Name:	Julian Tapp	Date:	21 October 2022
Company:	Strike Energy Limited	Job/Doc. No.:	63100 – 146,397 (Rev 0)
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Project Haber – Entrance Area – Desktop Review and Database Search Summary

1. Background

Strike Energy Limited (Strike) has requested Strategen-JBS&G to undertake a desktop review of available studies and previous work undertaken over and in proximity to a vegetated parcel of land identified for the entrance to Project Haber (Entrance Area), a proposed Urea Production Plant located in South Erregulla. The Entrance Area is located within Petroleum Exploration Permit EP 503 (held by Strike North West Pty Ltd, a wholly owned subsidiary of Strike), approximately 45 km southeast of Dongara and 280 km north of Perth (Figure 1).

The purpose of the desktop review is to identify any areas of potential knowledge gaps and constraints which may exist within the context of the approval requirements for Project Haber. Along with a review of existing literature, additional desktop searches were undertaken to ensure that the list of species and communities that are anticipated to occur in the local area is current.

This memorandum summarises the outcomes of the literature review and desktop searches for key environmental features and listed species and communities in relation to the Entrance Area. The Entrance Area contains approximately 1.3 ha of extant native vegetation, though the access to Project Haber would only impact less than 1 ha of that area. The rest of the development envelope for Project Haber is on cleared farmland.

2. Method

2.1 Available Work and Previous Studies

A review of previous work and available studies undertaken in the area surrounding the Entrance Area was conducted to identify potential gaps or constraints in environmental baseline knowledge and options to address those gaps and constraints. Studies reviewed as part of this desktop assessment include:

- Targeted Flora Survey Trieste 3D Seismic Project, Arrowsmith (Mattiske 2017);
- Trieste 3D Seismic Survey: Level 1 Vertebrate Fauna Survey and Black-Cockatoo Habitat Survey November 2017 (Western Wildlife 2017);
- Flora and Vegetation Assessment of Zemira 3D Seismic Survey area – Interim Report (Strategen-JBS&G 2020);
- Minijiny 3D Seismic Targeted Flora Survey (Strategen-JBS&G 2022 draft report); and
- Beach Energy's Zemira 3D Seismic Survey Fauna Values Assessment (Bamford 2020).

Legend

- Project area
- Cadastral boundary
- Suburb boundary
- Minor road

Scale 1:100,000 at A4

0 1 2 Kilometres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 63099

Client: Strike Energy Limited

Version: A | Date: 14-Jul-2022

Drawn By: ianandagoda | Checked By:CT

South Erregulla, WA

REGIONAL LOCATION

FIGURE 1

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Strike Energy\63099 SE4 Ecological Survey & Approvals\GIS\Maps\M01_Rev_A\63099_01_RegLocn.mxd
Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Except for the Strategen-JBS&G (2022) Minijiny survey, the reports associated with the above studies are publicly available on either the Environmental Protection Authority (EPA) website as they are associated with proposals referred to the EPA for assessment or on the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Public Portal on the Department of Climate Change, Energy, the Environment and Water website. The Minijiny survey will become publicly available once that project has been referred to the EPA.

The Strategen (2022) Minijiny report is relevant to the Entrance Area as vegetation immediately to the north of Tomkins Road, near the Entrance Area, was surveyed for this report in 2021. This area has similar mapped soil landscape and pre-European vegetation to the Entrance Area and is likely to contain vegetation types consistent with that in the Entrance Area.

2.2 Database Searches

Database searches were undertaken to determine the current known extent of conservation significant 'Threatened' and 'Priority' flora, fauna, and ecological communities that have the potential to occur within the Entrance Area. Matters of National Environmental Significance (MNES) were also reviewed using a database search. The databases used to conduct these searches are listed in Table 2.1.

Table 2.1: Database searches

Custodian	Database	Search Group	Search Extent (from Entrance Area boundary)	Output
Department of Biodiversity Conservation and Attractions	Threatened and Priority Ecological Communities database	Ecological communities	20 km	Attachment A
	Threatened and Priority Flora database	Flora species	5 km	Attachment A
	Threatened and Priority Fauna database	Fauna species	20 km	Attachment A
Department of Agriculture, Water and the Environment	Protected Maters Search Tool	Matters of National Environmental Significance	20 km	Attachment B
WA Herbarium	Western Australian Herbarium	Flora species	5 km	Attachment A

3. Results

3.1 Climate

The Mid West region of WA experiences a Mediterranean climate (i.e., dry and warm summers, and relatively wet and cool winters). The nearest weather station that records both temperature and rainfall is the Carnamah weather station (Station 8025) located approximately 60 km east-southeast of the Development Envelope.

The mean maximum temperature for the period 1991-2020 ranged from 18.7 °C in July to 36.7 °C in January, whereas the mean minimum temperature ranged from 7.5 °C in August to 19.7 °C in February (Figure 2).

The average annual rainfall between 1991 and 2020 was 322.45 mm per annum, with the highest monthly rainfall typically occurring between May and August. Mean rainfall ranged from 8.4 mm in December to 58.8 mm in July, with a mean 48.5 days of rainfall above 1.0 mm. In 2021, the annual rainfall ranged from zero in December to 105.9 mm in July (Figure 2).

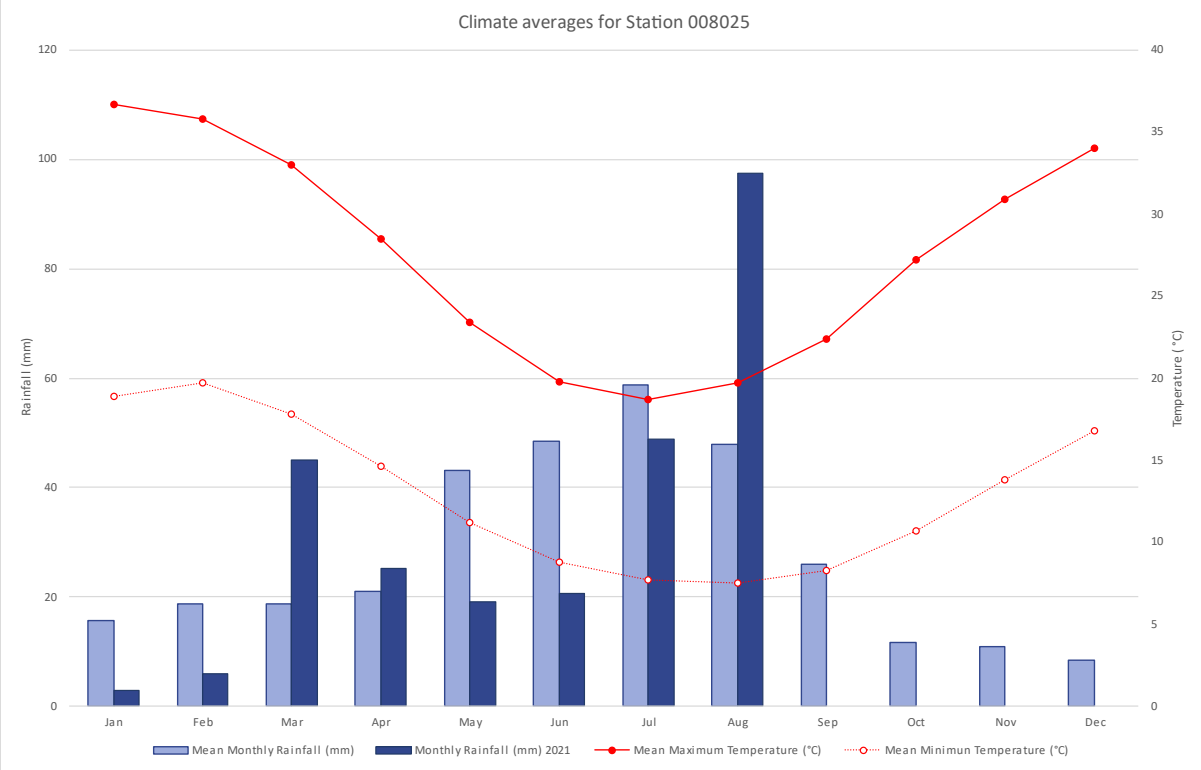


Figure 2: Climate statistics (Carnamah Weather Station)

3.2 Soils and Landforms

The Geraldton Sandplains are characterised by a series of old dunes which run parallel to the coast. The younger Quindalup dunes occur near the contemporary coastline, with the Spearwood dunes occurring further inland. The soils are typically sandy with some areas of exposed limestone, and a series of wetlands occur along the plains. In the east lateritic rises occur.

Based on soil and landform mapping data (DPIRD-027) from the Department of Primary Industries and Regional Development (DPIRD), one main soil subsystem is mapped in the Entrance Area (Table 3.1). The soil subsystem has been used to inform the potential presence of conservation significant flora and ecological communities.

Table 3.1: Soil Landscape Subsystems (DPIRD-027)

Reference	Soil subsystem	Description
224Ma_3	Mount Adams 3 Subsystem	Undulating rises to low hills with common minor lateritic outcrops; sandy gravels and pale and yellow deep sands

3.3 Topography

The topography of the Entrance Area is a gradual slope with the western end at approximately 223 mAHD and the eastern end at approximately 232 mAHD ().

3.4 Surface Water and Wetlands

There are two ephemeral surface watercourses identified approximately 1 km to the west and 7 km to the southeast of the Entrance Area These watercourses form tributaries of the Arrowsmith River (Figure 4).

There are no listed wetlands in or within 5 km of the Entrance Area.

3.5 Heritage

Oner registered Aboriginal heritage site – the Arrowsmith River (ID 30068), which runs northeast-southwest – was identified approximately 11.5 km to the southeast of the Entrance Area (Figure 4 and Figure 5). The registered site follows the course of the main river. None of the ephemeral surface watercourses identified above form part of the registered site.

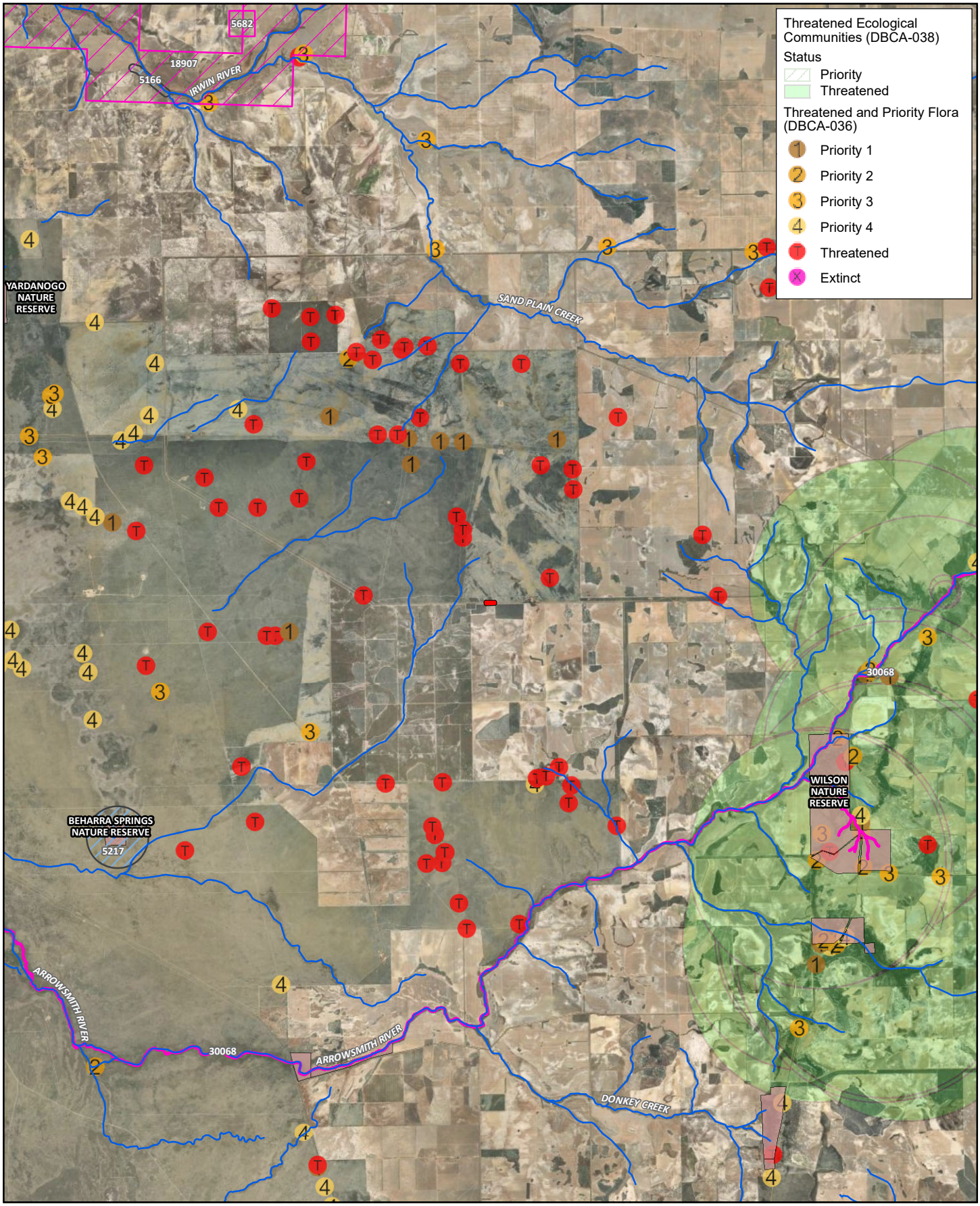
One heritage place (Stored Data/Not a Site) is located approximately 17 km west of the Entrance Area (Figure 4). Further afield, registered sites associated with the Irwin River and Yarra Lakes are located approximately 23 km northwest and 45.5 km east of the Entrance Area, respectively.

Legend

- Project area
- Cadastral boundary
- Topographic contours (mAHD)
- Watercourse - minor, non-perennial
- Earth Dam
- Minor road

Scale 1:10,000 at A4 (0 100 200 Metres)		**South Erregulla, WA**
Coord. Sys. GDA 1994 MGA Zone 50		**REGIONAL TOPOGRAPHY AND HYDROLOGY**
Job No: 63099		
Client: Strike Energy Limited		**FIGURE 3**
Version: A	Date: 14-Jul-2022	strategen JBS&G
Drawn By: ianandagoda	Checked By:CT	

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Strike Energy\63099 SE4 Ecological Survey & Approvals\GIS\Maps\M01_Rev_A\63099_03_RegTopoHydrology.mxd
Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Legend

- Project area

Aboriginal heritage places (DAA-001)

- Registered site
- Other heritage place

Legislated lands and waters (DBCA)

- Nature reserve
- Watercourse

Scale 1:201,000 at A4

0 2 4 Kilometres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 63099

Client: Strike Energy Limited

Version: A | Date: 14-Jul-2022

Drawn By: ianandagoda | Checked By: CT

South Erregulla,WA

KEY ENVIRONMENTAL FEATURES

FIGURE 4

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Strike Energy\63099 SE4 Ecological Survey & Approvals\GIS\Maps\M01_Rev_A\63099_04_KeyEnvFeatures.mxd
Image Reference: LANDGATE/SLIP
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

3.6 Vegetation

3.6.1 Pre-European Vegetation

Beard et al. (2013) have mapped the extent of pre-European vegetation across Western Australia, which is represented in spatial dataset (DPIRD-006) maintained by DPIRD. Inspection of the spatial dataset revealed one vegetation association corresponds with the Entrance Area: Tathra_379. The pre-European and current extent of each vegetation association is available from the State-wide Vegetation Statistics Dataset published by the Department of Biodiversity, Conservation and Attractions (DBCA) and is provided in Figure 6 and Table 3.2.

Table 3.2: Vegetation Associations

System	Association	Pre-European extent within IBRA region (ha)	Percent remaining within IBRA region (%)
Tathra	379 - Shrublands; scrub-heath on lateritic sandplain in the central Geraldton Sandplain Region	544,708	23.75

3.6.2 Vegetation Units

Vegetation mapping to association level has been undertaken of native vegetation within the South Erregulla property where Project Haber will be located (Strategen 2020). One dominant vegetation unit was mapped – 'low mixed heathlands associated with laterite' which is described by Strategen (2020) as:

> "A mosaic of medium open heathland of *Banksia carlinoides* and/or mixed Myrtaceous and Proteaceous species, including *Melaleuca* spp., *Eremaea beaufortioides*, *Leptospermum oligandrum* and *Scholtzia* spp., with isolated *Eucalyptus todtiana*, and frequent *Hibbertia hypericoides*, over *Ecdeiocolea monostachya*, *Schoenus clandestinus* and *Mesomelaena pseudostygia*, with areas of low open heathland of *Melaleuca aspalathoides,* with isolated *Allocasuarina campestris* on lateritic soils and *Allocasuarina humilis on rises.*"

3.6.3 Vegetation Condition

The Entrance Area consists of remnant vegetation positioned between a road and a cleared paddock. As such, the majority of vegetation present is anticipated to be in 'Good' condition as per the scales developed by Keighery (1994) presented in Table 3.3.

Table 3.3: Condition Rating Categories

Condition rating	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

3.6.4 Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

Two conservation-significant ecological communities were identified by a database search within 20 km of the Entrance Area (Figure 4); both are categorised as Threatened Ecological Communities (TECs).

Neither of the identified ecological communities were identified in the Entrance Area, with both being more than 10 km from the boundary of the area. However, the potential for occurrence of each of these ecological communities in the Entrance Area has been assessed based on available pre-European vegetation, soils and geology information (Table 3.4).

Table 3.4: Threatened Ecological Communities Potentially Occurring within the Entrance Area

Floristic Community	Conservation Status		Description	Likelihood of Occurrence
	BC Act	EPBC Act		
Assemblages of organic mound springs of the Three Springs area	EN	Not listed	The habitat of this community is characterised by continuous discharge of groundwater in raised areas of peat. The peat and surrounds provide a stable, permanently moist series of microhabitats. The vegetation component of the community contains many moisture loving species including an overstorey of *Melaleuca preissiana* trees. *Eucalyptus camaldulensis* and *E. rudis* are also found in a number of the mound springs. The shrub layer often includes *Hypocalymma angustifolium* and *Acacia saligna* over *Baumea vaginalis* and other sedges. The herbaceous *Patersonia occidentalis* (swamp variant) was recorded at several mound springs.	Unlikely (based on mapped vegetation units, soils and landform)
Ferricrete floristic community (Rocky Springs type)	VU	Not listed	This tall shrubland is located on irregularly inundated red brown sandy loams over ferricrete dominated by *Acacia blakelyi, Allocasuarina campestris, Dryandra stricta* and *Labichea lanceolata subsp. lanceolata*. Associated species include *Alyogyne hakeifolia, Borya sphaerocephala, Isotoma hypocrateriformis, Petrophile seminuda, Stylidium dichotomum, Thysanotus patersonii* and *Waitzia paniculata*.	Unlikely (based on mapped vegetation units, soils and landform)

3.6.5 Conservation Significant Flora

A total of 22 conservation significant flora species were identified within 5 km of the Entrance Area (Attachment A) based on the desktop assessment. Records returned from the DBCA database search are shown in Figure 7. A likelihood of occurrence assessment was undertaken on all species and is provided in Attachment C.

The likelihood assessment for conservation significant flora was undertaken in line with the criteria outlined in Table 3.5.

Table 3.5: Criteria for Flora Likelihood Assessment

Likelihood	Criteria
Recorded	Species or community has been recorded previously and/or from the field survey.
Likely	Species or community likely to occur as suitable habitat is present and existing records are close to the Survey Area (within 1 km).
Possible	Species or community might occur as there are existing records in the vicinity (within 2.5 km) and suitable habitat is likely to be present. Species or community may also be present if there is insufficient information to exclude presence.
Unlikely	Species or community is unlikely to occur as habitat is not present, or habitat is present, but there are no records within the vicinity.

A total of 8 'Threatened' flora species as listed under Section 178 of the *Environmental Protection and Biodiversity Conservation Act 1999* (C'th) (EPBC Act) and Section 19(1) of the *Biodiversity Conservation Act 2016* (WA) (BC Act) were identified as potentially occurring within 5 km of the Entrance Area. The Threatened flora species with potential to occur in the area and their likelihood of occurrence are shown in Table 3.6.

Table 3.6: Threatened Flora Species Potentially Occurring in the Entrance Area

Taxon	Conservation Status		Description	Likelihood of occurrence
	WA status	C'th status		
Eucalyptus crispata	EN	EN	A lignotuberous mallee from 3-7 m high, with rough bark on the trunk, in partly decorticated curls. Yellow-cream flowers appear from March to June. Prefers lateritic soils.	Unlikely (Habitat present but no records within the vicinity[1])
Daviesia speciosa	EN	EN	Many-stemmed shrub, 0.3-0.8 m high. Fl. red, Apr to May. Gravelly lateritic soils. Undulating plains, rises.	Unlikely (Habitat present but no records within the vicinity)
Eucalyptus leprophloia	EN	EN	(Mallee), 2-5(-8) m high, bark rough loose & flaky to 1 m. Fl. cream-white, Aug to Oct. White or grey sand over laterite. Valley slopes.	Unlikely (Habitat present but no records within the vicinity)
Hakea megalosperma	VU	VU	Spreading, lignotuberous shrub, 1-2 m high. Fl. white-cream/pink, May to Jun. Grey sand, loam. Lateritic hills & rocks.	Unlikely (Habitat present but no records within the vicinity)
Hemiandra gardneri	CR	EN	Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Fl. red/pink-red, Aug to Oct. Grey or yellow sand, clayey sand. Sandplains.	Unlikely (Habitat present but no records within the vicinity)
Leucopogon obtectus (current name: Styphelia obtecta)	EN	EN	Erect, open shrub, up to 1.5 m. Fl. Creamy yellow, Crests and upper slopes of sand dunes. Interdundal swales in grey white/pale yellow sand.	Unlikely (Habitat present but no records within the vicinity)
Paracaleana dixonii	VU	VU	A tuberous perennial orchid from 90-200 mm high, with a single, small basal leaf. Brown-yellow-green-red flowers in the shape of a duck appear from October to December or January. Found in shrubland under *Banksia* on deep sand, or in heath on shallow sand over laterite.	Unlikely (Habitat present but no records within the vicinity)
Thelymitra stellata	EN	EN	A tuberous, perennial orchid from 150-250 mm high. Its yellow and brown flowers appear from October to November. Occurs on sand, gravel, and lateritic loam.	Unlikely (Habitat present but no records within the vicinity)

[1] Vicinity = <2.5km

The remaining identified species were listed as 'Priority' flora species by DBCA as follows:

- Priority 1 flora (P1) – 1 taxon;
- Priority 2 flora (P2) – 2 taxa;
- Priority 3 flora (P3) – 4 taxa; and
- Priority 4 flora (P4) – 2 taxa.

Of these, 4 were considered likely to occur based on the presence of suitable habitat and the location of previous records. Another 3 species were determined to have the potential to occur. The remaining Priority species were considered unlikely to occur.

In addition to those taxa identified by the database search, a survey undertaken by Strategen-JBS&G in unallocated crown land vegetation immediately to the north of the Entrance Area along Tomkins Road in 2021 revealed the presence of the following conservation significant taxa (Strategen-JBS&G 2022):

- *Banksia fraseri* var. *crebra* (P3);
- *Banksia scabrella* (P4);
- *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3);
- *Lasiopetalum ogilvieanum* (P1); and
- *Verticordia luteola var. luteola* (P3).

The potential occurrence of these species in the Entrance Area was therefore also considered as part of the likelihood assessment presented in Attachment C.

No conservation significant flora have been recorded in the Entrance Area.

Legend

- Project area
- Native vegetation (DPIRD)

Aboriginal heritage places (DAA-001)

- Registered site
- Watercourse
- Sensitive receptors

Scale 1:125,000 at A4	0 1 2 Kilometres
Coord. Sys. GDA 1994 MGA Zone 50	
Job No: 63099	
Client: Strike Energy Limited	
Version: A	Date: 16-Sep-2022
Drawn By: cthatcher	Checked By: CT

South Erregulla,WA

NATIVE VEGETATION AND SENSITIVE RECEPTORS

FIGURE 5

strategen JBS&G

File Name: W:\Projects\1)Open\Strike Energy\63099 SE4 Ecological Survey & Approvals\GIS\Maps\M01_Rev_A\63099_05_NativeVegSenReceptrs.mxd
Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Project area
- Cadastral boundary

Pre-European vegetation (DPIRD-006)

- Tathra 379
- Tathra 49
- Minor road

Scale 1:10,000 at A4

0 100 200
Metres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 63099

Client: Strike Energy Limited

Version: A | Date: 14-Jul-2022

Drawn By: ianandagoda | Checked By:CT

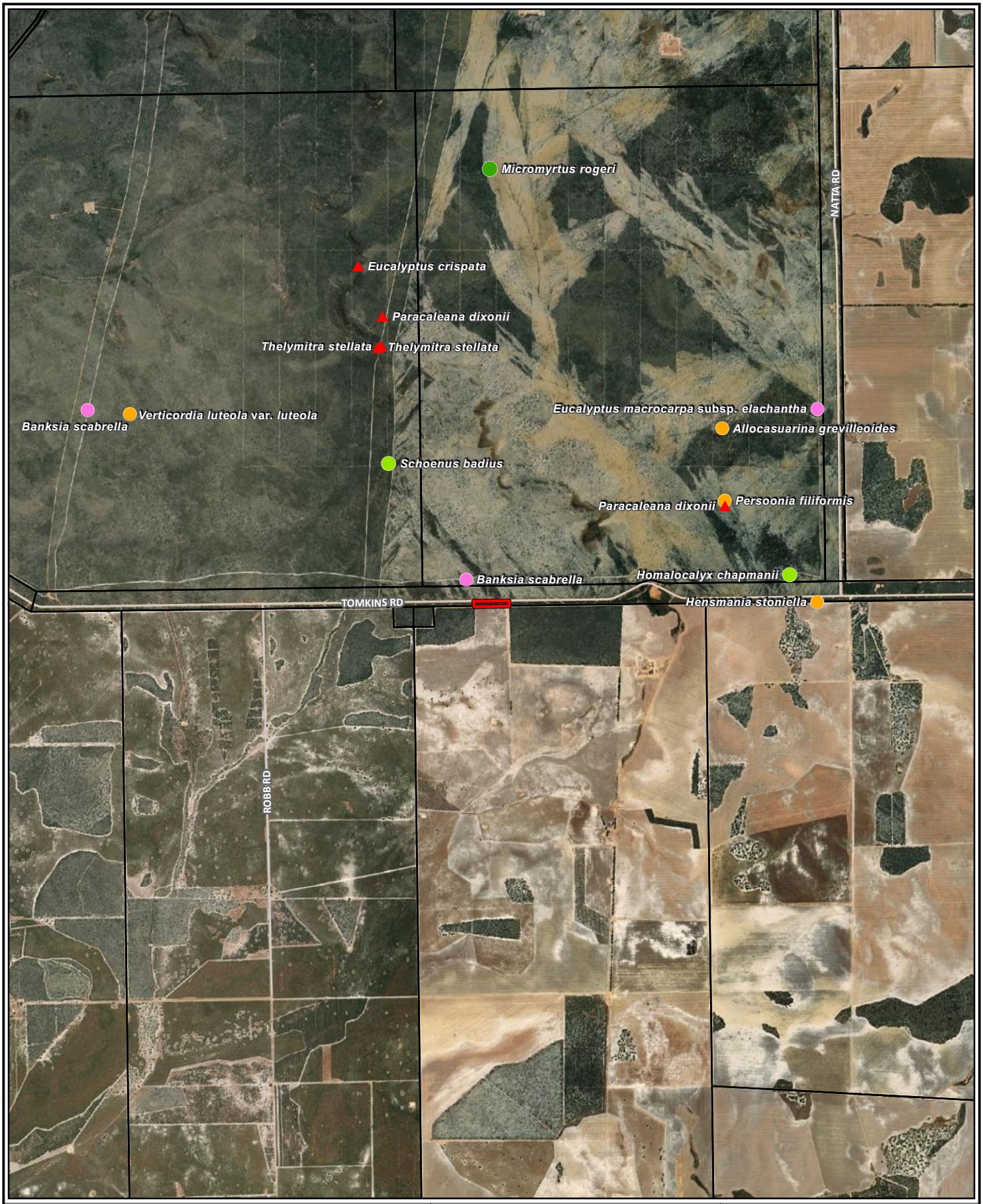
South Erregulla, WA

PRE-EUROPEAN VEGETATION

FIGURE 6

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Strike Energy\63099 SE4 Ecological Survey & Approvals\GIS\Maps\M01_Rev_A\63099_06_PreEuroVeg(Beards).mxd
Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Legend

- Project area
- Cadastral boundary
- Minor road

Conservation significant flora

- T
- P1
- P2
- P3
- P4

Scale 1:50,000 at A4

0 0.5 1
Kilometres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 63099

Client: Strike Energy Limited

Version: A

Date: 14-Jul-2022

Drawn By: ianandagoda

Checked By:CT

South Erregulla, WA

CONSERVATION SIGNIFICANT FLORA

FIGURE 7

strategen JBS&G

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Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

3.7 Conservation Significant Fauna

A total of 26 conservation significant fauna species were identified by database searches of an area within 20 km of the Entrance Area (Attachment A).

Of these, 11 'Threatened' fauna species were listed under Section 178 of the EPBC Act and Section 19(1) of the BC Act. The closest record was of a Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) located approximately 2.9 km to the west northwest of the Entrance Area (Figure 8).

A likelihood of occurrence assessment was undertaken on all fauna species returned from the database searches and is provided in Attachment D. Criteria applied as part of the likelihood assessment are described in Table 3.7.

Table 3.7: Criteria for Fauna Likelihood Assessment

Likelihood	Criteria
Recorded	Species has been recorded previously from the study site.
Likely	Species considered likely to occur as suitable habitat is present and multiple existing records are close to the Survey Area (within 5 km).
Possible	Species has potential to occur as suitable habitat is likely to be present, and there are existing records in the wider vicinity (within 10 km) or the area is insufficiently surveyed to exclude local occurrence.
Unlikely	Species is unlikely to occur as suitable habitat is not considered to be present, or habitat may be present but there are no recent (<25yr) existing records in the wider vicinity (within 10 km).
Very Unlikely	Species is very unlikely to occur as suitable habitat is not considered to be present, and there are no existing records in the wider vicinity (within 10 km).

The Threatened fauna species with potential to occur in the Entrance Area are shown in Table 3.8.

Table 3.8: Threatened Fauna Species Potentially Occurring within the Entrance Area

Taxon	Description	Likelihood of Occurrence
Calidris ferruginea Curlew Sandpiper (CR) SCOLOPACIDAE	The Curlew Sandpiper is a small to medium-sized wader (migratory shorebird). It has a long, black bill with a down-curved end and black legs and feet. In its non-breeding plumage, it is grey-brown above, white below, with a white wing bar visible in flight. In breeding plumage, it is bright reddish brown below and the wings are barred black. The Curlew Sandpiper is a common summer migrant from north-eastern Siberia and Alaska, found in many Australian coastal sites and may also be seen inland in suitable habitats. It is most common in the far southeast and north-west of Australia. It is also found in Africa, across southern Asia to Indonesia and New Guinea, and in New Zealand. The Curlew Sandpiper is found on intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters. Its breeding habitat is the lowland tundra of Siberia.	Very Unlikely (based on habitat preferences)

Taxon	Description	Likelihood of Occurrence
Calyptorhynchus latirostris Carnaby's Black Cockatoo (EN) CACATUIDAE	The Carnaby's Black Cockatoo is a large, dull-black cockatoo with a short erectile crest and a large bill. The bird is mostly grey-black, with narrow off-white fringes to the feathers, giving it a scaly appearance. This is relieved by a patch of cream-coloured feathers on the ear-coverts, and the tail has large white panels, especially noticeable when the bird is flying. Carnaby's Black Cockatoos occur only in south-western Western Australia, between Cape Arid and Kalbarri. The Carnaby's Black Cockatoo inhabits native woodlands dominated by eucalypts such as Wandoo and Salmon Gum, as well as nearby heathlands. From late winter till summer, they usually occupy inland parts of their range, in woodlands dominated by eucalypts such as Wandoo and Salmon Gum which are utilised for breeding. In late summer they move to coastal and near-coastal areas, where they forage within proteaceous shrublands or woodlands of *Banksia* and are sometimes observed in built-up areas.	Possible (based on habitat preferences and proximity of known records)
Dasyurus geoffroii Chuditch; Western Quoll (VU) DASYURIDAE	The Chuditch, also known as the Western Quoll, is the largest carnivorous marsupial that occurs in WA. It has mostly brown fur with distinctive white spots. It has large, rounded ears, a pointed muzzle and a mostly black, brushy tail about three-quarters the length of it head and body. At the time of European settlement, Chuditch were present in all Australian States (except Tasmania); however, they are now only present in approximately 5% of their former range. Most Chuditch are now found in varying densities throughout the jarrah forest and south coast of Western Australia. They also occur at lower densities in the goldfields and wheatbelt, as well as in Kalbarri National Park (translocated). Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian jarrah forest. Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive. They are capable of travelling long distances and have large home ranges, and even at their most abundant, Chuditch are generally present in low numbers. For this reason, they require habitats that are of a suitable size and not excessively fragmented.	Unlikely (based on habitat preferences and primary distribution)
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink (EN) SCINCIDAE	The Western Spiny-tailed Skink is one of the larger subspecies of *Egernia stokesii*, growing to 194 mm (snout to vent length). Its skin is coloured with heavily keeled scales. It has a short, flattish, distinctively spiny tail which it uses as anchorage within crevices when defending. There are two forms of Western Spiny-tailed Skink: a reddish-brown form, with angular pale blotches arranged in irregular bands and a paler underside, in the northern and central wheatbelt; and a wholly black form in the Murchison region. The Western Spiny-tailed Skink is known to occur in a broad semi-arid area in southwest Western Australia, between Shark Bay and Minnivale and east to Cue. Much of area now known as the wheatbelt has been cleared since the 1960s and suitable microhabitat is now far less abundant, although an increasing number of skinks are being located in altered habitat under piles of wood, scrap metal or under buildings on private property. Most records of the brown form Western Spiny-tailed Skink are in York Gum woodland with some records in Gimlet and Salmon Gum woodland. Populations persist in woodland patches as small as one hectare and completely surrounded by wheatfields. Sites with the greatest number of individuals contain numerous fallen logs and were subjected to low intensity grazing by domestic.	Unlikely (based on habitat preferences and lack of local records)

Taxon	Description	Likelihood of Occurrence
Falco hypoleucos Grey Falcon (VU) FALCONIDAE	Known to occur widely in arid or semi-arid zones of Australia where annual rainfall does not exceed 500 mm, this species frequents lowland wooded plains and shrublands, especially *Acacia* shrublands netted by watercourses. It hunts primarily on avian prey including doves, pigeons, finches and small psittacines within grasslands. Breeding occurs from June to November, with young staying with the parents for more than 12 months after fledging, even if a new brood is reared. Nests are built in the tallest available tree along a watercourse, typically in species such as *Eucalyptus camaldulensis* (River Red Gum). This bird occurs at very low densities throughout Australia and is considered to be an elusive species. It is unlikely to nest within the Entrance Area due to lack of suitable nesting or roosting trees, however, use of the area as foraging habitat is possible.	Unlikely (based on habitat preferences and lack of local records)
Idiosoma nigrum Shield-backed Trapdoor Spider (VU) IDIOPIDAE	The Shield-backed Trapdoor Spider is dark brown to black, large (females up to 30 mm in body length) and with a distinctive thick and hard cuticle on the abdomen. The end of the abdomen is flattened into a shield and the sides are deeply corrugated. The burrows always have a lightweight, leaf litter and silk door, with leaf and twig trip-lines fanning out from the centre of the front of the burrow rim. The Shield-backed Trapdoor Spider is endemic to semi-arid southwest WA. It occurs in a number of severely fragmented populations in the central and northern Wheatbelt. Further north, the species occurs in more arid, isolated ranges in the Midwest (e.g., Jack Hills, Weld Range, Blue Hills, etc.) and coastal areas of the Midwest (e.g., Murchison River, Shark Bay, etc.). The arid Midwest populations are naturally fragmented or isolated because they persist only on ranges, but the Wheatbelt and coastal Midwest populations are all severely fragmented as a result of land clearing. Arid Midwest populations are associated with rocky habitats, primarily in positions with increased moisture retention properties like gullies and drainage lines on southern facing slopes.	Very Unlikely (based on habitat preferences and lack of local records)
Leipoa ocellata Malleefowl (VU) MEGAPODIIDAE	The Malleefowl is a large ground-dwelling bird with strong feet and a short bill. The head and neck are mostly grey, with a dark stripe extending down along foreneck from the throat to the upper breast, and the underparts are mostly creamy-coloured, but it is the upperparts that are most striking. The upperwings are a complex combination of mottles, barring and variegations of grey, cream, black and Rufous. The bill is blackish, and the legs and feet are pale greyish. The Malleefowl occurs in semi-arid parts of mainland Australia, ranging from New South Wales (west of the Great Divide), extending into north-western Victoria and the Riverland of South Australia; on the Eyre Peninsula of South Australia, extending into the Great Victoria Desert; and in southern and western parts of Western Australia. Malleefowl usually occur in mallee eucalypt woodlands with a dense but discontinuous canopy and varied shrubby understorey, especially where the mallee trees are multi-stemmed. They also very occasionally occur in other types of dry eucalypt forests. The key to their presence is the period since the habitat was last burnt, with habitat that has not been burnt for 40–60 years preferred; frequently burnt areas are unsuitable and do not support populations of Malleefowl.	Unlikely (based on habitat preferences and lack of local records)

Taxon	Description	Likelihood of Occurrence
Macroderma gigas Ghost Bat (VU) MEGADERMATIDAE	The ghost bat is the largest microchiropteran bat in Australia, with a head and body length of 10 – 13 cm and a forearm length of 10 – 11 cm. It is Australia's only carnivorous bat. Its fur is light to dark grey above and paler below. It has long ears which are joined together, large eyes, a simple noseleaf and no tail. Since the arrival of Europeans, ghost bats have contracted further northwards, with much of their arid zone distribution disappearing in the past few decades. Ghost bats occur in the Pilbara, Kimberley (including several islands, northern Territory (including Groote Eylandt), and coastal and near coastal eastern Queensland from Cape York to near Rockhampton. Ghost bats disperse widely when not breeding, but concentrate in a relatively few maternity roost sites when breeding. Few of these sites are known and most are not protected or managed. Roost sites include caves, rock crevices and disused mine adits. Preferred roosting habitat is caves beneath bluffs of low rounded hills.	Very Unlikely (based on habitat preferences)
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew (CR) SCOLOPACIDAE	Found in all states and territories of Australia in primarily coastal areas, this migratory bird occupies Australian habitat through the non-breeding season, moving north through Asia to breed from early May to late June. During its Australian inhabitation it is associated with estuaries and coastal lagoons, favouring large mudflats, saltmarsh and mangrove habitats. They roost on sandy spits or amongst vegetation of marshy areas, preferring to roost in large flocks separated from other shorebirds. Crustaceans such as crabs and prawns, molluscs and invertebrates form the bulk of the bird's diet. Feeding activity is governed by the tide and is thus both diurnal and nocturnal.	Very Unlikely (based on habitat preferences)
Parantechinus apicalis Dibbler (EN) DASYURIDAE	This small carnivorous marsupial was formerly widespread along the west and south coasts of Australia but is now restricted to a small number of sites of mainland Western Australia, and several offshore islands near Jurien. Although the species is known to utilise diverse habitats, preferred habitat includes heathland on sandy or occasionally lateritic soils, and long-unburnt vegetation over 1 m high with dense canopy. Diet includes predominantly invertebrates, with a portion comprised of plant matter which varies, likely due to conditions. It is thought that the availability of flowering shrubs from the Proteaceae and Myrtaceae families may be of importance within forage habitat. Breeding is seasonal, with mating taking place over 3-4 weeks from late March, after which males may die as part of a phenomenon termed "facultative male die-off". Young are born in April or May, with litters of up to eight young carried in the female's shallow pouch. Juveniles have been trapped in September.	Very Unlikely (based on restricted distribution and lack of local records)
Rostratula australis Australian Painted Snipe (EN)	The Australian Painted Snipe is a snipe-like shorebird with a bulbous-tipped bill, broad, rounded wings and longish legs that protrude beyond the tip of the tail when in flight. The sexes differ. Males have a dark-brown crown with a buff median stripe; the rest of the head and neck are dark ashy-grey, with a cream-coloured, comma-shaped mark around the eye. The species occupies shallow freshwater or brackish wetlands, such as saltmarshes, swamps, claypans and waterlogged grasslands, where it forages for aquatic invertebrates and occasionally grass seeds. They may forage during day or night time, but generally remains in dense cover where available.	Very Unlikely (based on habitat preferences)

The 15 remaining species were listed as either 'Priority' or 'Other Specially Protected Species' under the BC Act, or 'Marine' or 'Migratory' under the EPBC Act.

3.8 Matters of National Environmental Significance

Matters of National Environmental Significance (MNES) identified in the vicinity of the Entrance Area using the Protected Matters Search Tool (PMST) included Threatened flora, fauna, and ecological

communities and fauna listed as Migratory or Marine (see Attachment B). The potential for these to occur in the Entrance Area has been addressed in the above sections, as well as in Attachment C and Attachment D.

One MNES – Carnaby's Black Cockatoo (Endangered) – was assessed as possibly occurring in the Entrance Area based on existing records and preferred habitat; this species is discussed further below. No other Threatened flora or fauna species are previously recorded or assessed as having a 'Possible' or 'Likely' chance of occurrence.

3.9 Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) [EN; EN]

The desktop assessment identified multiple records of Carnaby's Black Cockatoo, including a known roost site approximately 2.9 km to the northwest the Entrance Area (Figure 8).

Carnaby's Black Cockatoo is listed as Endangered under the EPBC Act, and a National Recovery Plan is in place (DPaW 2013). However, there is no approved Conservation Advice or Listing Advice for the species. The National Recovery Plan describes the species' distribution, habitat and population and identifies known threats to the species (DPaW 2013).

3.9.1 Distribution and Habitat

Carnaby's Black Cockatoo is endemic to the southwest of Western Australia, ranging from the Lower Murchison in the north, Esperance in the south and Forrestania in the east. The species exists as two genetically distinct subpopulations – an eastern and western population; the latter subpopulation occurs within the broader region (EPA 2019).

There is no accurate estimate of population numbers, and little is known about the species' occurrence within the region. Smaller, important populations for the long-term survival of the species have not been defined for black cockatoos due to the mobile and widely dispersed nature of the species and variation in flock compositions (DSEWPaC 2012; DAWE 2017). For this reason, it is more appropriate to consider significance in terms of impacts on habitat and individuals rather than a resident population (DAWE 2017).

Carnaby's Black Cockatoo is predominantly restricted to areas of remnant native woodland with an understory dominated by proteaceous species such as *Banksia*, *Hakea* and *Grevillea*. However, the species is highly mobile and adaptive, and accesses resources spread over a relatively large area (DPaW 2013). Mapping of the species has proven difficult due to seasonal migration and movement over long distances. This mobility, in combination with the adaptive behaviour of the species, indicates that the significance of locations within the species' range, especially in reference to breeding, is likely to continue to change over time. Breeding occurs mainly in the Wheatbelt and extends to Hopetoun and Ravensthorpe (DAWE 2017). During the non-breeding season (January to July), most individuals migrate to the Mid West, Swan Coastal Plain and South coastal regions (DAWE 2017).

Identified breeding and nearby feeding habitat, former breeding habitat that has hollows intact and vegetation that provides habitat for feeding, watering and regular night roosting for Carnaby's Black Cockatoo are defined as 'habitat critical to the recovery' of the species (DPaW 2013). This includes all areas of breeding habitat including known nesting trees, and foraging areas that support breeding.

As stated above, the Entrance Area does occur in proximity to a known record of the species; however, it does not occur within the species' breeding range (DAWE 2017). Mapping of Carnaby's Black Cockatoo foraging habitat carried out by Bamford (2020) designated the vegetation within the vicinity of the Entrance Area as having 'Low to moderate foraging value'. As such, the species is considered to have potential to utilise vegetation within the Entrance Area on an occasional basis for foraging purposes; However, the species is not considered to be reliant upon this vegetation as a primary forage resource or on the Entrance Area for breeding activity.

Legend

- Project area

Conservation significant fauna

- Endangered species
- Specially protected migratory species
- Other specially protected species
- Priority 3 species
- Priority 4 species

Scale 1:275,000 at A4

0 2 4
Kilometres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 63099

Client: Strike Energy Limited

Version: A | Date: 14-Jul-2022

Drawn By: ianandagoda | Checked By:CT

South Erregulla, WA

CONSERVATION SIGNIFICANT FAUNA

FIGURE 8

strategen JBS&G

File Name: \\008PMPMR004V001.jbsg.aust\JBS Perth\Projects\1)Open\Strike Energy\63099 SE4 Ecological Survey & Approvals\GIS\Maps\M01_Rev_A\63099_08_ConSigFauna.mxd
Image Reference: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Attachment A: DBCA Database Search Results

Provided as separate Excel workbook

wkt_geom	OCC_UNIQ	COM_ID	COM_NAM	STATE_CAT	COMM_CA	S_ID_COU	FIRST_S_ID	LAST_S_ID
MultiPolyg	653	Mound Spr	Assemblag	Endangered		4	6	MSTS02JB
MultiPolyg	685	Mound Spr	Assemblag	Endangered		2	JB13	MSTS12
MultiPolyg	1948	Mound Spr	Assemblag	Endangered		1	MSTS17	
MultiPolyg	1947	Mound Spr	Assemblag	Endangered		1	MSTS16	
MultiPolyg	688	Mound Spr	Assemblag	Endangered		1	MSTS14	
MultiPolyg	683	Mound Spr	Assemblag	Endangered		2	JB19	MSTS11
MultiPolyg	1965	Mound Spr	Assemblag	Endangered		1	MSTS18	
MultiPolyg	1966	Mound Spr	Assemblag	Endangered		1	MSTS19	
MultiPolyg	1967	Mound Spr	Assemblag	Endangered		1	MSTS20	
MultiPolyg	1968	Mound Spr	Assemblag	Endangered		1	MSTS21	
MultiPolyg	1969	Mound Spr	Assemblag	Endangered		1	MSTS22	
MultiPolyg	1970	Mound Spr	Assemblag	Endangered		1	MSTS23	
MultiPolyg	901	Mound Spr	Assemblag	Endangered		3	JB29	TSWT
MultiPolyg	443	Ferricrete	Ferricrete f	Vulnerable		6	BUNNEY1	NNR226B
MultiPolyg	2228	Ferricrete	Ferricrete f	Vulnerable		1	Bunney1a	
MultiPolyg	654	Mound Spr	Assemblag	Endangered		2	JB03	MSTS03
MultiPolyg	686	Mound Spr	Assemblag	Endangered		4	JB01	Pool
MultiPolyg	669	Mound Spr	Assemblag	Endangered		2	JB04	MSTS04
MultiPolyg	2225	Mound Spr	Assemblag	Endangered		1	JB05	
MultiPolyg	670	Mound Spr	Assemblag	Endangered		7	Dense Sed	Pool 1
MultiPolyg	651	Mound Spr	Assemblag	Endangered		8	Flooded Se	Pool 2
MultiPolyg	2224	Mound Spr	Assemblag	Endangered		1	JB02	
MultiPolyg	671	Mound Spr	Assemblag	Endangered		2	JB06	MSTS06
MultiPolyg	2226	Mound Spr	Assemblag	Endangered		1	MSTS07a	
MultiPolyg	672	Mound Spr	Assemblag	Endangered		2	JB32	MSTS07
MultiPolyg	674	Mound Spr	Assemblag	Endangered		2	JB17	MSTS09
MultiPolyg	2227	Mound Spr	Assemblag	Endangered		1	JB37	
MultiPolyg	682	Mound Spr	Assemblag	Endangered		1	MSTS10	
MultiPolyg	2230	Ferricrete	Ferricrete f	Vulnerable		1	Bunney1c	
MultiPolyg	2231	Ferricrete	Ferricrete f	Vulnerable		1	Bunney1d	
MultiPolyg	2229	Ferricrete	Ferricrete f	Vulnerable		1	Bunney1b	
MultiPolyg	673	Mound Spr	Assemblag	Endangered		2	JB12	MSTS08
MultiPolyg	2207	Ferricrete	Ferricrete f	Vulnerable		3	Yan075	Yan077
MultiPolyg	2237	Ferricrete	Ferricrete f	Vulnerable		1	Yan05	
MultiPolyg	2232	Mound Spr	Assemblag	Endangered		1	Yan01	
MultiPolyg	2233	Mound Spr	Assemblag	Endangered		1	MSTS (Yan02)	
MultiPolyg	2234	Mound Spr	Assemblag	Endangered		1	Yan03	
MultiPolyg	2235	Mound Spr	Assemblag	Endangered		1	Yan04	
MultiPolyg	2236	Mound Spr	Assemblag	Endangered		1	MSTS15a	
MultiPolyg	2206	Ferricrete	Ferricrete f	Vulnerable		1	WINR	
MultiPolyg	124926	Mound Spr	Assemblag	Endangered		1	Harding02	
MultiPolyg	124925	Mound Spr	Assemblag	Endangered		1	Harding01	
MultiPolyg	124922	Mound Spr	Assemblag	Endangered		1	ArrowsmithMS1	
MultiPolyg	124923	Mound Spr	Assemblag	Endangered		1	ArrowsmithMS2	

BUFFER	BDY_ID	ORIG_FID	OBJECTID	Shape_Len	Shape_Area
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5000	613	474	0	0	0
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5000	615	476	0	0	0
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5000	761	610	0	0	0
5000	762	611	0	0	0
5000	763	612	0	0	0
5000	764	613	0	0	0
5000	765	614	0	0	0
5000	766	615	0	0	0
5000	848	683	0	0	0
5000	954	778	0	0	0
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5000	956	780	0	0	0
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5000	962	786	0	0	0
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5000	979	803	0	0	0
5000	980	804	0	0	0
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500	121951	120186	0	0	0
500	0	898	0	0	0
500	0	899	0	0	0

Attachment B: PMST search results

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

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

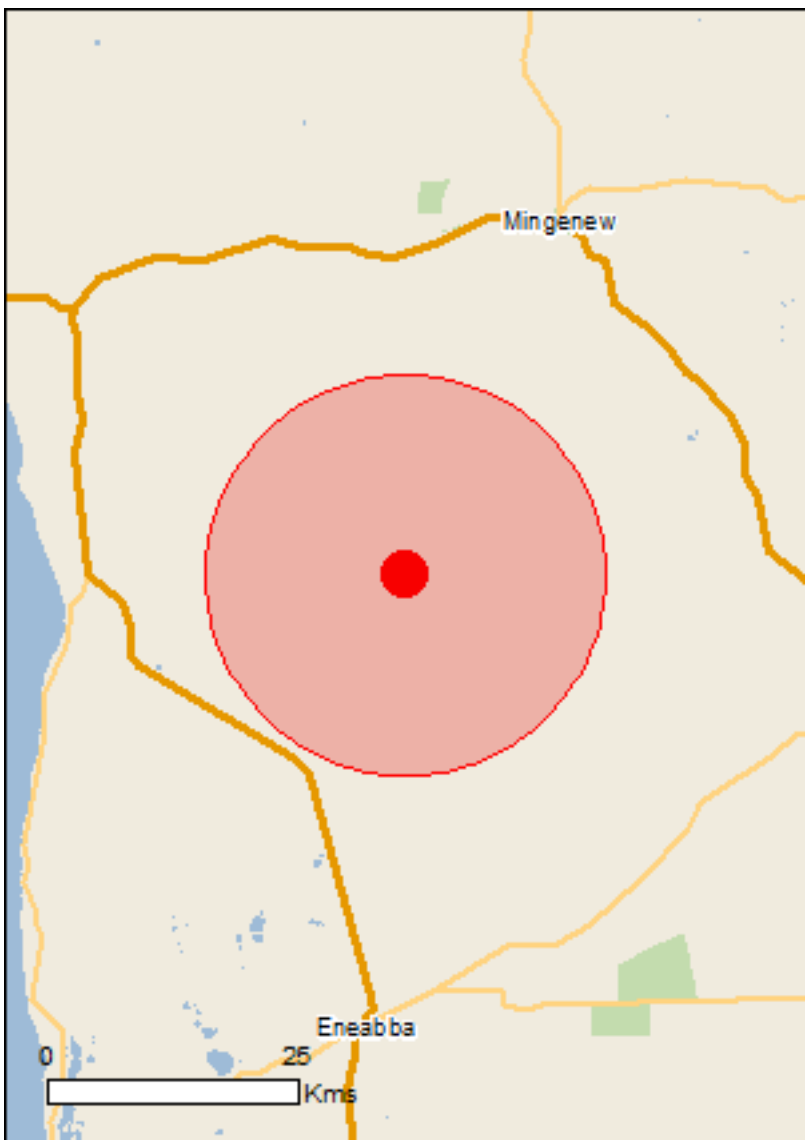
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 30/06/22 12:27:58

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

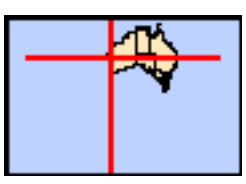
Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 20.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	26
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	14
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus latirostris		
Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Falco hypoleucos		
Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata		
Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Macroderma gigas		
Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Parantechinus apicalis		
Dibbler [313]	Endangered	Species or species habitat may occur within area
Other		
Idiosoma nigrum		
Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Conostylis dielsii subsp. teres		
Irwin's Conostylis [3614]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Conostylis micrantha Small-flowered Conostylis [17635]	Endangered	Species or species habitat may occur within area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
Daviesia speciosa Beautiful Daviesia [56698]	Endangered	Species or species habitat known to occur within area
Eucalyptus crispata Yandanooka Mallee [24268]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat known to occur within area
Hakea megalosperma Lesueur Hakea [10505]	Vulnerable	Species or species habitat may occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat may occur within area
Hypocalymma angustifolium subsp. Hutt River (S.Patrick 2982) [85023]	Endangered	Species or species habitat likely to occur within area
Leucopogon obtectus Hidden Beard-heath [19614]	Endangered	Species or species habitat likely to occur within area
Paracaleana dixonii Sandplain Duck Orchid [86882]	Endangered	Species or species habitat known to occur within area
Tetratheca nephelioides [83217]	Critically Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area
Wurmbea tubulosa Long-flowered Nancy [12739]	Endangered	Species or species habitat may occur within area
Reptiles		
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
NTWA Bushland covenant (0101)	WA
Unnamed WA12705	WA
Unnamed WA25495	WA
Unnamed WA47436	WA
Wilson	WA

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-29.46879 115.30263

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Attachment C: Flora likelihood of occurrence assessment

Taxon	Conservation Status		Description	Likelihood of occurrence
	BC Act	EPBC Act		
Allocasuarina grevilleoides	P3	Not Listed	Dioecious, lignotuberous shrub, 0.15-0.4 m high. Sand over laterite, gravel.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Banksia fraseri var. *crebra*	P3	Not Listed	Dense, low shrub to 1 m high. Fl. Yellow-brown in July or August. White sand, brown clay or sandy soils with laterite. Often associated with Allocasuarina spp. in vegetation.	Likely based on habitat preference and proximity of previous records
Banksia scabrella	P4	Not Listed	Much-branched, lignotuberous shrub, 0.6-2 m high. Fl. yellow & cream & purple, Sep to Dec or Jan. White, grey or yellow sand, sometimes with lateritic gravel. Sandplains, lateritic ridges.	Likely based on habitat preference and location of previous records
Daviesia speciosa	EN	EN	Many-stemmed shrub, 0.3-0.8 m high. Fl. red, Apr to May. Gravelly lateritic soils. Undulating plains, rises.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Eucalyptus crispata	EN	EN	A lignotuberous mallee from 3-7 m high, with rough bark on the trunk, in partly decorticated curls. Yellow-cream flowers appear from March to June. Prefers lateritic soils.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Eucalyptus leprophloia	EN	EN	(Mallee), 2-5(-8) m high, bark rough loose & flaky to 1 m. Fl. cream-white, Aug to Oct. White or grey sand over laterite. Valley slopes.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Eucalyptus macrocarpa subsp. *elachantha*	P4	Not Listed	(Spreading or sprawling mallee), 0.8-4 m high, bark smooth, grey over salmon pink. Fl. red-pink, Aug to Sep or Nov to Dec. White or grey sand over laterite. Hillslopes, ridges, sandplains.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Hakea megalosperma	VU	VU	Spreading, lignotuberous shrub, 1-2 m high. Fl. white-cream/pink, May to Jun. Grey sand, loam. Lateritic hills & rocks.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Hemiandra gardneri	CR	EN	Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Fl. red/pink-red, Aug to Oct. Grey or yellow sand, clayey sand. Sandplains.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Hemiandra sp. Eneabba (H. Demarz 3687)	P3	Not Listed	Straggly, erect shrub, 0.5-0.9 m high, to 0.4 m wide. Fl. blue/violet, Feb. Sand. Disturbed sites.	Likely based on habitat preference and proximity of previous records
Hensmania stoniella	P3	Not Listed	Tufted, stilt-rooted perennial, herb, 0.1-0.2 m high. Fl. yellow-cream-white, Sep to Nov. White, grey or lateritic sand, often winter-wet.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Homalocalyx chapmanii	P2	Not Listed	Shrub, 0.2-0.5 m high. Fl. red-pink-purple, Sep to Oct. Yellow or grey/brown sand. Undulating plains, weathered granite.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Lasiopetalum ogilvieanum	P1	Not Listed	Shrub, 0.45-1.5 m high. Fl. pink-white, Jul to Oct. White/grey or yellow sand, stony loam. Undulating plains, lateritic rises.	Possible based on habitat preference and location of previous records
Leucopogon obtectus (current name: Styphelia obtecta)	EN	EN	Erect, open shrub, up to 1.5 m. Fl. Creamy yellow, Oct to March. Crests and upper slopes of sand dunes. Interdundal swales in grey-white/pale yellow sand.	Unlikely - Habitat present but no records within the vicinity (<2.5km)

Taxon	Conservation Status		Description	Likelihood of occurrence
	BC Act	EPBC Act		
Mesomalaena stygia subsp. *deflexa*	P3	Not Listed	Tufted perennial, grass-like or herb (sedge), 0.1-0.5 m high. Fl. brown-black, Mar to Oct. White, grey or lateritic sand, clay, gravel.	Possible based on habitat preference and location of previous records
Micromyrtus rogeri	P1	Not Listed	Shrub, 0.2-0.4 m high. Fl. white, Jul to Oct. Yellow-brown sandy soils, gravel, laterite. Breakaways.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Paracaleana dixonii	VU	VU	A tuberous perennial orchid from 90-200 mm high, with a single, small basal leaf. Brown-yellow-green-red flowers in the shape of a duck appear from October to December or January. Found in shrubland under Banksia on deep sand, or in heath on shallow sand over laterite.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Persoonia filiformis	P3	Not Listed	Erect, spreading, lignotuberous shrub, 0.07-0.4 m high. Fl. yellow, Nov to Dec. Yellow or white sand over laterite.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Schoenus badius	P2	Not Listed	Slender annual, grass-like or herb (sedge), 0.05-0.12 m high. Fl. brown-green, Sep to Oct. Grey sand. Moist areas.	Unlikely based on habitat preference
Schoenus griffinianus	P4	Not Listed	Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Fl. Sep to Oct. White sand.	Possible based on habitat preference and location of previous records
Thelymitra stellata	EN	EN	A tuberous, perennial orchid from 150-250 mm high. Its yellow and brown flowers appear from October to November. Occurs on sand, gravel and lateritic loam.	Unlikely - Habitat present but no records within the vicinity (<2.5km)
Verticordia luteola var. luteola	P3	Not Listed	Slender shrub, 0.5-1.4 m high. Fl. white-yellow, Nov to Dec. Grey sand over gravel. Flats.	Likely based on habitat preference and location of previous records

Attachment D: **Fauna likelihood of occurrence assessment**

Class	Scientific Name	Common Name	WA Status	C'wealth Status	DBCA Search	PMST Search	PMST attribution	Likelihood of occurrence
BIRD	*Actitis hypoleucos*	Common Sandpiper	MI	MI, MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Apus pacificus*	Fork-tailed Swift	MI	MI, MA	x	x	Species or species habitat likely to occur	Unlikely (no local records within 10km)
BIRD	*Bubbulcus coromandus (Ardea ibis)*	Cattle Egret	MI	MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Calidris acuminata*	Sharp-tailed Sandpiper	MI	MI, MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Calidris ferruginea*	Curlew Sandpiper	CR, MI	CR, MI, MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Calidris melanotos*	Pectoral Sandpiper	-	MI, MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Calyptorhynchus latirostris*	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	EN	EN	x	x	Species or species habitat known to occur	Possible (recent proximal record)
BIRD	*Chalcites osculans (Chrysococcyx osculans)*	Black-eared Cuckoo	-	MA		x	Species or species habitat likely to occur	Unlikely (no local records, preferred habitat absent)
BIRD	*Falco hypoleucos*	Grey Falcon	VU	VU		x	Species or species habitat may occur	Unlikely (no local records)
BIRD	*Falco peregrinus*	Peregrine falcon	OS	-	x			Unlikely (no local records within 10km)
BIRD	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	MI	MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Leipoa ocellata*	Malleefowl	VU	VU		x	Species or species habitat likely to occur	Unlikely (no local records)
BIRD	*Merops ornatus*	Rainbow Bee-eater	-	MA		x	Species or species habitat may occur	Unlikely (no local records)
BIRD	*Motacilla cinerea*	Grey Wagtail	MI	MI, MA		x	Species or species habitat may occur	Unlikely (absence of suitable habitat)
BIRD	*Numenius madagascariensis*	Eastern Curlew, Far Eastern Curlew	VU, MI	CR, MI, MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Pandion cristatus*	Osprey, eastern osprey	MI	MI		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Rostratula australis (Rostratula benghalensis)*	Australian Painted Snipe	EN, MI	EN, MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)
BIRD	*Thinornis rubricollis*	Hooded plover, hooded dotterel	P4	MA		x	Species or species habitat may occur	Very Unlikely (habitat not considered to be present)

Class	Scientific Name	Common Name	WA Status	C'wealth Status	DBCA Search	PMST Search	PMST attribution	Likelihood of occurrence
BIRD	*Tringa nebularia*	Common greenshank, greenshank	MI	MI, MA	x			Very Unlikely (habitat not considered to be present, no records within 10km)
INVERTEBRATE	*Idiosoma nigrum*	Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider	EN	VU		x	Species or species habitat likely to occur	Unlikely (no local records)
INVERTEBRATE	*Phasmodes jeeba*	Springtime corroboree stick katydid (Eneabba)	P3	-	x			Unlikely (no records within 10km)
MAMMAL	*Dasyurus geoffroii*	Chuditch, Western Quoll	VU	VU		x	Species or species habitat likely to occur	Unlikely (no local records)
MAMMAL	*Macroderma gigas*	Ghost bat	VU	VU		x	Species or species habitat may occur	Very Unlikely (habitat not expected to be present)
MAMMAL	*Notamacropus irma*	western brush wallaby	P4	-	x			Unlikely (no local records within 10km)
MAMMAL	*Parantechinus apicalis*	Dibbler	EN	EN		x	Species or species habitat may occur	Very Unlikely (no local records, outside of known current distribution)
REPTILE	*Egernia stokesii badia*	Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink	VU	EN		x	Species or species habitat likely to occur	Unlikely (no local records within 10km)

Note: 'Local' records are considered to be those within 10 km of the Entrance Area.