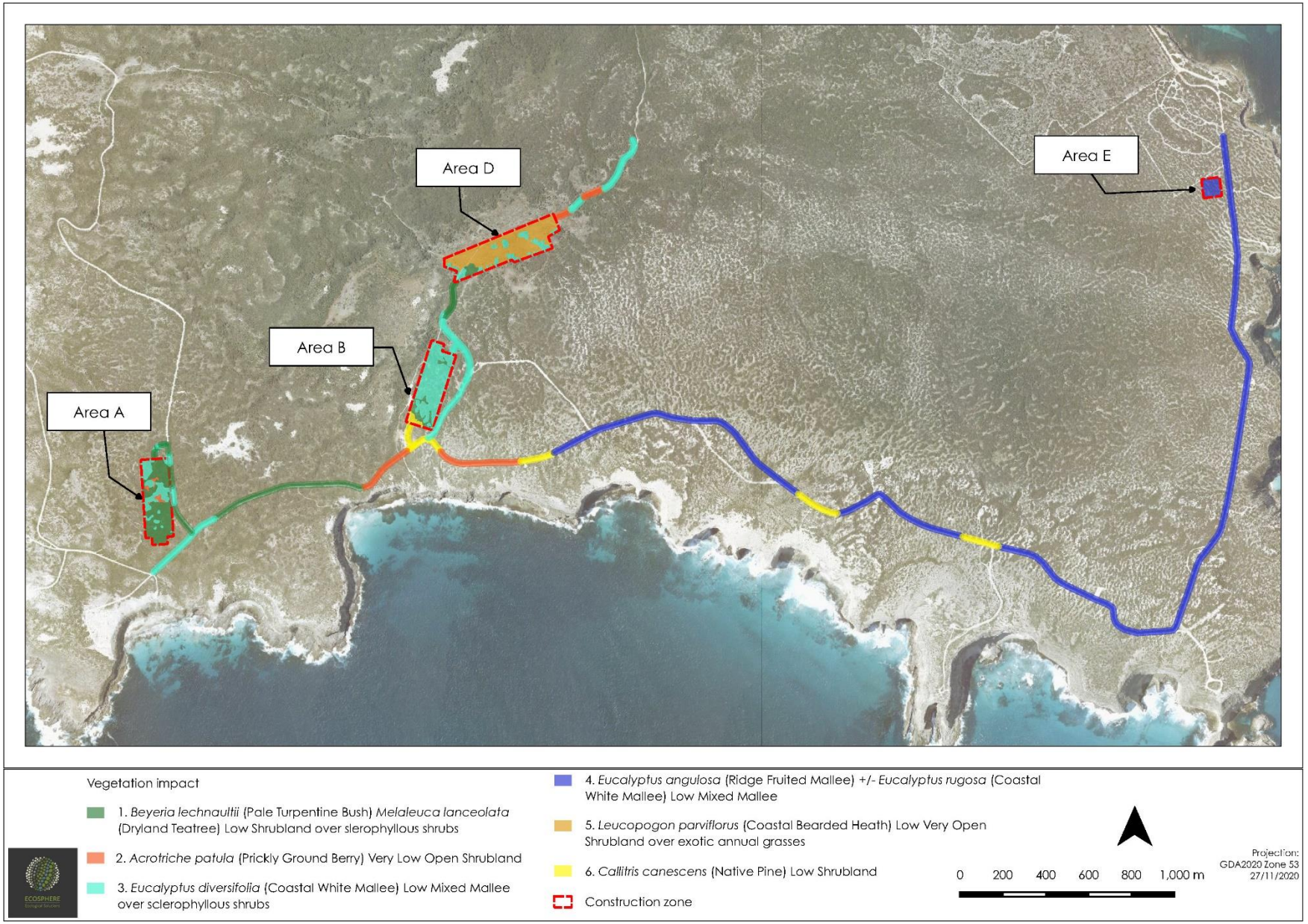
- Stage 1 - A permanent launch pad and permanent launch support infrastructure;
- Stage 2 - A second permanent launch pad and permanent launch support infrastructure;
- Stage 3 - A permanent range operations centre and permanent visitors centre;
- Stage 4 - A permanent engine test stand and test support infrastructure; and
- Stage 5 - Non-conventional launch facilities (not part of the current application).

2.2 Background

The Project is located at the southern tip of the Eyre Peninsula in Sleaford, commonly known as Whalers Way. It is approximately 25 km southwest of Port Lincoln, in the District Council of Lower Eyre Peninsula. The land is owned by Theakstone Property Pty Ltd. The area is zoned as Coastal Conservation under the District Council of Lower Eyre Peninsula.

The area is covered in remnant indigenous vegetation and is largely continuous apart from access roads and small areas of regenerating pasture. The site is under a Heritage Agreement (HA 148).

2.3 General location map



2.4 Details of the proposal

The Project comprises of the following key components, which hereinafter will be referred to as the Project Area (Figure 1):

- Launch Site A;
- Launch Site B, including the construction of a new road alignment to the east and south;
- Infrastructure Site D, including the construction of a new road alignment to the south;
- Range Control Site E;
- Whalers Way Road upgrade; and
- Access track upgrades to the north and west of Infrastructure Site D.

2.5 Approvals <u>required</u> *or* <u>obtained</u>

Environment and Biodiversity Conservation Protection Act 1999

The EPBC Act and the Environment Protection and Biodiversity Conservation Regulations 2000 (EPBC Regs) are the main pieces of Federal legislation protecting biodiversity in Australia. The EPBC Act and EPBC Regs protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the EPBC Act as matters of national environmental significance (MNES). The nine MNES to which the EPBC Act applies are:

1. world heritage properties;
2. national heritage places;
3. wetlands of international importance (listed under the Ramsar Convention);
4. nationally threatened species and ecological communities;
5. migratory species;
6. Commonwealth marine areas;
7. the Great Barrier Reef Marine Park;
8. nuclear actions (including uranium mining); and
9. a water resource, in relation to coal seam gas development and large coal mining development.

If an action that has, will have, or is likely to have a significant impact on a MNES requires referral to the Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act.

Native Vegetation Act 1991

Native vegetation in South Australia is protected under the South Australian Native Vegetation Act 1991 (NV Act) and Native Vegetation Regulations 2017 (NV Regs). Any proposed clearance of native vegetation in South Australia (unless exempt under the NV Regs) is to be assessed against the NV Act Principles of Clearance and requires approval from the Native Vegetation Council (NVC). The Project is considered to fall under Part 3, Division 5, Regulation 12 & 13 Major Developments and Projects.

National Parks and Wildlife Act 1972

Native plants and animals in South Australia are protected under the South Australian 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. Persons must not:

- Take a native plant on a reserve, wilderness protection area, wilderness protection zone, land reserved for public purposes, a forest reserve or any other Crown land.
- Take a native plant of a prescribed species on private land.
- Take a native plant on private land without the consent of the owner (such plants may also be covered by the NV Act).
- Take a protected animal or the eggs of a protected animal without approval.
- Keep protected animals unless authorised to do so.
- Use poison to kill a protected animal without approval.

2.6 Native Vegetation Regulation

Regulation 12(27) – Major projects, to facilitate the interactions between the *Native Vegetation Act 1991* and the *Development Act 1993* in relation to the approvals for projects of major social, economic or environmental significance. The NVC will comment on the proposal as part of the assessment for major projects as to whether it avoids and minimises clearance a far as practicable, and at the same time determine the SEB required to offset the impact of the clearance.

2.7 Development Application information

The Project was declared a Major Development by the Minister of Planning on 22 August 2019. As such, a range of environmental assessments are required to support the Major Development Application that Southern Launch is preparing.

3. Method

3.1 Flora assessment

A detailed desktop study was conducted to describe the existing environment and determine the potential environmental values present within the Survey Area. The desktop assessment considered the following resources:

- Protected Matters Search Tool – (DAWE, 2020a)
- NatureMaps flora and fauna records and vegetation mapping
- Aerial imagery
- South Australian Resources Information Gateway (SARIG, 2020)
- Eyre Peninsula fauna surveys 2004 and 2009 as published on NatureMaps (2020) and in Brandle (2010).

A likelihood of occurrence assessment was completed for all conservation significant species and communities that were identified in the desktop study. The assessment considered the Whalers Way area, which includes the Survey Area and buffer, to inform future impact assessment studies.

The likelihood assessment considers the presence of suitable habitat, number of records, date of records, and proximity of known records in relation to Whalers Way. Five categories are used for the assessment, including:

- Unlikely: No preferred/suitable habitat present. Species unlikely to be present on the site at any time or during any season. No records of species/community in Study Area.
- Low: Potentially suitable habitat present lacking condition, specific floristic or complexity data. Species may visit or fly over however habitat is unlikely to be considered critical to the survival of the species. No recent records of species/community in Study Area.
- Moderate: Preferred habitat (or parts thereof) present and is of size suitable for supporting species (individual or population).
- High: Suitable habitat is present. One or more recent records of species/community.
- Present: Species known to be present, confirmed records and suitable habitat is present.

Provide details of the flora assessment, such as database searches, date(s) of inspection, time spent on site and effort and methodology applied including searches for the presence of species listed under the NP&W 1972 or the EPBC Act 1999.

The vegetation survey was performed in accordance with the Bushland Assessment Method (BAM). The NVC BAM was designed for assessing vegetation that is located within the agricultural region of South Australia. The BAM uses biodiversity 'surrogates' or 'indicators' to measure biodiversity value against benchmark communities. Each area to be assessed is termed an application area ('Block'), within which different vegetation associations ('Sites') are identified.

For the NVC BAM, three components of the biodiversity value of the site are measured and scored (Table 5) including vegetation condition, conservation value, and landscape context. These three component scores are combined to provide a 'Unit Biodiversity Score' (UBS) for a hectare and then multiplied by the size (hectares) of the site to provide a 'Total Biodiversity Score' for the site.

The Survey Area was traversed on foot and a complete flora species list was recorded.

Targeted searches were conducted for conservation significant flora species in areas of native vegetation. A ramble survey method was adopted (i.e. randomly walking through areas of vegetation, attempting to cover different topography and habitats) to ensure best coverage of the block of vegetation.

Where conservation significant flora species were identified, the following was recorded:

- location using a handheld GPS unit (accuracy +/-5m)
- population extent
- vegetation association
- additional habitat observations where relevant.

Additional targeted flora surveys for threatened species were undertaken in early October 2020. Specific species targeted were *Caladenia* spp. and any species of the ORCHIDACEAE family, *Prostanthera calycina* (EP Mintbush), *Euphrasia collina* ssp. *osbornii* (Osbornes Eyebright). All species recorded were added to existing species lists.

3.2 Fauna assessment

Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna, in order to determine the potential for these habitats to support conservation significant species. The survey focussed on searching for habitat that would be utilised by conservation significant species identified in the desktop assessment as having the potential to occur in the area.

The fauna habitat assessments included:

- location
- general habitat description
- habitat condition and disturbance types
- dominant / characteristic flora species and vegetation layers
- presence and abundance of key habitat features such as large mature trees, small and large hollows, fallen logs, course and fine litter, decorticating bark, bare ground, grass, stones and boulders, rock crevices, soil cracks, vines, dense shrubs, water bodies etc.
- presence of fauna and secondary signs (e.g. scats, digging, tracks, burrows, egg shell, bones, feathers etc.)
- connectivity of habitat.

Fauna observations focussed on avian species, using distinctive calls and direct observation. All observations were made between daylight hours of 0700 and 1700.

Targeted fauna assessments were carried out for the nationally threatened bird species, The Southern Emu-wren (Eyre Peninsula) (*Stipiturus malachurus parimeda*) and Western Whipbird (eastern) (*Psophodes leucogaster leucogaster*) in June 2020.

Historical surveys in the area include three Eyre Peninsula biological standard surveys sites within the HA. These were undertaken from 14 December 2004 and included pitfall, Elliott, and cage trapping over four nights duration (Brandle 2010).

Other surveys within and adjacent to the area include:

- Cathedral Rocks Wind Farm Southern Emu Wren and Western Whip Bird surveys 2004-2008 (Pickett, 2004.
- Offshore Islands surveys 1980 (DEH 1980).
- Eyre Peninsula Southern Emu Wren surveys 2002-2009 (Pickett 2004).
- Numerous stakeholder and interest group avian surveys.

4. Assessment Outcomes

4.1 Vegetation Assessment

Six vegetation associations were observed within the Project areas. These were all typical of coastal communities commonly occurring within the southern Eyre Peninsula region and were intact indigenous communities with low weed cover and disturbance except for association 5. The vegetation associations recorded were:

1 -Beyeria lechenaultii (Pale Turpentine Bush) *Melaleuca lanceolata* (Dryland Tea-tree) Low Shrubland over sclerophyllous shrubs.

2 -Acrotriche patula (Prickly Ground Berry) Very Low Open Shrubland.

3 -Eucalyptus diversifolia (Coastal White Mallee) Low Mixed Mallee over sclerophyllous shrubs.

4 -Eucalyptus angulosa (Ridge Fruited Mallee) +/- *Eucalyptus rugosa* (Coastal White Mallee) Low Mixed Mallee.

5 -Leucopogon parviflorus (Coastal Bearded Heath) Low Very Open Shrubland over exotic annual grasses.

6 -Callitris sp 'Limestone' (Native Pine) Low Shrubland.

Vegetation Association 1	*Beyeria lechenaultii* (Pale Turpentine Bush) *Melaleuca lanceolata* (Dryland Teatree) Low Shrubland over sclerophyllous shrubs.

General description	Vegetation association 1 was largely and primarily dominant on the near cliff zone where stable dune habitats were present intertwined with exposed sheet limestone which was generally devoid of vegetation or contained only sparse sclerophyllous shrubs. Cover within association 1 was generally high with the most diverse floristic community observed across the area with a mix of primarily coast front species co-habiting with other taller shrubs which were persisting in the hollows resulting in a mixed community. This association had the highest visual incidence of small skinks and dragons observed opportunistically.				
Threatened species or community	Habitat for Southern Emu Wren and Rock Parrot.				
Landscape context score	1.04	Vegetation Condition Score	55.08	Conservation significance score	1.10
Unit biodiversity Score	62.58	Area (ha)	4.94	Total biodiversity Score	347.84

Vegetation Association 2	*Acrotriche patula* (Prickly Ground Berry) Very Low Open Shrubland.

General description	Vegetation association 2 occupies exposed and/or elevated sections of clifftop where a lack of soil, high alkalinity and salt laden winds result in specific niche communities dominated by ground hugging shrubs and mat plants. The average overstorey height in these areas is less than 300 mm in most instances.				
Threatened species or community	Provides habitat for Southern Emu Wren and Rock Parrot				
Landscape context score	1.04	Vegetation Condition Score	51.17	Conservation significance score	1.10
Unit biodiversity Score	57.43	Area (ha)	0.74	Total biodiversity Score	42.42

Vegetation Association 3	*Eucalyptus diversifolia* (Coastal White Mallee) Low Mixed Mallee over sclerophyllous shrubs.

General description	Vegetation association 3 communities were recorded on stable dunes where grey sandy loams overlay sheet limestone. These were often transitional between the low coastal shrublands of the clifftop edges and the higher elevation calcareous clay loam soils. Association 3 occurs in patches, varying from circular 'hummocks' to linear lunettes further from the coast. The interpatch spaces were generally sheet limestone occupied by Association 1. With distance from the coastline, the community structure changed by way of a more continuous and taller stratum with average heights of 3.5 m and a denser canopy cover.				
Threatened species or community	Provide habitat for Southern Emu-wren, Western Whip Bird and Rock Parrot				
Landscape context score	1.04	Vegetation Condition Score	46.55	Conservation significance score	1.10
Unit biodiversity Score	52.74	Area (ha)	8.36	Total biodiversity Score	445.92

Vegetation Association 4	*Eucalyptus angulosa* (Ridge Fruited Mallee) +/- *Eucalyptus rugosa* (Coastal White Mallee) Low Mixed Mallee				
					
General description	Vegetation Association 4 was present in the eastern extent of the Survey Area where soils were largely a calcareous silty loam. The soil surface was highly stable and formed a thick crust with high levels of biocrust and Moss species. Melaleuca species were a common species in this Association compared to those on lighter soils with Eucalyptus diversifolia (Coastal White Mallee). Inter-patches were dominated largely by Association 6 (Callitris sp. limestone). In areas where the community was protected from high coastal winds the strata were taller, with an average of 3 m compared to 2 m near the coast.				
Threatened species or community	Provides habitat for Western Whip Bird				
Landscape context score	1.04	Vegetation Condition Score	49.19	Conservation significance score	1.10
Unit biodiversity Score	55.48	Area (ha)	3.95	Total biodiversity Score	214.41

Vegetation Association 5	*Leucopogon parviflorus* (Coastal Bearded Heath) Low Very Open Shrubland over exotic annual grasses.				
					
General description	Vegetation association 5 was a disturbed regenerating association with pioneer species such as Adriana quadripartita (Coast Bitter Bush) present that were otherwise absent from the intact sections of the Project site. Numerous environmental weed species were present throughout the area and grass species were overwhelmingly annual exotic species such as Bromus (Brome), Vulpia (Fescue) and Avena (Wild Oat). Overall, the condition was very poor and regeneration of local species was patchy.				
Threatened species or community	No threatened flora or fauna recorded within this association. Potentially provides habitat for Diamond firetail Finch, Painted Button Quail and Purple-gaped Honeyeater.				
Landscape context score	1.04	Vegetation Condition Score	26.8	Conservation significance score	1.1
Unit biodiversity Score	30.66	Area (ha)	150.84	Total biodiversity Score	150.84

Vegetation Association 6	*Callitris* sp. 'Limestone' (Native Pine) Low Shrubland.				
					
General description	Vegetation association 6 was dominated by Callitris sp. 'Limestone' mixed with other sclerophyllous shrubs. It occurred exclusively with Association 4 on calcareous silty loam soils. Condition of these communities was generally good with the only perennial exotic species present Limonium companyonis (Sea Lavender) which increased with proximity to the coast.				
Threatened species or community	Provides habitat for Southern Emu-wren, Western Whip bird, Rock Parrot				
Landscape context score	1.04	Vegetation Condition Score	51.6	Conservation significance score	1.1
Unit biodiversity Score	58.35	Area (ha)	.85	Total biodiversity Score	48.97

Site map showing areas of proposed impact

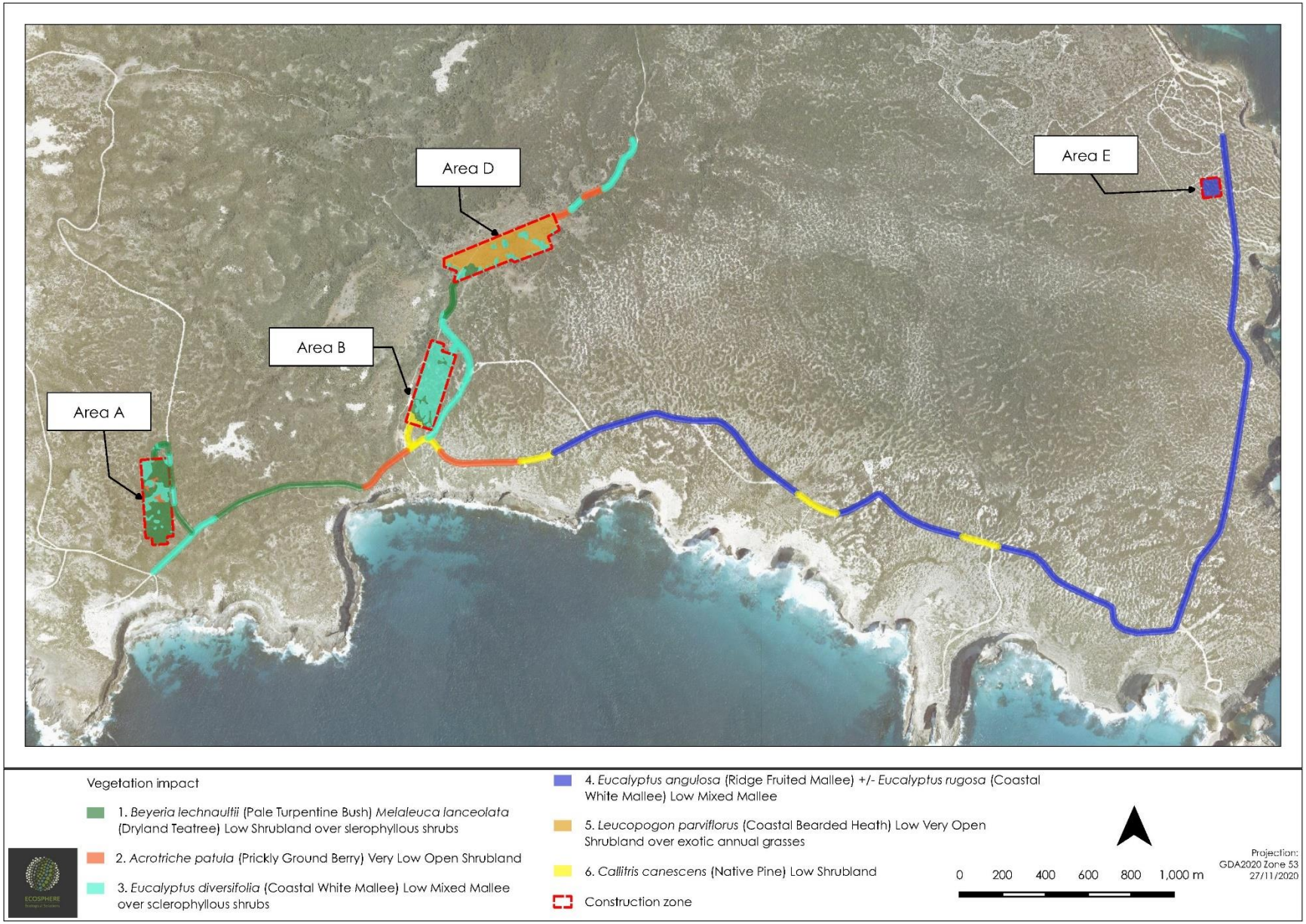


Figure 1. Map 1 of 7, Sites and road upgrade overview..

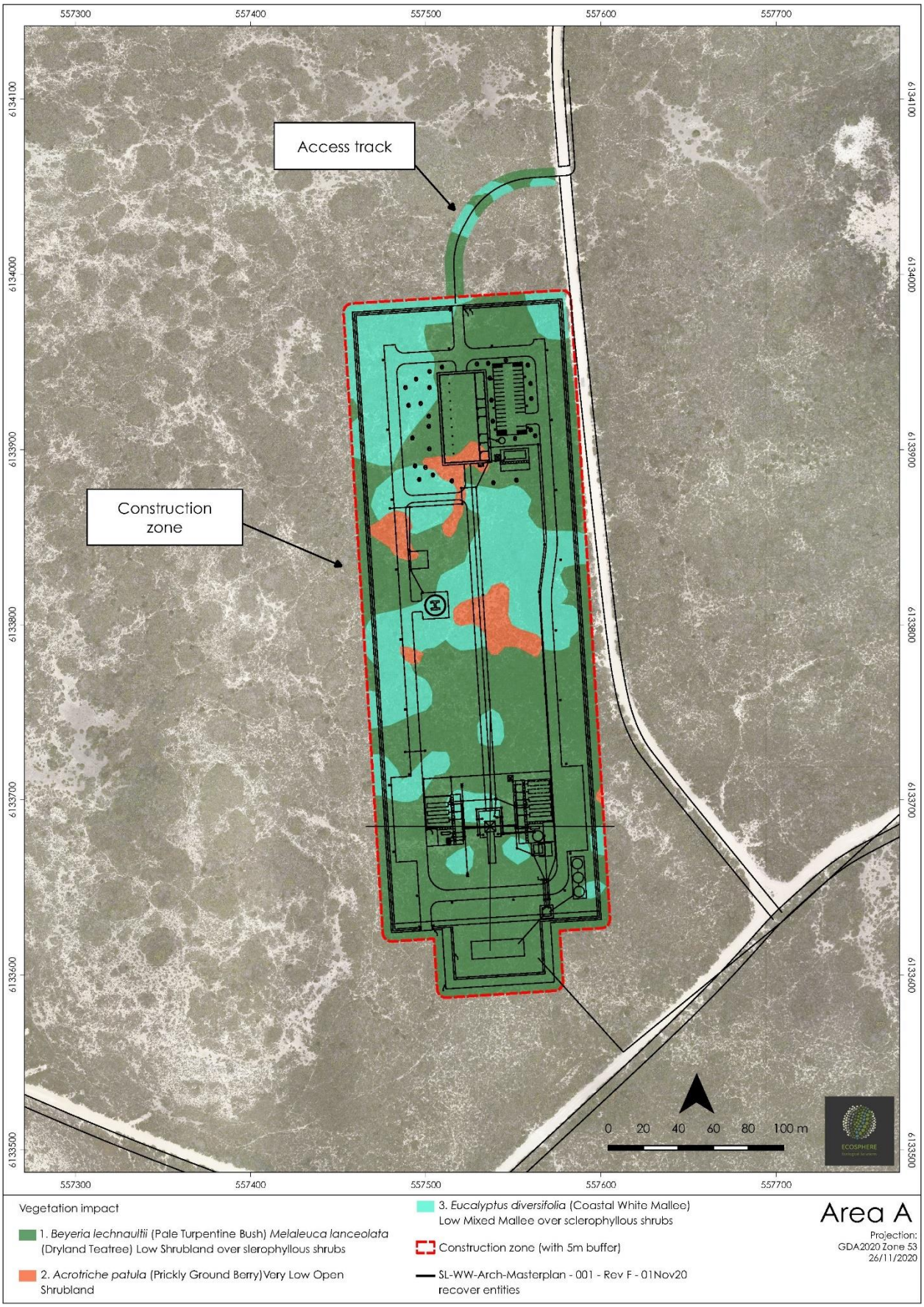


Figure 2. Map 2 of 7 Site A.

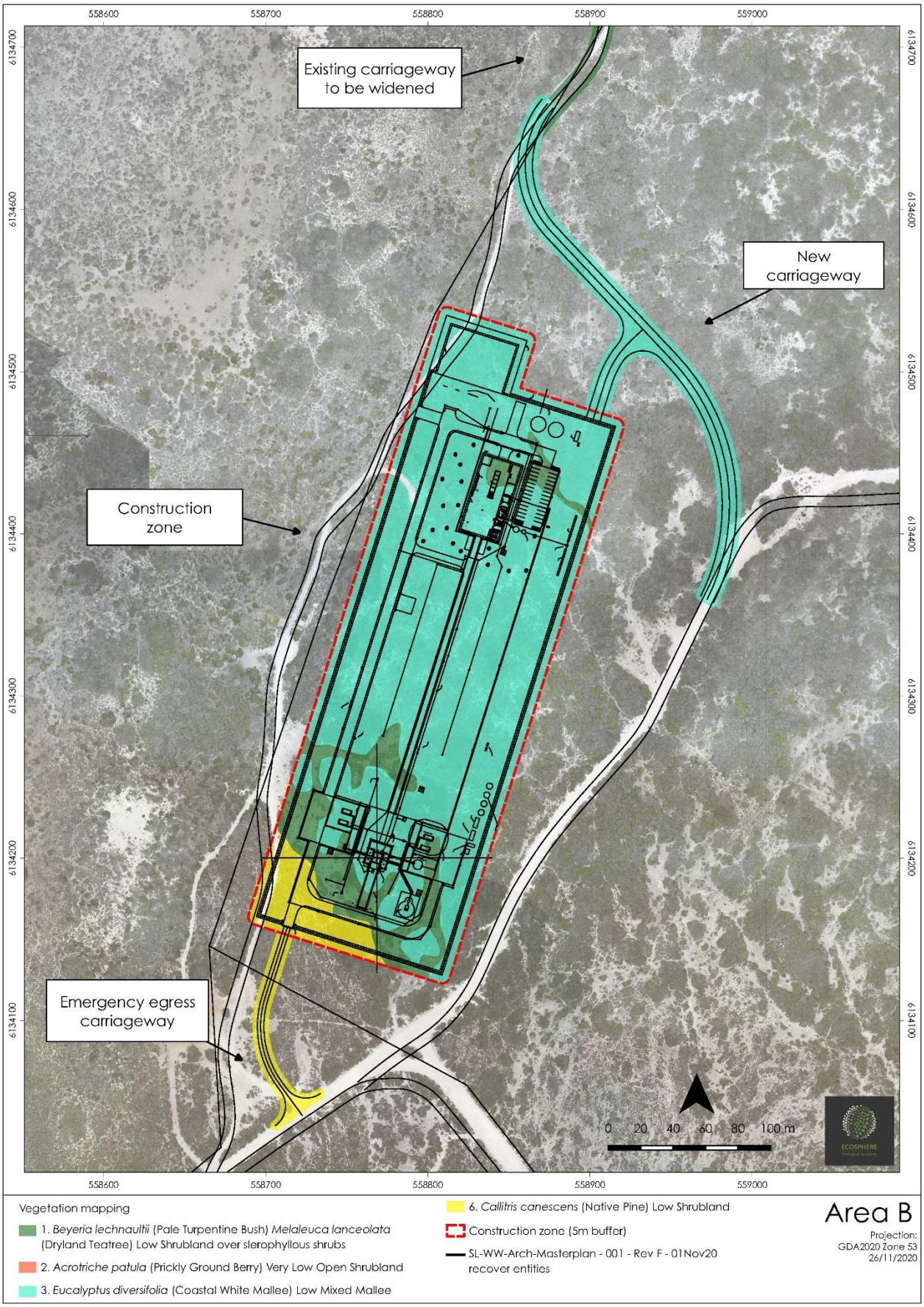


Figure 3. Map 3 of 7, Site B

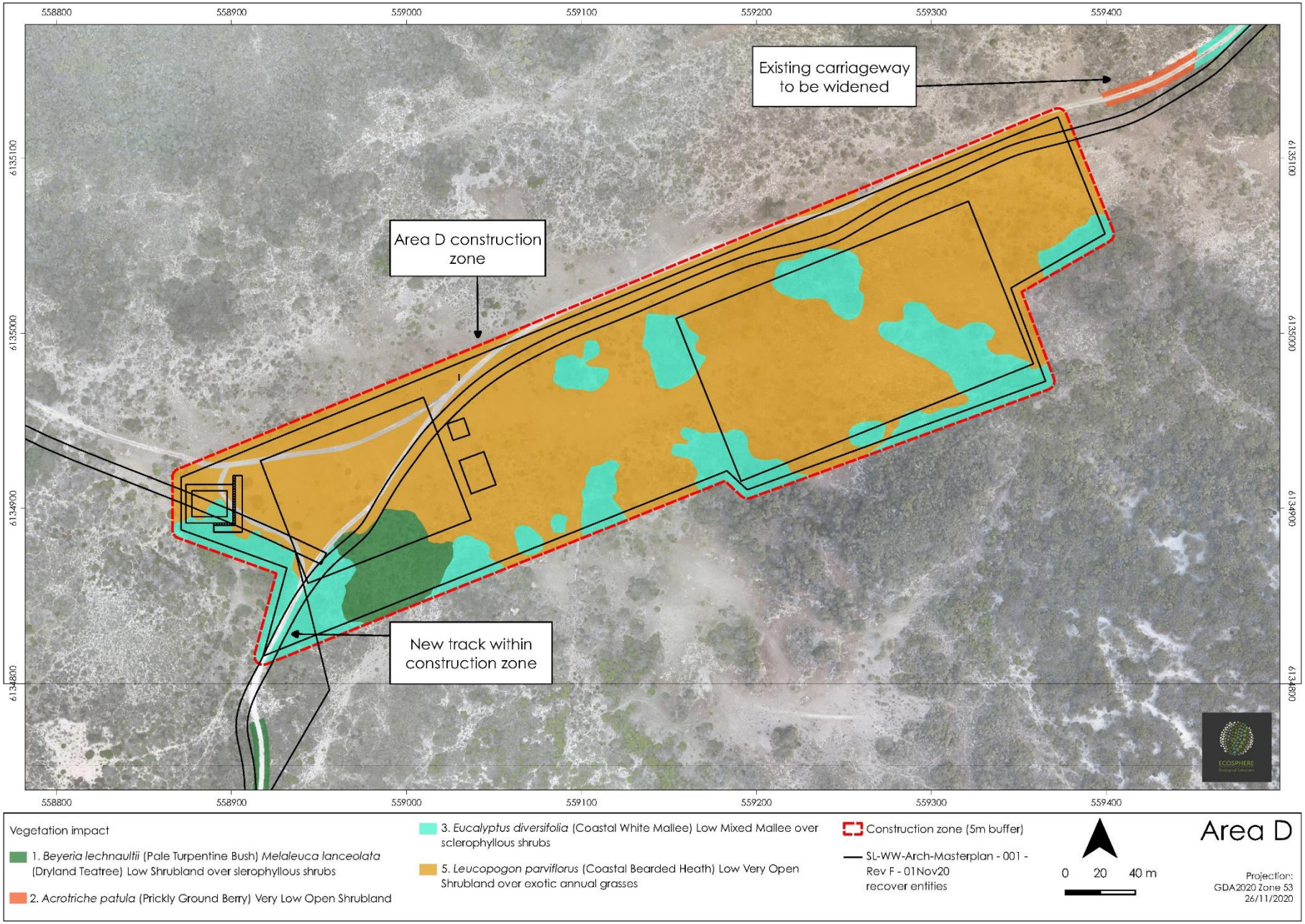


Figure 4. Map 4 of 7, Site D.

Figure 5. Map 5 of 7 Site E.

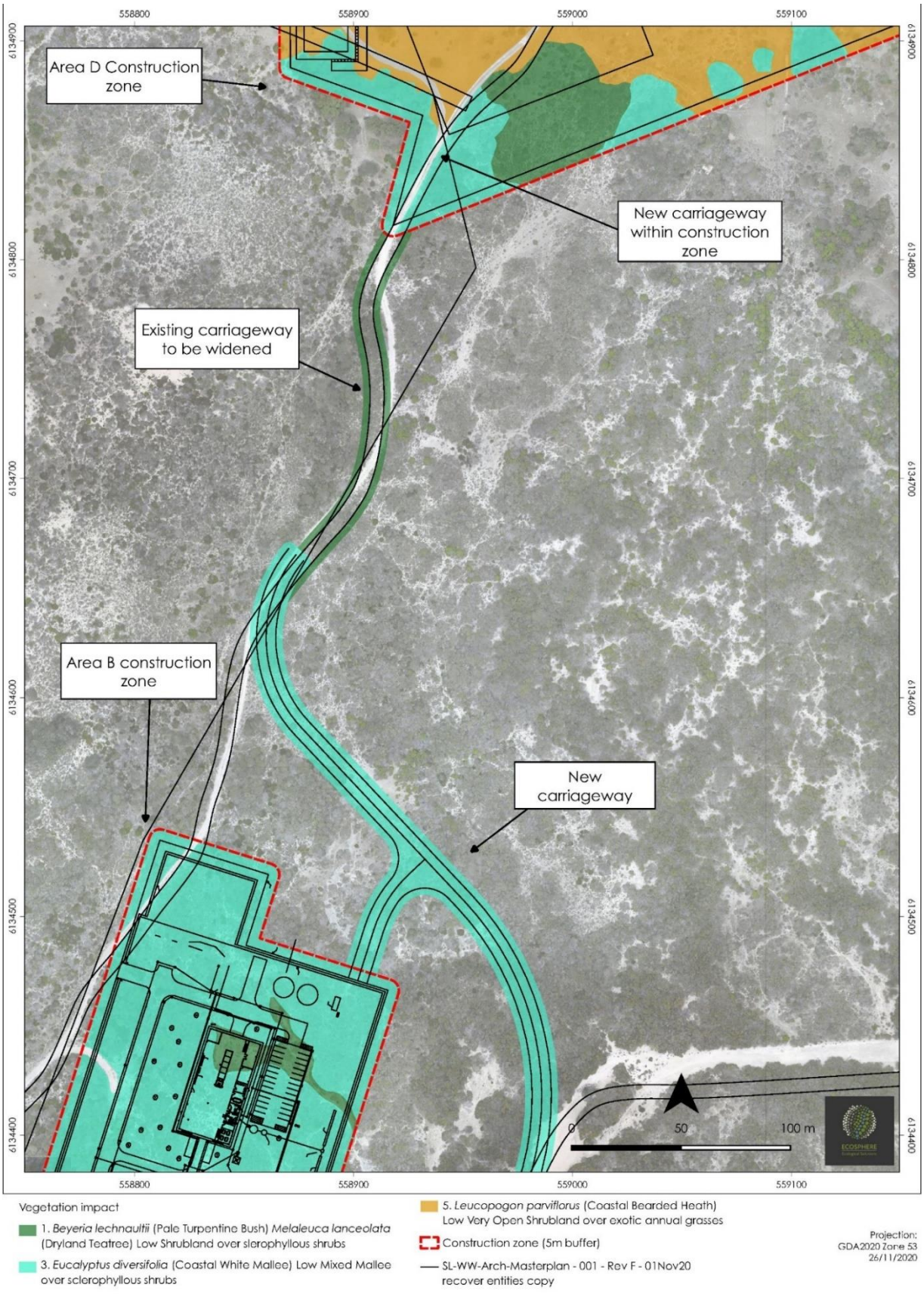


Figure 6. Map 6 of 7, Site B to D access.

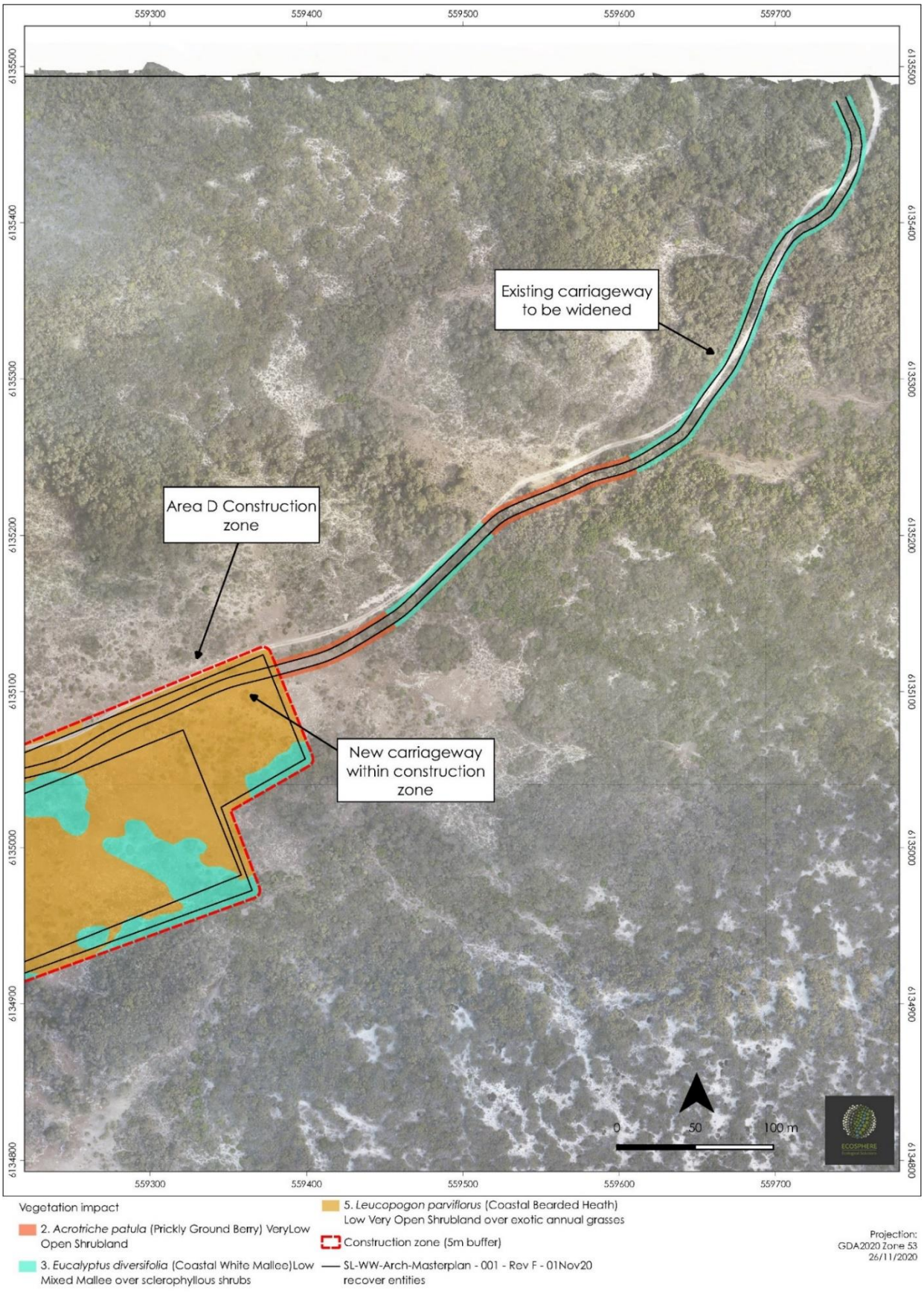


Figure 7. Map 7 of 7. Site D access road upgrade.

Photo log

Cliff edge vegetation outside of project areas provide the highest diversity locations.

Looking south east over Site A proposed location

Looking east over proposed site B location.

4.2 Threatened Species assessment

Threatened Flora

The desktop study identified 11 conservation significant flora species that may occur in the Survey Area. This included six species listed as threatened under the EPBC Act, and five species listed under the *National Parks and Wildlife Act 1972* Act. An assessment of likelihood was completed prior to conducting the field survey. This assessment determined:

- two species are likely to occur
- four have a moderate likelihood of occurrence
- five species are unlikely to occur.
- Species likely to, or possibly occur, are outlined in Table 1.

Table 1. Desktop flora assessment results.

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys- Likelihood
		EPBC Act	NPW Act			
Acacia alcockii	Alcocks Wattle	-	R	Normally grows in sand over limestone in Mallee communities, sometimes with *Melaleuca* spp. Numerous records close to coastal fringe within Port Lincoln NP and Cathedral Rocks however not recorded during targeted flora survey in BDBSA location.	Possible	Possible
Acacia pinguifolia	Fat-leaved Wattle	E		Loam soils, all known EP populations occur within rail reserves and corridors. Highly unlikely within this habitat.	Unlikely	Highly Unlikely
Caladenia tensa	Greencomb Spider-orchid	E		Taxonomic confusion has led to records of *Caladenia tensa* (Inland Green-comb Spider-orchid) occurring on the Eyre Peninsula. However, it is unlikely that C. tensa occurs on Eyre Peninsula, and rather records of its presence were of the *Caladenia interanea* (Inland Spider-orchid). Despite this, the nearest record at Tulka, occurs on Limestone plain with calcareous outcropping and sparse calcareous cobble Clay loam. *Allocasuarina verticillata, Melaleuca lanceolata* Low Open Forest (Atlas Living Australia, 2020). Targeted orchid surveys within Project area returned common species such as Microtis and Acianthus in high abundance however proximity to open coast and long term grazing may have impacted area.	Possible	Unlikely
Eucalyptus gillenii	Mallee Red Gum	-	R	Was known from only Mount Wooltarlinna and Birksgate Range in far north -west of the state. Unknown whether local records are planted specimens.	Possible	Possible/Unlikely
Hibbertia cinerea		-	R	Decumbent habit with cane-like branches that scramble into other vegetation. Can be up to 2m high. Was recorded in 1986.Located in same area as some other doubtful records where follow up surveys were unable to locate individuals	Unlikely	Unlikely
Pleuropappus phyllocalymmeus	Silver Candles	V		The species occurs on the margins of coastal saline lakes and depressions and low lying stream channels and watercourses.(DotE 2013b). No habitat matching description was present within project areas been well drained sandy soils and limestone. Remains unlikely	Unlikely	Unlikely
Poa fax		-	R	Known from dune mallee and gypsum plains and near-coastal sands (Vicflora 2020). Possible however targeted surveys did not record any tussocks, species is distinctive so would be likely to be observed if present.	Unlikely	Unlikely
Prostanthera calycina	West Coast Mintbush	V	V	Occurs in association with *Eucalyptus diversifolia* Mallee. Records in nearby heritage agreements. Intensive targeted	Likely	Unlikely

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys- Likelihood
		EPBC Act	NPW Act			
				search for this species returned no individuals. Recorded *Prostanthera serpyllifolia* along coast fringe in similar preferred habitat. Definitely not recorded within project footprints.		
Ptilotus beckerianus	Ironstone Mulla Mulla	V		Associated with orange duplex soils and ironstone nearest records >50km north of Project Area. Associated with *Melaleuca uncinata* (Broombush). Previous personal knowledge of this species has seen it largely confined to gravelly soils around Wanilla on southern Eyre Peninsula. Very different habitat to that found within project area.	Unlikely	Unlikely
Thelymitra epipactoides	Metallic Sun-orchid	E		Occurs largely on fertile red loams ideally suited to cropping, hence the high levels of fragmentation, with most remnant populations occurring within road reserves and other easements such as rail, power and water corridors. It is likely the historical disturbance from grazing has all but destroyed any real chance of this species occurring within area.	Unlikely	Unlikely
Xanthorrhoea semiplana subsp. *tateana*		-	R	Widespread throughout southern Eyre Peninsula, most often in association with Mallee / Banksia, Hysterobaeckea on inland consolidated white sand dunes and low rises. Species observed in road reserve not far from Fishery Beach. Record near Groper Bay associated with some other doubtful records and observation description does not match site location. No Yaccas present within coastal fringe of HA nor within project areas. No Yaccas recorded within HA at all however may be present in northern sections as present on Fisheries Beach Road reserve.	Unlikely	Unlikely

EPBC Act: CE Critically endangered, E Endangered, V Vulnerable, Mi Migratory, Ma Marine NPW Act: E Endangered, V Vulnerable, R Rare

Threatened Ecological Communities

No Threatened Ecological Communities (TEC) are known to occur and none are considered likely to occur within the Survey Area. The closes community is the Eyre Peninsula Blue Gum (*Eucalyptus petiolaris*) Woodland, listed as Endangered under the EPBC Act. This community occurs approximately 30 km north of the Survey Area

Threatened Fauna

The desktop study identified 112 conservation significant fauna species that may occur in the area. This included 71 bird species, 36 fish species, 23 mammal species, and three reptile species. Of these:

- Nine species are listed as Threatened under the EPBC Act
- 25 species are listed as Threatened and Migratory and/or Marine under the EPBC Act
- 67 species are listed as Migratory and/or Marine under the EPBC Act
- 11 species are listed as protected under the NPW Act.

Seventeen species are known or considered likely to occur (Table 7) based on habitat preference and previous surveys. These are all bird species. Another five species have a moderate likelihood, 14 have a low likelihood, and 27 species are unlikely to occur.

Marine species, including whales, fish, turtles and dolphins, were not assessed. This desktop study was used as an opportunity to identify these species that will require consideration in the future.

Marine species comprise 45 of the 112 conservation significant fauna species.

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Birds						
Actitis hypoleucos	Common Sandpiper	Mi	R	Edges of saltwater to fresh waterbodies and wetlands, including estuaries, lakes, drainage lines, tidal watercourses, and mudflats; occasionally beaches and rocky headlands; mainly spring-summer non-breeding migrant.	Unlikely	Unlikely
Apus pacificus	Fork-tailed Swift	Mi, Ma	-	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas, and cities. They mostly occur over dry or open habitats, including riparian woodland and Tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	Possible	Unlikely
Ardea alba	Great Egret	Ma	-	The Great Egret occupies a wide variety of wet habitats including freshwater wetlands, dams, flooded pastures, estuarine mudflats, mangroves and reefs (Morcombe, 2003). The species is also known to visit shallows of rivers, sewage ponds and irrigation areas (Pizzey & Knight, 2007).	Unlikely	Unlikely
Ardea ibis	Cattle Egret	Ma	R	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures. It has been recorded on earthen dam walls and ploughed fields. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer. The Cattle Egret is known to follow earth-moving machinery and has been located at rubbish tips. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation.	Unlikely	Unlikely

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Ardenna carneipes	Flesh-footed Shearwater	Mi, Ma	R	The Flesh-footed Shearwater mainly occurs in the subtropics over continental shelves and slopes and occasionally inshore waters. They breed on islands in burrows on sloping ground in coastal forest, scrubland, shrubland or grassland.	Unlikely	Unlikely
Ardenna grisea	Sooty Shearwater	Mi, Ma	-	The Sooty Shearwater forages in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters.	Unlikely	Unlikely
Ardenna tenuirostris	Short-tailed Shearwater	Mi, Ma	-	Found in coastal waters. Likely to be present on adjacent offshore islands potentially.	Possible	Unlikely
Ardeotis australis	Australian Bustard	-	V	Ground dweller, common in grasslands, woodland and in agricultural areas (Birdlife, 2020). Not likely to utilise shrubland community or if does would be very unfrequently. The project areas are highly unlikely to constitute critical habitat for this species and there are no records within project areas. This species has a habit of turning up unexpectedly in random locations so is always a possibility almost anywhere.	Known	Unlikely/Possible as vagrant.
Botaurus poiciloptilus	Australasian Bittern	E	V	Favours wetlands with tall dense vegetation where it forages in still shallow water at the edge of pools and waterways or from platforms or mats of vegetation over deep water (TSSC, 2019)	Unlikely	Unlikely within project area
Calidris acuminata	Sharp-tailed Sandpiper	Mi	-	Prefers the grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches.	Unlikely	Unlikely
Calidris alba	Sanderling	Mi, Ma	R	Coastal species, open sandy beaches exposed to open sea-swell and exposed sandbars and spits and shingle banks where they forage in wave-wash zone amongst rotting seaweed. May occur on sheltered sandy shorelines of estuaries, inlets and harbours.	Possible	Unlikely
Calidris canutus	Red Knot	E, Mi, Ma	-	Intertidal mudflats, sandflats and sandy beaches of sheltered coasts. Sometimes seen on terrestrial saline wetlands.	Unlikely	Unlikely
Calidris ferruginea	Curlew Sandpiper	CE, Mi, Ma	-	Coastal estuaries, bays and shallow wetlands, tidal mudflats and sandflats; mainly spring-summer non-breeding migrant.	Unlikely	Unlikely
Calidris melanotos	Pectoral Sandpiper	Mi, Ma	R	Shallow freshwater or brackish wetlands, including swamps, flooded grasslands, sewage ponds, occasionally tidal flats and saltmarshes.	Unlikely	Unlikely
Calidris ruficollis	Red-necked Stint	Mi, Ma	-	Coastal areas, sheltered inlets, intertidal mudflats, protected sandy or coralline shores.	Unlikely	Unlikely

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Catharacta skua	Great Skua	Ma	-	Marine species breeds on islands.	Unlikely	Unlikely
Cereopsis novaehollandiae (NC)	Cape Barren Goose	-	R	Coastal grasslands and wetlands (Birdlife, 2020). Noted grazing in open paddocks adjacent to Whalers Way. Have taken advantage of grain left in paddocks and roost in Sleaford Mere. Commonly occurring in local area but unlikely to use Whalers as habitat area. No observations over three site visits.	Known	Unlikely
Charadrius ruficapillus	Red-capped Plover	Ma	-	Coastal species on bare sand or mudflats at margins of saline, brackish or freshwater wetlands (Birdlife, 2020).	Unlikely	Unlikely
Charadrius veredus	Oriental Plover	Mi	-	A non-breeding visitor to Australia, they spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland. Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps.	Unlikely	Unlikely
Chrysococcyx osculans	Black-eared Cuckoo	Ma	-	Dry country in mulga and mallee open woodlands and shrublands. Often found in vegetation along creek beds.	Unlikely	Unlikely
Diomedea antipodensis	Antipodean Albatross	V, Mi, Ma	-	Marine, pelagic, and aerial. Nests on New Zealand islands in open patch vegetation among tussock grassland or shrubs on ridges, slopes and plateaus.	Unlikely	Unlikely
Diomedea epomophora	Southern Royal Albatross	V, Mi, Ma	V	Predominantly marine, breeds on a few select islands in tussock grassland, plateaus, or ridges (Birdlife, 2020).	Unlikely	Unlikely
Diomedea exulans	Wandering Albatross	V, Mi, Ma	V	Marine, pelagic and aerial. Breeds on islands.	Unlikely	Unlikely
Diomedea sanfordi	Northern Royal Albatross	E, Mi, Ma	E	Marine, pelagic and aerial. Nests on Chatham Islands.	Unlikely	Unlikely
Falco peregrinus	Peregrine Falcon	-	R	A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009). Possibly fly through however project not likely to impact on this species. More likely to encourage this species and provide advantageous benefit if towers used as part of project.	Known	Possible fly through project area

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Falco subniger	Black Falcon	-	R	Sparsely spread across inland Australia where it is found along tree-lined watercourses and isolated woodlands. It may move to coastal areas and is known to have regular seasonal movements (Birdlife, 2020). Possibly fly through only, uncommon species unlikely to use whalers as part of critical habitat.	Known	Possible
Gallinago hardwickii	Latham's Snipe	Mi, Ma	R	Wet grasslands and pastures, open and wooded swamps; spring-summer non-breeding migrant.	Unlikely	Unlikely
Haematopus fuliginosus	Sooty Oystercatcher	-	R	Occurs over the Southern Ocean. Non-breeding visitor to Australia. Breeds on Campbell I and Auckland Island (Birdlife, 2020). None recorded within area including targeted searches at Redbanks where beach was available, probably not extent of habitat required for permanent habitat. Definitely at Fishery Bay and may very infrequently utilise Redbanks Bay.	Known	Unlikely
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma	E	Occupies all coastal areas extending inland through main waterways, coastal islands, coastal lakes and along some inland rivers. It forages primarily for fish over large areas of open water. Was recorded flying along cliffs and probably does so frequently. Requires ongoing surveys to determine extent of use of whaler's area and potential impacts relating to rocket launching facility. Requires EPBC referral	Known	Known
Halobaena caerulea	Blue Petrel	V, Ma	-	Breeds offshore stacks near Macquarie Island. It forages in Antarctic and subantarctic waters (TSSC, 2015).	Unlikely	Unlikely
Hydroprogne caspia	Caspian Tern	Mi, Ma	-	Breeding in SA has been recorded along the coast from the Coorong north-west to Ceduna, and inland at Lake Eyre and Lake Goyder. It forages in open wetlands including lakes and rivers. Prefers sheltered shallow water near margins.	Unlikely	Unlikely
Larus pacificus	Pacific Gull	Ma	-	Prefers sandy beaches or sometimes rocky coasts and/or areas that are protected from ocean swells including estuaries, bays and harbours. It has also been seen on farmland and rubbish piles (Birdlife, 2020).	Possible	Unlikely
Leipoa ocellata	Malleefowl	V	V	Mallee woodlands, scrubland, and heathlands, often with sandy substrate. Breed in areas with good leaf litter layer. Occasional forage in open areas, including farmland and clearing amongst mallee.	Unlikely	Unlikely

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Lichenostomus cratitius occidentalis	Purple-gaped Honeyeater	-	R	Inhabits mallee heathlands and sometimes mallee with open understorey. Preferred habitat present along with historical records. Other honeyeater species present within project areas in high abundance. No individuals recorded however would utilise area periodically and targeted approach to identifying this species would likely be successful.	Known	Likely
Limosa lapponica	Bar-tailed Godwit	Mi, Ma	R	Coastal habitats including large intertidal sandflats, banks, mudflats, estuaries, inlets and harbours. Forages near edge of water, prefers soft mud. Roosts on sandy beaches, sandbars, spits and near-coastal saltmarsh.	Unlikely	Unlikely
Limosa lapponica baueri	Bar-tailed Godwit	V	-	Non-breeding visitor to Australia where it occurs in coastal habitats including intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, and bays (TSSC, 2016a).	Possible	Unlikely
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	CE	-	Non-breeding visitor to Australia where it occurs in coastal habitats including intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, and bays (TSSC, 2016b).	Possible	Unlikely
Macronectes giganteus	Southern Giant-Petrel	E, Mi, Ma	V	This species breeds on subantarctic and Antarctic islands in Australian territory.	Unlikely	Unlikely
Macronectes halli	Northern Giant Petrel	V, Mi, Ma	-	Breeds in the sub-Antarctic and visits Australian mainland during winter months. Commonly seen in waters around Fremantle (Western Australia) to Sydney (New South Wales).	Unlikely	Unlikely
Merops ornatus	Rainbow Bee-eater	Ma	-	Spring-summer migrants to Victoria where they occur in many wooded habitats with an annual rainfall of less than 800mm, especially north of the Great Divide, often along vegetated watercourses and cuttings or banks along watercourses. Lack of cuttings and nesting areas for species. Lack of historical records suggests unlikely.	Unlikely	Unlikely
Motacilla cinerea	Grey Wagtail	Mi, Ma	-	The grey wagtail is found around fast-flowing mountain streams, often in forested areas, as well as lowland watercourses such as canals and rivers.	Unlikely	Unlikely
Motacilla flava	Yellow Wagtail	Mi, Ma	-	The yellow wagtail occurs in a variety of damp or wet habitats with low vegetation, from brushy pastures, meadows, hay fields and marshes to damp steppe and grassy tundra.	Unlikely	Unlikely

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Neophema elegans	Elegant Parrot	-	R	Inhabits open areas including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland (Birdlife, 2020). Suitable habitat present. One sighting in 2004.	Known	Likely
Neophema petrophila	Rock Parrot	-	R	Restricted to coastlines and offshore rocky islands, frequenting windswept coastal dunes, mangroves, saline swamps and rocky islets (Birdlife, 2020). Suitable habitat present. Sighted 17 times in 2004 comprising 479 individuals and other surveys have noted high abundance and frequency of this species within coastal fringe and low dune swales. One of the more common species at Whalers Way.	Known	Present
Numenius madagascariensis	Eastern Curlew	CE, Mi, Ma	V	Coastal lakes, estuaries, tidal mudflats and sandflats, mangroves and saltmarshes; occasionally fresh or brackish lakes near coast; mainly spring-summer non-breeding migrant	Unlikely	Unlikely
Pachyptila turtur subantarctica	Fairy Prion (southern)	V	-	Breeds on Macquarie Island and other subantarctic islands.	Unlikely	Unlikely
Pandion haliaetus	Osprey, Eastern Osprey	Mi, Ma	E	Occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia. Found in coastal areas of open fresh, brackish or saline water for foraging. Four records, five individuals. Lack of data to determine level of habitat utilisation. Requires EPBC referral.	Known	Present
Pezoporus occidentalis	Night Parrot	E	E	Extinct in south-eastern Australia; historical records from arid and semi-arid chenopod shrublands, spinifex (Triodia) on stony rises, flats around salt lakes and flooded claypans. Lack of suitable habitat.	Unlikely	Unlikely
Phalacrocorax fuscescens	Black-faced Cormorant	Ma	-	Coastal waters where they are found in flocks in large bays, deep inlets, rocky headlands and islands.	Possible	Unlikely
Phoebetria fusca	Sooty Albatross	Mi, Ma	E	This species is marine and pelagic and breeds on subtropical and subantarctic islands in the Indian and Atlantic Oceans.	Unlikely	Unlikely
Psophodes leucogaster	Western Whipbird (eastern) (eastern subspecies)	V	E	Occupies mallee and thicket vegetation in coastal and inland areas of southern South Australia (DAWE, 2020b). 80 records and heard with high frequency during targeted surveys. Very difficult to determine how many individuals present due to inconspicuous nature however appear to be relatively abundant within Whalers Way area.	Known	Present

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Pterodroma mollis	Soft-plumaged Petrel	Ma		Marine, oceanic species that is a non-breeding visitor to Australia.	Unlikely	Unlikely
Rostratula australis	Australian Painted Snipe	Ma	VU	Inhabits shallow terrestrial freshwater wetlands and inundated or waterlogged grassland or saltmarsh. Exposed bare wet mud with ample canopy cover nearby are preferred.	Unlikely	Unlikely
Stagonoleura guttata	Diamond Firetail	-	V	Open grassy woodland, heath and farmland or grassland with scattered trees (Birdlife, 2020). One record of 10 individuals in BDBSA as well as additional record during baseline assessments.	Known	Present
Sternula nereis nereis	Australian Fairy Tern	V	VU	Nests in southern Australia on sheltered sandy beaches, spits and banks above the high tide line and below vegetation between October and February. Occupies a variety of habitats including offshore, estuarine, or lacustrine islands, wetlands and mainland coastline. Sighted in 2004. Likely to be around.	Likely	Likely
Stipiturus malachurus parimeda	Southern Emu-wren	V	E	This species is confined to the extreme south of the Eyre Peninsula. It occurs in shrubland/heathland, mallee and sedgeland. 74 sightings in 2004 comprising 109 individuals. Targeted surveys identified presence within project area and also along all areas of suitable habitat within 50m of coast edge. See targeted survey assessment report. EPBC referral required	Known	Present
Thalassarche cauta cauta	Shy Albatross	V, Mi, Ma	VU	Marine species that occurs in subantarctic and subtropical waters. It is a non-breeding visitor to Australia.	Unlikely	Unlikely
Thalassarche cauta steadi	White-capped Albatros	V, Mi, Ma	-	Marine species that occurs in subantarctic and subtropical waters. It is a non-breeding visitor to Australia.	Unlikely	Unlikely
Thalassarche impavida	Campbell Albatross	V, Mi, Ma	VU	Marine sea bird and specialised shelf feeders. They are non-breeding visitors to Australian waters.	Unlikely	Unlikely
Thalassarche melanophris	Black-browed Albatross	V, Mi, Ma	-	Marine sea bird that inhabits Antarctic, subantarctic and temperate waters and occasionally enters the tropics. It forages around breaks of continental and island shelves and across nearby underwater banks.	Unlikely	Unlikely
Thinornis rubricollis rubricollis	Hooded Plover	V, Ma	VU	Mainly occurs on wide beaches backed by dunes with large amounts of seaweed and jetsam, creek mouths and inlet entrances. Suitable habitat present. Sighted 20 times in 2004 comprising 50 individuals. No records within Redbanks Bay where beach has lack of refuge sites with boulders present at	Likely	Unlikely

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
				base of cliff at high tide mark. Certain to be present at Fisheries Beach however unlikely within proximity to project area.		
Tringa nebularia	Common Greenshank	Mi, Ma	-	Found in a variety of inland wetlands and sheltered coastal habitats. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass.	Likely	Unlikely
Turnix varius	Painted Buttonquail	-	R	Prefer closed canopies with understorey cover in temperate and eastern tropical forests and woodlands (Birdlife, 2020). Also known from scrub and grassy habitat. Suitable habitat present. Sighted three times in 2004 comprising 23 individuals. Likely within mallee habitats within Whalers Way.	Likely	Likely
Zanda (Calyptorhynchus) funerea whiteae	Yellow-tailed Black Cockatoo	-	V	Favours Eucalypt woodland and pine plantations (Birdlife, 2020). Six records sighted in 2004 comprising 14 individuals. Potentially flyover, the project area does not support habitat for this species however they may infrequently fly through area to foraging patches on southern EP.	Likely	Possible
Fish						
Acentronura australe	Southern Pygmy Pipehorse	Ma	-	Not considered	-	Marine
Campichthys galei	Gale's Pipefish	Ma	-	Not considered	-	Marine
Carcharodon carcharias	White Shark	V, Mi, Ma	-	Not considered	-	Marine
Filicampus tigris	Tiger Pipefish	Ma	-	Not considered	-	Marine
Heraldia nocturna	Upside-down Pipefish	Ma	-	Not considered	-	Marine
Hippocampus abdominalis	Big-belly Seahorse	Ma	-	Not considered	-	Marine
Hippocampus breviceps	Short-head Seahorse	Ma	-	Not considered	-	Marine
Histiogamphelus cristatus	Rhino Pipefish	Ma	-	Not considered	-	Marine
Hypselognathus horridus	Shaggy Pipefish	Ma	-	Not considered	-	Marine
Hypselognathus rostratus	Knifesnout Pipefish	Ma	-	Not considered	-	Marine
Kaupus costatus	Deepbody Pipefish	Ma	-	Not considered	-	Marine

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Lamna nasus	Porbeagle	Mi, Ma	-	Not considered	-	Marine
Leptoichthys fistularius	Brushtail Pipefish	Ma	-	Not considered	-	Marine
Lissocampus caudalis	Australian Smooth Pipefish	Ma	-	Not considered	-	Marine
Lissocampus runa	Javelin Pipefish	Ma	-	Not considered	-	Marine
Maroubra perserrata	Sawtooth Pipefish	Ma	-	Not considered	-	Marine
Notiocampus ruber	Red Pipefish	Ma	-	Not considered	-	Marine
Phycodurus eques	Leafy Seadragon	Ma	-	Not considered	-	Marine
Phyllopteryx taeniolatus	Common Seadragon	Ma	-	Not considered	-	Marine
Pugnaso curtirostris	Pugnose Pipefish	Ma	-	Not considered	-	Marine
Solegnathus robustus	Robust Pipehorse	Ma	-	Not considered	-	Marine
Stigmatopora argus	Spotted Pipefish	Ma	-	Not considered	-	Marine
Stigmatopora nigra	Widebody Pipefish	Ma	-	Not considered	-	Marine
Stipecampus cristatus	Ringback Pipefish	Ma	-	Not considered	-	Marine
Urocampus carinirostris	Hairy Pipefish	Ma	-	Not considered	-	Marine
Vanacampus margaritifer	Mother-of-pearl Pipefish	Ma	-	Not considered	-	Marine
Vanacampus phillipi	Port Phillip Pipefish	Ma	-	Not considered	-	Marine
Vanacampus poecilolaemus	Longsnout Pipefish	Ma	-	Not considered	-	Marine
Vanacampus vercoi	Verco's Pipefish	Ma	-	Not considered	-	Marine
Mammals						
Arctocephalus forsteri	Long-nosed Fur-seal	Ma	-	Not considered	-	Marine
Balaena glacialis australis	Southern Right Whale	E, Mi, Ma	V	Not considered	-	Marine
Balaenoptera acutorostrata	Minke Whale	Ma	R	Not considered	-	Marine
Balaenoptera borealis	Sai Whale	V, Mi, Ma	V	Not considered	-	Marine
Balaenoptera edeni	Bryde's Whale	Mi, Ma	R	Not considered	-	Marine

Scientific Name	Common Name	Conservation Code		Habitat	Desktop Assessment - Likelihood	Post Field Surveys - Likelihood
		EPBC Act	NPW Act			
Balaenoptera musculus	Blue Whale	E, Mi, Ma	E	Not considered	-	Marine
Balaenoptera physalus	Fin Whale	V, Mi, Ma	V	Not considered	-	Marine
Caperea marginata	Pygmy Right Whale	Mi, Ma	R	Not considered	-	Marine
Delphinus delphis	Common Dolphin	Ma	-	Not considered	-	Marine
Grampus griseus	Risso's Dolphin	Ma	R	Not considered	-	Marine
Lagenorhynchus obscurus	Dusky Dolphin	Mi, Ma	-	Not considered	-	Marine
Megaptera novaeangliae	Humpback Whale	V, Mi, Ma	V	Not considered	-	Marine
Neophoca cinerea	Australian Sea-lion	V, Ma	V	Not considered	-	Marine
Orcinus orca	Killer Whale	Mi, Ma	-	Not considered	-	Marine
Tursiops aduncus	Indian Ocean Bottlenose Dolphin	Ma	-	Not considered	-	Marine
Tursiops truncatus s. str.	Bottlenose Dolphin	Ma	-	Not considered	-	Marine
Reptiles						
Caretta caretta	Loggerhead Turtle	E, Mi, Ma	E	Non-breeding visitor to SA waters. They live at or near the surface of the ocean and move with currents.	Unlikely	Marine
Chelonia mydas	Green Turtle	V, Mi, Ma	V	A non-breeding visitor to SA waters. They drift on ocean currents and are often found with drift lines and rafts of *Sargassum* sp.	Unlikely	Marine
Dermochelys coriacea	Leatherback Turtle	E, Mi, Ma	V	A non-breeding visitor to most Australian waters. This species is highly pelagic and only comes close to shore during nesting season.	Unlikely	Marine

EPBC Act: CE Critically endangered, E Endangered, V Vulnerable, Mi Migratory, Ma Marine NPW Act: E Endangered, V Vulnerable, R Rare

4.3 Cumulative impact

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

All vegetation within the project areas has had an additional 5m clearance buffer applied for fire safety. The buildings and infrastructure are all located within 5m of the project boundary meaning the 10m clearance buffer is within the existing fence buffer.

All roads have a 3m buffer applied to each side of the road however this may be utilised as 6m on one side of the road as part of upgrades or alternatively as the buffer is stated. Dependent on the bends in roads and terrain encountered. This is also provided to allow for the addition of power and water easements, the construction method and infrastructure type not finalised at this stage.

Stormwater retention will be allocated within the existing project area boundaries and retained within. No cumulative additional effects have been allowed for nor expected to occur.

4.4 Address the Mitigation Hierarchy

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

a) Avoidance – outline measures taken to avoid clearance of native vegetation such as making adjustments to the location, design, size or scale of the activity in order to reduce the impact.
The Whalers Way area provides a number of benefits to operating an orbital launch complex at this location.

The availability of suitable sites is extremely constrained

- Southern Launch undertook an extensive site selection process
- The process was underpinned by a weighted multi-criteria analysis
- The process ultimately led to the selection of Whalers Way

Critical criteria included:

- Latitude – between -30 and -40 degrees
- Launch Trajectories – support launches from 60 to 180 degree wrt equator
- Coastal Access – site to be on the coast with open ocean due south
- Weather – support year round launches with no temperature extremes
- Land Size – min 500 Ha to support 2 launch pads and buffer zones
- Critical National Infrastructure – no critical national infrastructure in buffer
- zones or on trajectory
- Population – Need to be capable of exclusion from buffer zones
- Environment – Impact on environmental values

Existing cleared land exists several kilometres to the north of Whalers Way, this land is not suitable for the proposal due to constraints on achieving exclusion zones under national legislative requirements.

Internal site selection was based on criteria including:

- Existing degraded areas
- Existing cleared areas
- Topography
- Blast radius
- Existing road access
- Proximity to coast
- Security requirements

Avoidance of vegetation wherever possible has occurred within the engineering constraints of a highly technical project. Reduction of the footprint as far as practicable to avoid clearing native vegetation with the size of the Project Area reduced in size from 70.58 ha to 23.76 ha from concept design.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent.

The clearance footprints have been minimized to the minimum area possible and located adjacent to existing roads where possible. Existing access roads are being utilised to ensure minimum disturbance and implementing a CEMP and OEMP to manage direct and indirect impacts

- Some resizing and shapes of infrastructure areas refined to limit impact
- Areas minimised and located in areas of lower condition
- Future reductions in footprint are being sought
- Proposed access tracks have been aligned with existing tracks where possible
- Limitations due to engineering and nationally threatened fauna species

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

Southern Launch are enthusiastic about incorporating the restoration and conservation of the Whalers Way area as a critical part of the project. Mitigating impacts is at the forefront of the company ethos. Some measures that are in planning phases include:

- Predator Proof fencing and eradication of predators including cats and foxes from the Whalers Way HA
- Firebreaks incorporated along fences to protect and mitigate one of the primary threats to EPBC listed species present
- Weed control
- Ongoing studies into risks associated with the project which have no precedent such as funding PhD studies in association with state universities.

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

Southern Launch will provide a SEB in the form of an inground offset provided by SEB credit providers within the region. This is in association with ongoing negotiations and pending final footprints and offsetting requirements.

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

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

Principle of clearance	Considerations
Principle 1a - it comprises a high level of diversity of plant species	<u>Relevant information</u> The number of plant species recorded (native and introduced) for each vegetation association The plant diversity scores for 10 of the 26 sites assessed within Whalers Way were >20 points meaning they were seriously at variance with this principle. The remaining 16 sites were between 10 and 20 points being at variance with this principle.

	Assessment against the principles Seriously at Variance: • Site A1 and 3 • Site B3 and 6 • Site B-D Access 1 and 5 • Site D1 • Block D access 1 and 7 • Whalers Way Road 1 At Variance: • All remaining sites.
	Moderating factors that may be considered by the NVC The proposed clearance equates to approximately 1.5% of HA
Principle 1b - significance as a habitat for wildlife	Relevant information The Whalers Way area is under a current Heritage Agreement and constitutes an intact vegetation community. The area has numerous landforms and vegetation associations present and forms a link in a chain of a number or reserves and national parks in the southern Eyre Peninsula. The area has records for over 120 fauna species within 10km of the project site. The site directly provides critical habitat for two nationally threatened terrestrial species and at least 12 terrestrial species at state level. The following nationally threatened species are known to use the Project area for some or all their habitat requirements: • Southern Emu Wren • Western Whip Bird A further nine species listed as migratory/marine at federal level or of state conservation significance are known to, likely to or will possibly utilise the habitat present within the project areas. All areas subsequently resulted in a threatened fauna score of 0.1.
	Assessment against the principles The threatened fauna score for associations within the project site scored greater than 0.05 points making clearance of vegetation within all project area seriously at variance with this principle.
	Moderating factors that may be considered by the NVC There are no moderating factors relating to the presence of Southern Emu Wren and Western Whip bird. Some species such as Rock Parrot may be considered locally common only.
Principle 1c - plants of a rare, vulnerable or endangered species	Relevant information No threatened flora species were recorded within the Project site areas directly or in other sites surrounding the project areas. There are historical records for a number of species including: • *Xanthorrhoea semiplana* ssp. *tatei* • *Eucalyptus gillenii* • *Hibbertia crinita* • *Acacia alcockii* These records are all in similar locations and not recorded within the project area when checked for accuracy. There is some genuine doubt about the integrity of many of these records given the descriptions of record locations do not match the actual location and the specific habitat is not suitable for these species. Other species without records but more likely to be present base don habitat preferences such as *Prostanthera calycina* were also not recoded despite targeted searches within the project areas and within areas of preferred habitat.

	Assessment against the principles The clearance is not at variance with this principle.
	Moderating factors that may be considered by the NVC N/A
***Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered*:**	The low shrubland and Mallee communities within Whalers Way are not recognized as threatened at national or state level. The proposed clearance is not at variance with this principle. Threatened Community Score - 1
	Assessment against the principles The clearance is not at variance with this principle.
	Moderating factors that may be considered by the NVC N/A
Principle 1e - it is significant as a remnant of vegetation in an area which has been extensively cleared.	Relevant information The Talia sub region has 56% remnancy of which 32% is protected in formal reserves. The Mungerowie Association has 78% remnancy of which 25% is formally protected. The remnants within whalers Way are highly valuable in providing connectivity between the Port Lincoln National Park and the Coffin Bay National Park. Total Biodiversity Score – 1,965
	Assessment against the principles Clearance of vegetation within the Project areas with a biodiversity score of greater than 500 and over 30% remnancy is at variance within this principle.
	Moderating factors that may be considered by the NVC No moderating factors are considered for this principle.
Principle 1f - it is growing in, or in association with, a wetland environment.	Relevant information N/A
	Assessment against the principles The clearance is not at variance with this principle.
	Moderating factors that may be considered by the NVC N/A
Principle 1g - it contributes significantly to the amenity of	Relevant information The vegetation does contribute significantly to the amenity of the area. the types of soil present in the area means that the vegetation plays a highly significant role in stabilising an otherwise fragile environment. Careful management of stormwater will be required.
	The clearance is not at variance with this principle.

the area in which it is growing or is situated.	Moderating factors that may be considered by the NVC N/A

Principles of Clearance (h-m) will be considered by comments provided by the local NRM Board or relevant Minister. The Data Report should contain information on these principles where relevant and where sufficient information or expertise is available.

4.6 Risk Assessment

Determine the level of risk associated with the application

Total clearance	No. of trees	N/A
	Area (ha)	23.73
	Total biodiversity Score	1250.4217
Seriously at variance with principle 1(b), 1(c) or 1 (d)		Seriously at variance with principle 1a and 1b. At variance with 1e
Risk assessment outcome		Level 4

4.7 NVC Guidelines

Provide any other information that demonstrates that the clearance complies with any relevant NVC guidelines related to the activity.

5. Clearance summary

Clearance Area(s) Summary table

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	1	24	1	0	0.1	74.53	3.34	248.93	1			261.38	$182,171.07	$10,019.41
A	2	18	1	0	0.1	60.51	0.23	13.92	1			14.61	$10,184.90	$560.17
A	3	22	1	0	0.1	66.23	1.54	101.99	1			107.09	$74,640.97	$4,105.25
B	1	16	1	0	0.1	51.65	0.58	29.96	1			31.45	$21,923.01	$1,205.77
B	6	24	1	0	0.1	70.84	0.4	28.34	1			29.75	$20,736.73	$1,140.52
B	3	24	1	0	0.1	53.43	4.06	216.93	1			227.77	$158,749.74	$8,731.24
Site B-D track	1	22	1	0	0.1	51.65	0.1	5.17	1			5.42	$3,779.83	$207.89
Site B-D track	3	12	1	0	0.1	55.71	0.62	34.54	1			36.27	$25,277.07	$1,390.24
D	1	22	1	0	0.1	62.72	0.29	18.19	1			19.10	$13,310.85	$732.10
D	3	12	1	0	0.1	38.97	1.41	54.95	1			57.70	$40,211.60	$2,211.64
D	5	12	1	0	0.1	30.66	4.92	150.85	1			158.39	$110,392.38	$6,071.58
Site D Northern Access	2	18	1	0	0.1	55.89	0.11	6.15	1			6.46	$4,499.13	$247.45
Site D Northern Access	3	12	1	0	0.1	50.23	0.22	11.05	1			11.60	$8,087.00	$444.79
E	4	20	1	0	0.1	57.41	0.75	43.06	1			45.21	$31,510.16	$1,733.06
WWRA	1	24	1	0	0.1	72.38	0.63	45.60	1			47.88	$33,370.36	$1,835.37
WWRA	2	18	1	0	0.1	55.89	0.40	22.36	1			23.47	$16,360.48	$899.83
WWRA	3	16	1	0	0.1	51.89	0.51	26.46	1			27.79	$19,366.70	$1,065.17
WWRA	6	14	1	0	0.1	45.86	0.45	20.64	1			21.67	$15,102.48	$830.64
WWRA	4	18	1	0	0.1	53.55	3.20	171.36	1			179.93	$125,403.97	$6,897.22
Insert additional rows into the table as required.						**Total**	**23.76**	**1250.4217**				**1312.94**	**$915,078.45**	**$50,329.31**

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	1250.42	1312.94	$915,078.45	$50,329.31	$965,407.77

Totals summary table

IBRA Association percent vegetation remnancy (%)	87
IBRA Subregion percent vegetation remnancy (%)	56
Is the vegetation associated with a Wetland	No
Economies of Scale Factor	0.5
Rainfall (mm)	536

6. Significant Environmental Benefit

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

ACHIEVING AN SEB

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

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. _____

☐ Apply to have SEB Credit assigned from another person or body. The application form needs to be submitted with this Data Report.

☐ Apply to have an SEB to be delivered by a Third Party. The application form needs to be submitted with this Data Report.

☒ Pay into the Native Vegetation Fund.

PAYMENT SEB

If a proponent proposes to achieve the SEB by paying into the Native Vegetation Fund, summary information must be provided on the amount required to be paid and the manner of payment:

The SEB requirement as a payment into the NV Fund is $965,407.77

7. Appendices

Appendix 1. Fauna species list from EP biological survey (DEW 2004) with species updates from 2020 surveys.

CLASS	Species	Common	AUS	SA	Most Recent sighting
AVES	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater			15/12/2004
	Acanthiza apicalis	Inland Thornbill			15/12/2004
	Accipiter cirrocephalus cirrocephalus	Collared Sparrowhawk			13/12/2004
	Accipiter fasciatus fasciatus	Brown Goshawk			15/12/2004
	Anthochaera carunculata woodwardi	Red Wattlebird			15/12/2004
	Anthus australis	Australian Pipit			15/12/2004
	Aquila audax	Wedge-tailed Eagle			13/12/2004
	Artamus cyanopterus	Dusky Woodswallow			14/10/2020
	Barnardius zonarius	Australian Ringneck			15/12/2004
	Cacomantis flabelliformis	Fan-tailed Cuckoo			14/10/2020
	Calamanthus campestris campestris	Rufous Fieldwren			15/12/2004
	Chalcites lucidus	Shining Bronze Cuckoo			15/12/2004
	Chroicocephalus novaehollandiae	Silver Gull			14/10/2020
	Circus approximans	Swamp Harrier			15/12/2004
	Colluricincla harmonica	Grey Shrikethrush			15/12/2004
	Corvus coronoides	Australian Raven			14/10/2020
	Cracticus torquatus	Grey Butcherbird			14/10/2020
	Dromaius novaehollandiae	Emu			15/10/2020
	Drymodes brunneopygia	Southern Scrub Robin			15/12/2004
	Eolophus roseicapilla	Galah			14/10/2020
	Eopsaltria griseogularis	Western Yellow Robin			15/12/2004
	Falco cenchroides	Nankeen Kestrel			14/10/2020
	Falco peregrinus	Peregrine Falcon		R	15/12/2004
	Gliciphila melanops	Tawny-crowned Honeyeater			14/10/2020
	Gymnorhina tibicen	Australian Magpie			15/12/2004
	Haliaeetus leucogaster	White-bellied Sea Eagle		E	13/12/2004
	Hirundo neoxena	Welcome Swallow			15/12/2004
	Hydroprogne caspia	Caspian Tern			15/12/2004
	Larus pacificus	Pacific Gull			15/12/2004
	Lichenostomus cratitius occidentalis	Purple-gaped Honeyeater		R	15/12/2004
	Malurus cyaneus leggei	Superb Fairywren			14/10/2020
	Malurus pulcherrimus	Blue-breasted Fairywren			15/12/2004
	Melithreptus brevirostris	Brown-headed Honeyeater			14/10/2020
	Morus serrator	Australasian Gannet			13/07/2020
	Neophema elegans	Elegant Parrot		R	15/12/2004
	Neophema petrophila	Rock Parrot		R	14/10/2020
	Neophema sp.	Neophema parrots			15/12/2004

CLASS	Species	Common	AUS	SA	Most Recent sighting
	Pachycephala pectoralis	Australian Golden Whistler			12/07/2020
	Pandion haliaetus cristatus	Eastern Osprey		E	10/07/2020
	Pardalotus punctatus xanthopyge	Yellow-rumped Pardalote			15/12/2004
	Pardalotus striatus	Striated Pardalote			15/12/2004
	Phaps elegans	Brush Bronzewing			15/10/2020
	Phylidonyris novaehollandiae	New Holland Honeyeater			15/10/2020
	Pomatostomus superciliosus	White-browed Babbler			15/10/2020
	Psophodes leucogaster	Mallee (White-bellied) Whipbird	VU	E	15/10/2020
	Rhipidura albiscapa	Grey Fantail			15/12/2004
	Sericornis frontalis mellori	White-browed Scrubwren			15/10/2020
	Stagenopleura gutatta	Diamond Firetail		R	12/07/2020
	Sternula nereis	Fairy Tern	VU	E	15/12/2004
	Stipiturus malachurus parimeda	Southern Emuwren	VU	E	14/08/2020
	Strepera versicolor intermedia	Brown Currawong			15/12/2004
	Sturnus vulgaris	Common Starling			15/10/2020
	Thalasseus bergii	Greater Crested Tern			13/12/2004
	Thinornis cucullatus cucullatus	Hooded Plover	VU	V	15/12/2004
	Tribonyx ventralis	Black-tailed Nativehen			12/12/2004
	Turdus merula	Common Blackbird			15/12/2004
	Turnix varius	Painted Buttonquail		R	15/12/2004
	Zosterops lateralis	Silvereye			15/10/2020
MAMMALIA	*Felis catus*	Domestic Cat (Feral Cat)			15/12/2004
	Macropus fuliginosus	Western Grey Kangaroo			14/10/2020
	Macropus sp.				14/12/2004
	Mus musculus	House Mouse			16/12/2004
	Oryctolagus cuniculus	Rabbit (European Rabbit)			14/12/2004
	Phascolarctos cinereus	Koala			14/10/2020
	Rattus fuscipes	Bush Rat			16/12/2004
	Vulpes vulpes	Fox (Red Fox)			14/12/2004
REPTILIA	*Christinus marmoratus*	Marbled Gecko			14/12/2004
	Ctenophorus chapmani	Eastern Heath Dragon			14/10/2020
	Delma australis	Marble-faced Delma			16/12/2004
	Drysdalia mastersii	Master's Snake			14/12/2004
	Hemiergis peronii	Four-toed Earless Skink			14/12/2004
	Lampropholis delicata	Delicate Skink			16/12/2004
	Lerista bougainvillii	Bougainville's Skink			14/12/2004
	Lerista dorsalis	Southern Four-toed Slider			16/12/2004
	Liopholis multiscutata	Bull Skink			16/12/2004
	Menetia greyii	Dwarf Skink			12/12/2004
	Morethia obscura	Mallee Snake-eye			15/12/2004
	Notechis scutatus	Tiger Snake	ssp		15/10/2020
	Pseudonaja affinis	Dugite			15/12/2004
	Pseudonaja inframacula	Peninsula Brown Snake			15/10/2020

CLASS	Species	Common	AUS	SA	Most Recent sighting
	Pseudonaja sp.				16/12/2004
	Pygopus lepidopodus	Common Scaly-foot			14/12/2004
	Tiliqua occipitalis	Western Bluetongue			15/10/2020
	Tiliqua rugosa	Sleepy Lizard			14/10/2020
	Tympanocryptis lineata	Lined Earless Dragon			14/10/2020