RECONNAISSANCE FLORA, VEGETATION AND BASIC FAUNA SURVEY REPORT

Line 51 Esperance Branch Line, Esperance to Gibson – Degrussa Road (350.284 to 354.231 KM)

Gibson, WA 6448

Final

22/02/2023

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

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Executive Summary

Arc Infrastructure ("the client") commissioned Bio Diverse Solutions as Environmental Consultants to undertake a spring reconnaissance flora and vegetation survey and a basic (previously reconnaissance) fauna assessment for a total of 4.47 ha along Railway Line 51, north and south of Degrussa Road railway crossing, within the Shire of Esperance. Specifically, the survey was conducted along railway kilometre markings (KM) 350.284 to 354.231 KM. This corresponded with Site 8 of the 2022 scope of works program, as instructed by Arc Infrastructure. The reconnaissance survey was required to assess the impact on areas of native vegetation proposed to be cleared for a significant construction and maintenance project along the railway line, and to detect and report on the presence of any priority or threatened flora, fauna and ecological communities. An environmental risk assessment was completed prior to the biological survey to identify areas requiring clearing permits or further environmental approvals to allow for operations to occur. This process mitigated and reduced the environmental impact of the project by planning to use areas in a more degraded condition or previously cleared areas. A final report was submitted to Arc Infrastructure for review prior to approval for submission to DWER, as supporting information for a clearing permit application.

Eight vegetation units were recorded within the survey area, primarily associated with changes in topography, hydrology and soil type. Richness of ecological communities was therefore considered to be high within the survey area, indicating a high landscape-level diversity. Numerous vegetation units were significantly related to hydrological systems (primarily salt lakes) and considered riparian vegetation, specifically Vegetation Unit 3: *Melaleuca cuticularis* and Sedge Wetland (McSW), Vegetation Unit 5: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland (HaSHhS) and Vegetation Unit 6: Shrub and Samphire Salt Lake (SSSL). Condition of vegetation ranged from 'Completely Degraded' to 'Excellent' condition, with the majority of the survey area being in 'Very Good' to 'Good' condition. Due to the range of vegetation conditions present and high biological value, it is strongly recommended that a biosecurity operational plan is developed to limit the spread of plant pathogens and non-native species internally within the survey area.

The desktop assessment and 'Likelihood of Occurrence (LOO)' detected 7 Threatened and 73 Priority flora within the study area (30 km buffer surrounding the survey area). Of these, 10 were assessed as 'likely' and 31 as 'possible' to occur. Six species, P1 *Pimelea pelinos,* P2 *Thysanotus brachiatus,* P2 *Hibbertia turleyana,* P3 *Brachyloma mogin,* P3 *Astartea reticulata* and P4 *Frankenia glomerata,* that were identified in the LOO as 'possible' to occur were not expected to be flowering at the time of the survey and were therefore unlikely to be detected if present. Furthermore, they are small shrubs which are easily obscured by dense vegetation. These factors may have imposed a minor limitation on the findings.

A total of 218 flora species were recorded, indicating a high level of species richness used as a measure for floral diversity. This consisted of 187 native species and 31 introduced / non-native species. One of these weeds was of high concern, specifically *Asparagus asparagoides* (Bridal Creeper), a Declared Pest under the *BAM Act 2007* and a Weed of National Significance. In total, six species of priority flora were detected within the survey area: P1 *Darwinia* sp. Gibson (R.D. Royce 3569), P2 *Leucopogon ?bossiaea,* P2 *Conostylis seorsiflora* subsp. *longissima,* P3 *Austrobaeckea uncinella,* P3 *Kunzea salina* and P3 *Persoonia scabra.* Populations of *D.* sp. Gibson (R.D. Royce 3569) and *L. ?bossiaea* were already known, and the remaining four priority species were considered new populations. Four plants of *D.* sp. Gibson (R.D. Royce 3569), 83 plants of *L. ?bossiaea,* 92 plants of *K. salina* and two plants of *P. scabra* were detected within the survey area. The total number of plants of *C. seorsiflora* subsp. *longissima* and *A. uncinella* is unknown, as their priority status was not recognised until samples were examined following the completion of fieldwork. A count of a population therefore, did not occur, and a targeted flora survey specifically for these two species may be required to determine population dynamics and the potential level of impact associated with the proposed works. The population of *L. ?bossiaea* was first collected and verified in 2021, during a reconnaissance flora survey completed for the client in the adjacent railway corridor (BDS, 2022). Flowering was not occurring and the specimen submitted to the WA Herbarium was sterile, with identification unable to be verified with full confidence. The prefix '?' has therefore been applied as a prefix to the species name. Flowering was also not occurring during 2022 so no further collections were made. Priority flora were detected within Vegetation Unit 5: HaSHhS, Vegetation Unit 6: SSSL and Vegetation Unit 7: Mixed Mallee Shrubland and *Anarthria scabra* Sedgeland (MMSAsS). Vegetation Unit 7: MMSAsS, was noted to contain all priority flora recorded during the field survey indicating the high habitat value for priority flora of the vegetation unit.

Two Threatened (TEC) and Priority (PEC) ecological communities were identified in the desktop assessment, with TEC / PEC 'Subtropical and Temperate Coastal Saltmarsh' assessed as 'Unlikely' to occur and TEC / PEC 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' assessed as 'Likely' to

occur. A single vegetation unit bore similarity to Kwongkan TEC / PEC criteria; specifically Vegetation Unit 8: Mixed Shrubland (MS). It was highly diverse and contained a large number of Proteaceae species that represented a significant portion of the floristic composition. However, it was determined as not meeting Kwongkan TEC / PEC criteria due to being a small, isolated patch (0.16 ha) surrounded entirely by Completely Degraded or Degraded vegetation.

A total of 25 fauna species were recorded during the survey, consisting of 17 birds, four mammals, two reptiles, and two invertebrates. Of the fauna species observed, one was listed as Priority, specifically *Isoodon fusciventer*, (quenda / southern brown bandicoot, P4). No migratory species were detected. Two introduced fauna species were recorded, namely *Oryctolagus cuniculus* (rabbit) and *Vulpes vulpes* (European red fox). Eight fauna habitat units were identified within the survey area: HT1: Mixed Shrubland [Mixed SL], HT2: Disturbed/Cleared Vegetation [DC Veg], HT3: *Melaleuca cuticularis* Shrubland [Melcut SL], HT4: Yate Open Woodland [YOW], HT5: *Hakea adnata* Shrubland [Hakadn SL], HT6: *Melaleuca brevifolia* Shrubland [Melbre SL], HT7: Mallee Woodland [MW], and HT8: Mixed Eucalypt Woodland and Proteaceous Shrubland [MEWPS]. Of the eight units, HT1: Mixed SL, HT7: MW, and HT8: MEWPS formed the highest quality habitat for fauna in the survey area.

18 Threatened and Priority fauna species were identified in the pre-survey likelihood analysis as 'Likely' or 'Possible' to occur within the survey area. The only Threatened or Priority faunal taxa detected during the survey was *Isoodon fusciventer* (quenda / southern brown bandicoot, P4), which was directly observed through scattered evidence of diggings and suitably-sized runnels in all fauna habitat units.

Suitable low-quality foraging habitat was identified within the survey area for *Zanda latirostris* (Carnaby's Cockatoo / ngoolark, EN), totalling an area of approximately 1.94 ha. However, the absence of observed foraging activity indicators, such as feeding debris, and the low availability and diversity of suitable food plant species, suggests that the habitat is likely only opportunistically utilised by transient individuals and flocks during the non-breeding season. Larger, more intact remnants of similar habitat located to the east and south-west of the survey area are more likely to support higher quality Carnaby's Cockatoo foraging habitat. As the low-quality suitable foraging habitat covers approximately 1.94 ha, under the new referral guidelines (DAWE, 2022) for the three Threatened black cockatoo species the proposal is not required to be referred for assessment under the *Environmental Protection and Biodiversity Conservation (EPBC) Act* 1999. However, the accumulative total and potential impact across the entire Esperance Branch Line project should be taken into consideration on whether an *EPBC Act 1999* referral is required. Potential impacts to all fauna should be minimised by containing proposed clearing within previously cleared and disturbed areas.

Suitable habitat was present throughout the survey area for *Pseudomys occidentalis* (western mouse, P4), *Pseudomys shortridgei* (heath mouse / dayang, VU/EN), and *Apus pacificus* (fork-tailed swift, MI); however, no evidence was observed of these species. Marginally suitable habitat was present within the survey area for *Macropus irma* (western brush wallaby, P4) and *Elanus scriptus* (letter-winged kite, P4); however, the narrow, linear nature of the vegetation remnants along the railway corridor suggests their use of the habitat is likely be transient. The seasonally inundated area within the southern portion of the survey area, predominantly associated with HT6: Melbre SL is likely to be marginally suitable habitat for numerous LOO-listed migratory species, specifically the *Calidris acuminata* (sharp-tailed sandpiper, MI), *Calidris canutus* (red knot, EN / MI), *Calidris ferruginea* (curlew sandpiper, CR / MI), *Calidris melanotos (*pectoral sandpiper, MI), *Calidris ruficollis* (red-necked stint, MI), *Charadrius bicinctus* (double-banded plover, MI), *Thinornis rubricollis* (hooded plover, P4) and *Tringa nebularia (*common greenshank, MI). There were no observations, direct or indirect, of these species during the survey period, and habitat suitability for these species is presumed to be restricted to the seasonal inundation of the area and conformation to the species' preferred wetland / riparian conditions. High levels of fox and rabbit activity observed across the survey area are likely to reduce habitat favourability for numerous fauna, particularly small mammals within the critical-weight range.

1. Introduction, Scope and Background Information

Arc Infrastructure, here in referred to as "the client" commissioned Bio Diverse Solutions as Environmental Consultants to undertake a reconnaissance flora and vegetation survey and a basic (previously reconnaissance) fauna assessment during the spring flowering season, covering a total of 4.47 ha along Line 51 (350.284 to 354.231 KM), adjacent to the Degrussa Road railway crossing, within the Shire of Esperance. The total 4.47 ha consists of six separate 'areas' or zones and stretches a total distance of 1.8 km along an existing service road for the railway line.

The scope of works included:

- Desktop assessment of the survey area, including all publicly available database searches (including DBCA databases) for Threatened flora, ecological communities and Threatened fauna data;
- A spring reconnaissance flora and vegetation survey across the survey area to identify vegetation units, condition (using the EPA 2016 condition scale), possible Threatened or Priority ecological communities and Threatened or Priority flora habitat. This shall include a likelihood of occurrence (LOO) assessment for all conservation significant flora identified in the desktop assessment;
- Identification of flora species, including herbarium identification if required;
- TPFL forms submitted to DBCA for any Threatened or Priority flora or ecological communities detected within the survey area;
- Basic fauna survey to map fauna habitats in the area, identify areas likely to provide habitat for Threatened or Priority fauna species and opportunistic sampling of fauna species (including Threatened or Priority). This shall include a likelihood of occurrence (LOO) assessment for all conservation significant fauna identified in the desktop assessment;
- GPS and map any populations of Threatened and Priority flora and fauna species (if applicable) and Weeds of National Significance / Declared Pests;
- GIS mapping of vegetation units present and their condition, including the mapping of any populations of Threatened or Priority ecological communities;
- GIS mapping of fauna habitat;
- Prepare a report on survey outcomes, consistent with EPA Guidances; and
- Provide the client with the IBSA Data package (as required to be submitted by the client).

1.1. Location and Development Proposal

The "survey area" is defined as the 4.47 ha area designated by the client, as a possible development zone requiring a survey for the purposes of impact assessment. The survey area is broken into six separate areas or zones ranging from 0.11 ha to 2.24 ha, consisting of separate laydown areas to store materials and machinery along the railway corridor. The survey area is located along the railway line, 2.1 km north to 1.8 km south of the Degrussa Road railway crossing, and is located on both the eastern and western sides of the railway line.

The "study area" consists of a 30 km radius around the survey area, used for indications of likelihood of occurrence (LOO) of Threatened or Priority flora and ecological communities. It provides a broader local context and assessment of the survey area. This reconnaissance survey provides base-line data for determining whether further surveys and environmental approvals may be required for the clearing and development of these areas, such as further targeted or detailed surveys.

An environmental risk assessment was completed together with the Arc Infrastructure Project Team. The environmental risk assessment process mitigated and reduced the environmental impact of the project, determining the operational space by outlining areas with lower environmental risks, such as existing cleared or previously disturbed areas. This identified where, within Site 8 (2022 Scope of Works), the operational footprint of construction works required a clearing permit or further environmental approvals. The risk assessment categorised operational space using 'traffic light' system, as outlined below. Areas identified as 'red', requiring a clearing permit and biological surveys, were the areas included within the survey area. Surrounding areas identified as 'green' or 'yellow' that were outside of the survey area, are displayed in Figure 30, Appendix A.

Categorisation of "traffic light" system used in the environmental risk assessment process:

a) Red – further biological surveys or other surveys required;

b) Yellow – clearing permit submitted to DWER and under submission (no CPS number currently assigned); and
c) Green – valid exemptions apply or 'Cleared' areas with no native vegetation remaining.

1.2. Alignment to Legislation, Guidelines and Policies

This survey and subsequent report is aligned to the following legislation, guidelines and policies:

- *Environmental Protection and Biodiversity Conservation Act 1999* (EP Act). Administered by the Australian Government of Department of Agriculture, Water and Environment (DAWE);
- *Biodiversity Conservation Act 2016* (BC Act). Administered by the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA);
- *Environmental Protection Act 1986* (EP Act). Administered by the Western Australian Department of Water and Environmental Regulations;
- *Biosecurity and Agriculture Management Act 2007* (BAM Act);
- EPA (2016) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment;
- EPA (2020) Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact;
- CoA (2013) Draft Survey guidelines for Australia's Threatened Orchids;
- DEWHA (2010) Survey Guidelines for Australia's Threatened Birds;
- DSEWPaC (2011) Survey Guidelines for Australia's Threatened Mammals; and
- DAWE (2022) Referral guideline for 3 WA Threatened black cockatoo species.

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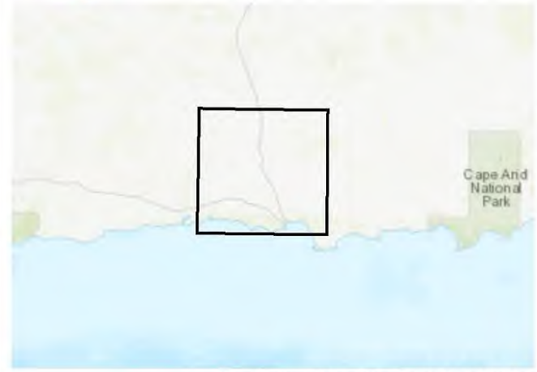


Overview Map Scale 1:5,000,000

Legend

- Survey Area
- 30 km Study Area

Scale
1:300,000@ A3
GDA MGA 2020 Zone 51

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 1: Survey Area Locality

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005_015**	*DATE* **11/01/2023**

1.3. Geology and soils

Database searches shows the survey area lies within the Esperance System (245Es). The Esperance System is described as *"Level to gently undulating mid-level plain with poor external drainage. Incised by river valleys (mapped as Young System). The southern boundary is defined by a low escarpment which forms a boundary to the Gore System below."* (DPIRD, 2022a).

The Esperance Sandplain Zone is described as "*Level to gently undulating plain dissected by a number of short rivers flowing south. Formed on Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are grey fine sandy duplex soils and fine sands."* (DPIRD, 2022b). The soil type within the application area is mapped as the Esperance 1 a phase (245Es_1E1a), Esperance 3sd phase (245Es_3sd), Esperance 2 a phase (245Es_1E2a) and Esperance 3s phase (245Es_3s). The Esperance 1 a phase is described as "*Gravelly, yellow mottled duplex soil with < 30 cm of sand over gravel layer (Fleming (shallow)), Dy5.82, on level plain, <1% slope",* the Esperance 3sd phase is described as "*Saline drainage lines*", the Esperance 2 a phase is described as "*Gravelly, yellow mottled duplex soil with < 30 cm of sand over gravel layer (Fleming (shallow)), Dy5.82, on level plain, <1% slope*" and the Esperance 3s phase is described as *"Salt scalds and salt affected lands"* (DPIRD, 2022c).

1.4. Climate

The closest open Bureau of Meteorology (BoM) site is Esperance Aero (009542). The average annual temperature at Esperance Aero ranges from 11.3–22.3°C. The average summer temperature ranges between 13.4-27.9°C, whilst average winter temperatures range between 7.6-17.4°C. The annual mean rainfall for Esperance is 570.9 mm (BoM, 2022). On average the months of May – September are the months with the highest rainfall (Figure 2). There was higher than average rainfall recorded in the months of October 2021 and April, July and August 2022 (Figure 2). The total rainfall in the year previous to the survey (September 2021 – August 2022) was 581.8 mm which is 10.9 mm above average and equates to 1.9 % increase in average rainfall.

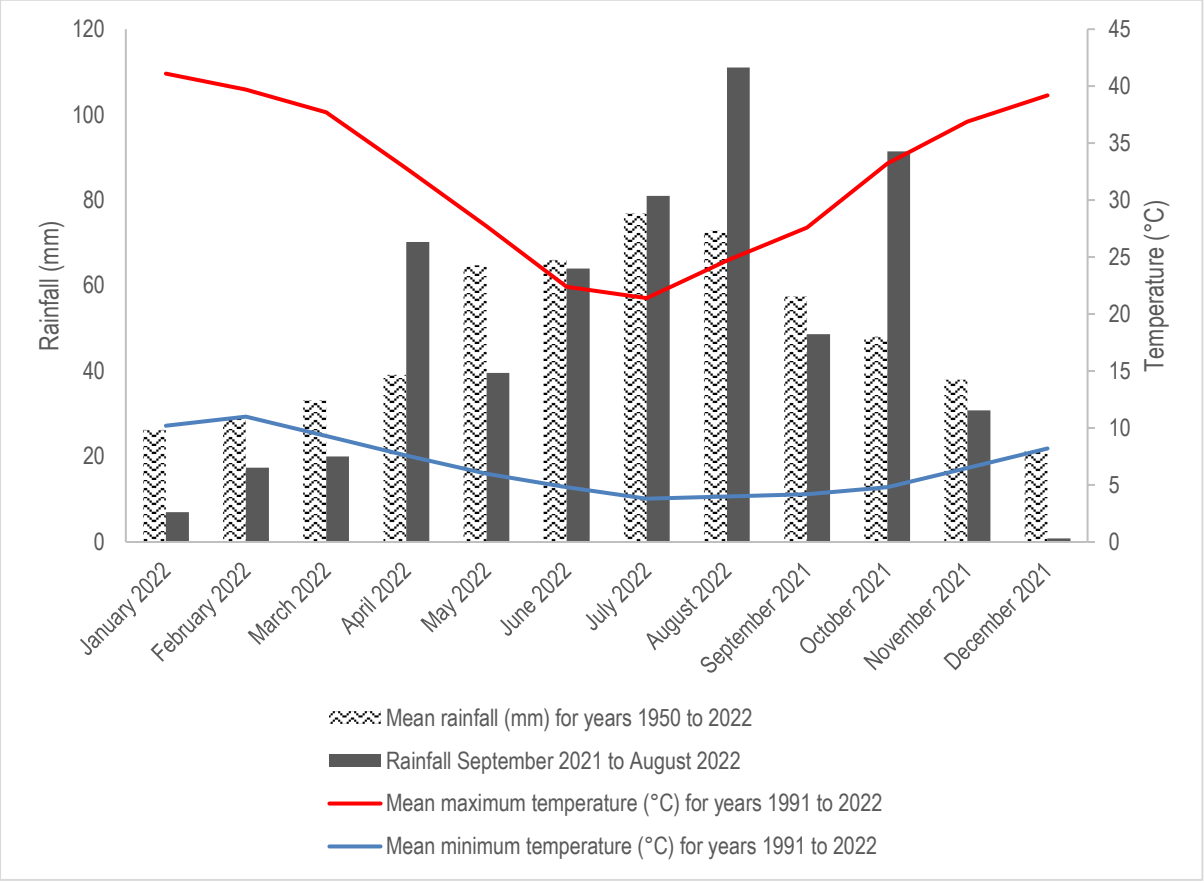


Figure 2: Monthly Temperature and Rainfall Data for Esperance Aero BoM Weather Station No. 009542.

1.5. Habitat Connectivity

Habitat connectivity assessments rely on a bioregional and landscape-scale approach to evaluate habitat for fauna movement and ecological linkage across a region. Habitat connectivity is largely reliant on remnant vegetation, recognising it plays a very important role in providing corridors between protected areas to assist in achieving long-term biodiversity management outcomes (Wilkins *et al.* 2006). The survey area lies within a highly modified landscape consisting of agricultural properties. Helms Arboretum is located approximately 6.5 km south of the survey area and the Mount Ridley Nature Reserve is located approximately 18 km to the northeast. There are other small to large areas of remnant bushland located to the north, south, east and west of the survey area. The survey area is ultimately linked to these surrounding areas of vegetation through the existing road reserves, and vegetation within private property.

1.6. Water and Wetlands

The survey area does not lie within any Public Drinking Water Source areas (DWER, 2022). The survey area lies within the Esperance Sandplain (HZ25_ES) Hydrological Zone (DPIRD, 2022d). The Esperance Sandplain zone is described as "*Level to gently undulating plain dissected by a number of short rivers flowing south. Formed on Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are grey fine sandy duplex soils and fine sands*" (DPIRD, 2022d). The survey area lies within the Lake Gore Hydrographic Catchment (DWER, 2018a) and within the Dalyup River Hydrographic Subcatchment (DWER, 2018b).

No RAMSAR wetlands, or significant wetlands are located within or near the survey area (DCCEEW, 2022).

1.7. Environmentally Sensitive Areas

The survey area does not contain any Environmentally Sensitive Areas (ESA; DWER, 2021).

1.8. Remnant Vegetation

The survey area lies within the Esperance Plains Bioregion and Recherche (ESP02) subregion. Comer *et al* (2001) describes the Esperance Plains Bioregion as "*Proteaceous scrub and mallee heaths on sandplain overlying Eocene sediments; rich in endemics. Herbfields and heaths (rich in endemics) on abrupt granite and quartzite ranges that rise from the plain. Eucalypt woodlands occur in gullies and alluvial foot-slopes."*

The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd *et al.* 2002) in the 1970s, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett, 2010). Vegetation units were regarded as associations and were grouped into Vegetation Systems representing a particular pattern of association distribution within a given area. A GIS search of J.S. Beards (Beard *et al.* 2013) vegetation classification places the survey area within two Vegetation Associations (DPIRD, 2019). Refer to Figure 30 in Appendix A:

- **System Association Name**: Esperance
- **Vegetation Association Number**: 47
- **Structure Description:** Mallee-heath
- **Floristic Description:** Mixed heath with scattered mallee e.g. tallerack *Eucalyptus tetragona* (now *E. pleurocarpa*).
- **Remnant Vegetation by Beard Association Rarity in LGA:** 13.43% remaining (GoWA, 2019).
- **Remnant Vegetation by Beard Association Rarity in IBRA Region:** 35.05% remaining (GoWA, 2019).

- **System Association Name**: Esperance
- **Vegetation Association Number:** 6048
- **Structure Description:** Scrub-heath
- **Floristic Description:** Mixed heath with scattered tall shrubs *Acacia* spp., Proteaceae and Myrtaceae.
- **Remnant Vegetation by Beard Association Rarity in LGA:** 14.21% remaining (GoWA, 2019).
- **Remnant Vegetation by Beard Association Rarity in IBRA Region:** 14.16% remaining (GoWA, 2019).

1.9. Heritage

The survey is located within the Wudjari Nyungar nation, and not located within a registered heritage site (DPLH, 2022). The nearest site (20790) is located approximately 2 km to the south of the survey area. It is recognised that there has been a large scale of loss of cultural knowledge and information, and the survey area may contain additional heritage values that are not recognised through DPLH (2022).

2. Methodology – Desktop Assessment

2.1. Flora and Vegetation

Desktop inventory of potential Threatened or Priority flora species likely to occur within 30 km of the survey area was undertaken using the following databases:

- Nature Map Database Search (combined data from DBCA, WA Museum and WA Herbarium; DBCA, 2007 -; WAH 1998 -);
- Protected matters search tool (DCCEEW 2022);
- Flora DBCA database records (DBCA, 2022a); and
- TEC/PEC DBCA database records (DBCA, 2022b).

The conservation significance of flora species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*). Administered by the Australian Government Department of Agriculture, Water and the Environment (DAWE);
- *Biodiversity Conservation Act 2016* (*BC Act*). Administered by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA);
- DBCA Priority and Threatened ecological community list (DBCA, 2021). A non-legislative list maintained by DBCA for management purposes; and
- DBCA Priority Flora list. A non-legislative list maintained by DBCA for management purposes.

2.2. Fauna

A desktop inventory of Threatened or Priority fauna species known to occur within 30 km of the survey area was undertaken using the following databases:

- Nature Map Database Search (combined data from DBCA, WA Museum and WA Herbarium; DBCA, 2022d); and
- Protected matters search tool (DCCEEW, 2022); and
- Fauna DBCA database records (DBCA, 2022c).

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Administered by the Australian Government Department of Agriculture, Water and the Environment (DAWE);
- *Biodiversity Conservation Act 2016* (BC Act). Administered by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA);

Additional datasets used to inform searches for threatened species within potentially suitable habitat included:

- Distribution maps for Black Cockatoos within the Referral Guidelines for Three Threatened Black Cockatoo Species DAWE (2022).
- Carnaby's Cockatoo Confirmed (DBCA_050; DBCA, 2018b) and Unconfirmed Roost Sites (DBCA_051; DBCA, 2018c).
- Carnaby's Cockatoo Confirmed (DBCA_52; DBCA, 2018d) and Unconfirmed Roost Sites Buffered 6km (DBCA-053; DBCA, 2018e).
- Carnaby's Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA_054; DBCA, 2018f).
- Carnaby's Cockatoo Unconfirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-055; DBCA, 2018g).
- Black Cockatoo Breeding Sites - Buffered DBCA_063 (DBCA, 2019a).
- Black Cockatoo Roosting Sites – Buffered DBCA_064 (DBCA, 2019b).
- National Malleefowl Monitoring Database (NMRT, 2022).

In addition, literature such as published papers, reports and theses, species recovery plans, species profiles, listing advice, referral guidelines, guidance statements and survey guidelines were consulted to ensure that survey methods and assessment criteria were informed by the most accurate and contemporary ecological knowledge.

3. Methodology – Field Survey

3.1. Flora and Vegetation

The aim of this survey was to assist in the environmental impact process by providing context and gather knowledge of the survey area. This type of survey aims to verify the desktop information obtained, and to characterise the flora and vegetation units present within the survey area.

A reconnaissance level flora and vegetation survey was undertaken by Katie White (Botanist) and Kahree Garnaut (Environmental Consultant / Ecologist) of Bio Diverse Solutions on the 30th September 2022, during the spring peak-flowering season. The survey area was surveyed on foot using traverses and relevés. The intent of the traverses was to identify and map the different vegetation units, their condition category and to undertake more intensive targeted surveys within suitable habitat for Threatened or Priority species. In addition, twelve relevés were systematically surveyed within representative vegetation units to enable thorough recording of species occurrence and representative vegetation descriptions (refer to Appendix D). Relevé locations were selected strategically to appropriately capture the vegetation units and variability within these vegetation units. Where further identification was required, collections of flora specimens occurred using Katie White's Regulation 62 Flora Taking Licence FTB62000237-2 and submitted to the Western Australian Herbarium for verification. For species that were not flowering and where foliage or nuts / fruit couldn't be used for identification, potential habitat was used as an indication of the likelihood of species occurrence. Vegetation units were formally described based on data collected within the relevés, using the basic survey general descriptions as a guide. Vegetation units were distinguished through changes in structure, dominant taxa and cover characteristics, which is described in both Muirs (1977) and NVIS Level 5 (sub-association; DoEE, 2017) description methods.

Information collected within each relevé included:

- Location: coordinates of the relevé using a handheld GPS unit.
- Date and site code.
- Site description: landform, slope, soil colour and type and hydrology.
- Vegetation description: dominant and non-dominant species present within the different growth forms and percentage cover.
- Vegetation condition.

3.2. Flora and Vegetation Survey Limitations and Constraints

An assessment of potential survey limitations was undertaken as per the EPA (2016) document *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* refer to Table 1.

Limitations were primarily nil to minor in nature, and did not affect the validity of results presented in the reconnaissance survey, such as presence of non-vascular species, relying on LOO for assessment of suitable habitat, lack of information on undescribed / informal species, standing water limiting access, intensity for surveying orchids and the vegetation being long unburnt limiting detection of fire ephemeral species.

A significant limitation was however present for six species which were not expected to be flowering at the time of the survey. P1 *Pimelea pelinos* (June to July flowering), P2 *Thysanotus brachiatus (*November to December flowering), P2 *Hibbertia turleyana* (August flowering), P3 *Brachyloma mogin* (June flowering), P3 *Astartea reticulata* (Late November to January flowering), and P4 *Frankenia glomerata* (November flowering) are all small species that could readily be obscured by dense vegetation, are similar in appearance to other species present when not in flower, and which would therefore be difficult to detect. Further details are provided in Section 5.5 and Table 12, Appendix B.

Table 1: Assessment of potential survey limitations.

Limitation	Significance of limitation	Comment
Experience of personnel	Nil Major – non-vascular flora P2 *Fabronia hampeana*	Katie White has over 5 years' experience at conducting targeted, reconnaissance and detailed flora surveys within the Esperance sandplains bioregion and is competent in taxonomic identification and assessment of vegetation in the area. Additionally, she has conducted targeted flora surveys and worked alongside the DBCA Flora Conservation Officer for a large number of flora species listed on the 30 km desktop analysis. Kahree Garnaut has 1.5 years' experience with reconnaissance flora and vegetation surveys, in the Midwest, South West, Great Southern and Esperance-Goldfields regions working with Bio Diverse Solutions' botanists and her previous role in NRM. A single species of non-vascular flora was identified in the desktop assessment, namely moss P2 *Fabronia hampeana*. This is outside the expertise of surveyors. However, a risk assessment was completed based on suitable habitat presence, and was determined as 'Unlikely' to occur.
Survey timing	Nil Minor – six species	The client requested a spring flora and vegetation survey, consistent with peak flowering times for the majority of species in the area, and was undertaken on the 30th September 2022. Six species were identified in the LOO (Table 12, Appendix B) as 'Likely' or 'Possible' to occur that are not recorded flowering during the survey period. P1 *Pimelea pelinos* (June to July flowering), P2 *Thysanotus brachiatus (*November to December flowering), P2 *Hibbertia turleyana* (August flowering), P3 *Brachyloma mogin* (June flowering), P3 *Astartea reticulata* (Late November to January flowering), and P4 *Frankenia glomerata* (November flowering) are all small species that could readily be obscured by dense vegetation, are similar in appearance to other species present when not in flower, and which would therefore be difficult to detect. Further details are provided in Section 5.5 and Table 12, Appendix B.
Access restrictions	Minor	Minor access restrictions were encountered during the survey. A portion of Vegetation Unit 6: SSSL was inundated with large pools of water. These areas were not traversed, but due to the high algal load and degradation, were unlikely to contain any conservation significant semi- or aquatic flora.
Availability of contextual information	Minor	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. Database searches were conducted through DBCA (DBCA, 2021a; DBCA 2021b) providing more comprehensive context. However, it is worth noting that database searches often rely on historical, outdated, understudied and under-resourced datasets and likely are not a comprehensive reflection of population status or presence of Priority or Threatened flora across the South Coast. It must also be noted that the Esperance area is highly understudied.

Table 1 cont.

Limitation	Significance of limitation	Comment
Availability of contextual information Continued.	Minor	Three species were identified in the LOO (Table 12, Appendix B) as 'Possible' to occur with very limited information present taxonomically. This related to the undescribed informally-named species, P1 *Schoenus* sp. Grey Rhizome (K.L. Wilson 2922), P1 *Baeckea* sp. Gibson (K.R. Newbey 11084) and P1 *Cyathostemon* sp. Esperance (A. Fairall 2431). Due to the lack of published descriptions or other information to support identification, precautionary principles were applied to any specimens within these genera, with specimens of a *Cyathostemon* sp. and *Schoenus* sp. submitted to the Herbarium for verification and confirmation that they were not priority flora.
Survey effort and extent	Nil Minor – Orchid species identified in desktop assessment.	218 species were identified during the survey, and twelve relevé datasets collected to gain as complete a picture as possible of flora species present at the site. A random meandering traverse ensured that all areas within 5-8 m of each other were covered. Orchids P2 *Paracaleana parvula* and P2 *Pterostylis faceta* were identified as 'Possible' to occur in the LOO. Following the *Draft Survey guidelines for Australia's Threatened Orchids* CoA (2013), it is recognised that due to the complex nature of Orchid phenology and physiology, more intensive survey transects and surveys over multiple time periods may be required to support a conclusive finding as to the absence of this species.
Disturbances that may affect results	Minor Major – P3 *Adelphacme minima*	The primary form of disturbance was the presence of cleared access tracks adjacent to the railway line. On the buffer surrounding these areas, disturbance-responding opportunists (e.g., *Coopernookia strophiolata*) were present and may represent a transitional stage of the vegetation community. No fires had recently occurred and the native vegetation showed indications of being long unburnt (density of leaf litter, age and height of obligate seeders, height of Mallee re-sprouters). It is possible that fire-responding ephemeral species stored in the soil seed bank were not captured by this survey. This forms a significant limitation for the detection of P3 *Adelphacme minima,* a fire-responding species identified as 'Possible' to occur in the LOO.
Identification issues	Nil	The survey was undertaken on 30th September, during the peak flowering period for many south coast flora species to maximise ease of identifying them, however given that not all flora species flower during this time some species will be more difficult to observe in the field than others. Of the 218 species observed, the vast majority contained sufficient taxonomic information for identification (such as nuts, fruit, leaf structure or flowers). It is estimated that 75-80% of species present were flowering. For numerous Priority or Threatened species listed on the 30 km desktop study, there were similar non-Threatened species present. Sufficient taxonomic material through retained nuts, fruit, budding or if flowering, was sufficient for determination. Specific rationale is found per species in Table 12, Appendix B.

3.3. Basic Fauna Survey Methodology

The aim of the basic fauna survey was to assess and map the fauna habitat within the survey area, assess the likelihood of conservation fauna species utilising the general area and/or particular vegetation units, recording actual presence of conservation fauna taxa, and undertaking an opportunistic inventory of vertebrate species encountered whilst traversing the survey area on foot. Field survey work was carried out by Bianca Theyer (Conservation and Wildlife Biologist/Ecologist) and Kahree Garnaut (Environmental Consultant) on the 30th September 2022.

Fauna surveys were was carried on foot using traverses and targeted survey techniques consistent with the following documents developed by the EPA and Department of Agriculture, Water and the Environment (DAWE) formerly the Department of Sustainability, Water, Population, and Communities (DSEWPaC) and Department of the Environment, Water, Heritage and the Arts (DEWHA):

- EPA (2020) Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment;
- DEWHA (2010) Survey guidelines for Australia's Threatened birds;
- DSEWPaC (2011) Survey guidelines for Australia's threatened reptiles;
- DSEWPaC (2011) Survey guidelines for Australia's Threatened mammals; and
- DAWE (2022) Referral guideline for Three WA Threatened black cockatoo species.

Fauna habitat units were identified, mapped and described. The presence of Threatened or Priority was recorded through direct (sightings) or indirect (tracks, runnels, scats, diggings, bones or other remains, feeding debris/residue or tree scratching) observations. Where signs of fauna were not observed, the presence of suitable habitat for Threatened and Priority fauna was noted. An opportunistic inventory of non-conservation species was observed was collected.

The conclusions presented are based upon field data collected over a limited period of time and are indicative of the environmental condition of the site at the time. Some fauna species are reported as potentially occurring within the subject site based on the presence of suitable habitat (quality and extent) within the subject site or immediately adjacent. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to seasonal inactivity during the field survey, species present within micro habitats not surveyed, cryptic species able to avoid detection. and transient wide-ranging species not present during the survey period.

Table 2: Brief overview of opportunistic survey techniques applied for each of the threatened species with a Possible or Likely likelihood of occurring in the survey area.

Scientific Name	Vernacular	Status WA / EPBC	Survey Technique
BIRDS			
Apus pacificus	Fork-tailed swift	MI / MI	Listen for calls and search for individuals flying overhead within dry or open habitats.
Elanus scriptus	Letter-winged kite	P4 / -	
Calidris acuminata	Sharp-tailed sandpiper	MI / MI	All are species associated with wetland / lake / coastal areas. Listen for calls and search for individuals around wetland area if / where extends into survey area.
Calidris ferruginea	Curlew Sandpiper	CR / CR & MI	
Calidris melanotos	Pectoral sandpiper	MI / MI	
Calidris ruficollis	Red-necked Stint	MI / MI	
Charadrius bicinctus	Double-banded Plover	MI / MI	
Thinornis rubricollis	Hooded Plover	P4 / -	
Tringa nebularia	Common Greenshank	MI / MI	
Limosa lapponica	Bar-tailed Godwit	MI / MI	
Zanda latirostris	Carnaby's Cockatoo	EN/EN	Listen for calls and detect birds by sight. Diurnal searches for evidence of feeding (chewed nuts or cones). Targeted searches for active or potential nest trees, food resources, and roosting habitat. Potential nest trees include those with a DBH >300mm. Hollows where present are inspected for evidence of activity and their dimensions estimated.
MAMMALS			
Isoodon fusciventer	Quenda	P4 / -	Diurnal searches for potentially suitable habitat resources, and for signs of activity, diggings, scats and runnels.
Notamacropus irma	Western Brush Wallaby	P4 / -	Diurnal searches for potentially suitable habitat resources, and for signs of activity, scats and prints / tracks.
Pseudomys occidentalis	Western Mouse	P4 / -	Cryptic species. Diurnal searches for potentially suitable habitat resources, and for signs of activity, such as nests, scats and runnels. Assess habitat present for suitability.
Pseudomys shortridgei	Heath mouse, Dayang	VU/EN	
REPTILES			
Acanthophis antarcticus	Southern Death Adder	P3 / -	Cryptic species. Diurnal searches for basking individuals and search of likely sheltering sites (hollow logs and roots, piles of timber, areas of deep fixed leaf litter) for individuals or latrines. Assess habitat present for suitability.
Parasuta spectabilis subsp. *bushi*	Spectacled hooded snake (Esperance),	P1	Cryptic species. Diurnal searches for basking individuals and search of likely sheltering sites (hollow logs and roots, piles of timber) for individuals or latrines. Assess habitat present for suitability.
INVERTEBRATES			
Zephyrarchaea marki	Cape Le Grand Assassin Spider	VU/-	Cryptic species. Assess vegetation for habitat suitability (presence of elevated leaf litter in *Banksia speciosa* thickets).

3.4. Fauna Survey Limitations and Constraints

An assessment of potential survey limitations was undertaken as per the EPA (2020) document *Technical Guidance Fauna Surveys for Environmental Impact Assessment* refer to Table 3 below.

Table 3: Fauna survey limitations and constraints.

Limitation	Constraint	Comment
Scope	Nil	The scope was a basic fauna survey to generally assess the presence / evidence of fauna species within the survey area, map the fauna habitat, undertake opportunistic inventory of species including Threatened and Priority species. Additional targeted assessment of significant trees was undertaken to identify breeding, roosting or foraging habitat for black cockatoos.
Disturbances that may affect results	Nil	No recent disturbances which may affect results of the survey were identified, e.g., recent fire or grazing. Historical and ongoing disturbances from the existing railway line may impact the presence of fauna within the survey area. However, given these disturbances are long-term and continuous, they are unlikely to have resulted in a significant limitation on detection probability or species occurrence during the survey period (i.e., activities would result in some fauna moving away / not utilising the survey area at all times).
Intensity of survey	Nil	The basic fauna survey and targeted components of the survey were deemed appropriate given the scope was to identify the general presence of fauna species and fauna habitat in the survey area.
Sources of information (recent or historic) and availability of contextual information	Minor	Publicly available desktop, background and ecological data were readily available to provide a contextual understanding for the site and the survey. DBCA data were also acquired (not publicly available) to provide a more detailed understanding of potential Threatened or Priority fauna in the survey area.
Remoteness or access issues	Nil	No access restrictions were encountered.
Species detection probability (e.g., as a result of seasonal activity and fauna movement patterns)	Minor (seasonality) – Major (cryptic species)	Cockatoo breeding periods affect the ability of surveys to detect breeding individuals, however, assessment of activity around potentially suitable hollows and protection of all potentially suitable hollows negates this limitation. Cockatoos also use a range of areas for foraging and roosting. Again, the use of activity indicators such as feeding debris (nuts) and faecal material negate this limitation and enable determination of the regularity with which an area is visited. Cryptic species such as the southern death adder (*Acanthophis antarcticus*, P3) western mouse (*Pseudomys occidentalis*, EN) and heath mouse (*Pseudomys shortridgei*, VU), spectacled hooded snake (*Parasuta spectabilis* subsp. *bushi,* P1) and Cape Le Grand assassin spider (*Zephyrarchaea marki*, VU) are unlikely to have been detected within the parameters of this survey. The presence of potential habitat was used as an indication of their likelihood of occurrence, and the possible need for follow-up targeted surveys.

Table 3 continued.

Limitation	Constraint	Comment
Species detection probability (e.g., as a result of seasonal activity and fauna movement patterns) Continued.	Minor (seasonality) – Major (cryptic species)	The conclusions presented in this report are based upon field data collected over a limited period of time. The results are therefore indicative of the environmental condition of the site at the time and the survey timing e.g., some species are more likely to use seasonally inundated areas when they are dry, transient wide-ranging species may not have been present during the survey period and some cryptic species are less detectable particularly when they are inactive. Species-level detection probabilities are dealt with in the fauna LOO in Table 14, Appendix B.
Survey limitations	Minor	Identifying hollows from the ground has limitations, as the full characteristics of a hollow are not evident (e.g., internal dimensions such as depth). The entrance dimensions and size of the branch / trunk into which the hollow was forming were used as indicators of the potential internal dimensions. The relative visibility of the canopy can also be limiting in identifying potential hollows, particularly where hollows are upward-facing or obscured by foliage.
Experience of personnel	Nil	Bianca Theyer has 6 years of fauna survey experience through her role at Bio Diverse Solutions and has been mentored by Dr Karlene Bain (Wildlife Ecologist) during this time. She has experience assisting other Zoologists (Bush Heritage, Australian Wildlife Conservancy and DBCA) in a voluntary capacity with fauna monitoring surveys. Kahree Garnaut has 1.5 years' experience with basic fauna surveys, in the Midwest, South West, Great Southern and Esperance-Goldfields regions working with Bio Diverse Solutions' ecologists and her previous role in NRM.

4. Results – Desktop Assessment

4.1. Threatened and Priority Flora

A list of all priority species potentially occurring in the survey area was compiled from all available data (Table 12 in Appendix B). As it was based on observations from a broader area than the survey area, it is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct. Conservation categories for Threatened and Priority flora are presented in Tables 15 and 16 in Appendix C. Protected matters search tool database searches (DCCEEW, 2022a) are provided in Appendix F.

As a result of the above-mentioned database searches seven Threatened and 73 Priority species were identified within the study area (30 km buffer). Of these, 10 were assessed as 'Likely' and 31 as 'Possible' to occur in the LOO. Refer to Table 12 in Appendix B for LOO analysis. Locations where Priority or Threatened species have previously been recorded within a 30 km radius of the survey area are shown in Figure 3. No populations of Priority or Threatened flora had previously been recorded directly within the survey area, prior to the reconnaissance survey.

Six species identified on the LOO (Table 12, Appendix B) as 'Possible' to occur could not be detected even if present due to not flowering at the time of the survey. As these species are small, easily obscured by dense vegetation, and similar to other non-threatened species, a significant limitation is still present. These species together with their recorded flowering times are presented in Table 4.

Table 4: Priority flora species not flowering at the time of the survey, representing a minor limitation.

Family	Species	Conservation Status	Flowering Time	Associated Habitat
Thymelaeaceae	*Pimelea pelinos*	P1	June to July	Vegetation Unit 6: SSSL
Asparagaceae	*Thysanotus brachiatus*	P2	November to December	Vegetation Unit 1: MyPrS Vegetation Unit 4: EoWHhS Vegetation Unit 5: HaSHhS Vegetation Unit 7: MMSAsS
Dilleniaceae	*Hibbertia turleyana*	P2	August	Vegetation Unit 4: EoWHhS Vegetation Unit 5: HaSHhS Vegetation Unit 6: SSSL Vegetation Unit 7: MMSAsS
Ericaceae	*Brachyloma mogin*	P3	June	Vegetation Unit 5: HaSHhS Vegetation Unit 6: SSSL Vegetation Unit 7: MMSAsS
Myrtaceae	*Astartea reticulata*	P3	Late November to January	Vegetation Unit 3: McSW Vegetation Unit 4: EoWHhs Vegetation Unit 5: HaSHhS Vegetation Unit 7: MMSAsS
Frankeniaceae	*Frankenia glomerata*	P4	November	Vegetation Unit 6: SSSL

4.2. Threatened and Priority Ecological Communities

The desktop assessment identified two ecological communities, namely Threatened Ecological Community (TEC)/ Priority Ecological Community (PEC) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' and TEC/PEC 'Subtropical and Temperate Saltmarsh (CSM)' as being present within the survey area, which are described and characterised in further detail below. Kwongkan TEC/PEC was identified as 'Likely' to occur and CSM as 'Unlikely' due to the significant distance from the coast. Further analysis is provided in Table 13, Appendix B.

Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)

Kwongkan is listed as Priority 3 (P3) PEC within WA under the *BC Act 2016* and as an Endangered TEC under the *EPBC Act 1999*. The survey area lies within the southeast botanical province of Western Australia (Hopper and Gioia, 2004), in which this community occurs. It is defined and assessed in the conservation advice as ranging from sparse to dense, thicket-forming shrubland, where Proteaceous species form a significant component (DoE, 2015b). It is confined to the southeast botanical province of Western Australia (Hopper and Gioia, 2004) and primarily occurs on sandplains and marine plains and lower- to upper slopes and ridges, as well as uplands across this region. Multiple other ecological communities are listed under the *BC Act 2016* that also meet criteria of Kwongkan TEC and should be considered when assessing whether Kwongkan is present.

Kwongkan is recognised by the below key diagnostic features and minimum condition thresholds outlined in Approved Conservation Advice Guidelines (DoE, 2015b):

1) Occurs within the South Coastal Floristic Province (Hopper and Gioia, 2004); relating to south west phytogeographic boundaries. Includes Island of the Recherche Archipelago.
2) a) Characterised by having 30% or greater cover of Proteaceae species across all layers of where shrubs occur (crowns measured as if opaque). OR;
   b) Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated. The use of diagnostic species is for situations in which the cover or Proteaceae species is reduced due to recent disturbance (e.g., fire).

Condition thresholds for the ecological community are described in Table 5.

Table 5: Condition thresholds and minimum patch size analysis for Kwongkan PEC/TEC diagnostic criteria (DoE, 2015b).

Condition category	Minimum patch size	Weeds	Dieback
High	1 ha	<30% perennial weed cover	No known Dieback infestation
Moderate	0.5 ha	<70% perennial weed cover	May be present or unknown

The approved conservation advice, available spatial mapping for the ecological community, and description above indicates that this TEC/PEC is likely to occur within the survey area.

Subtropical and Temperate Coastal Saltmarsh (CSM)

CSM is listed as a P3 PEC within WA under the *BC Act 2016* and as a Vulnerable TEC under the *EPBC Act 1999.* The community consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23 Degrees S latitude). CSM is recognised by the below key diagnostic features and minimum condition thresholds outlined in Approved Conservation Advice Guidelines (DoE, 2015a), which are outlined further below. Refer to Table 13 in Appendix B for further information.

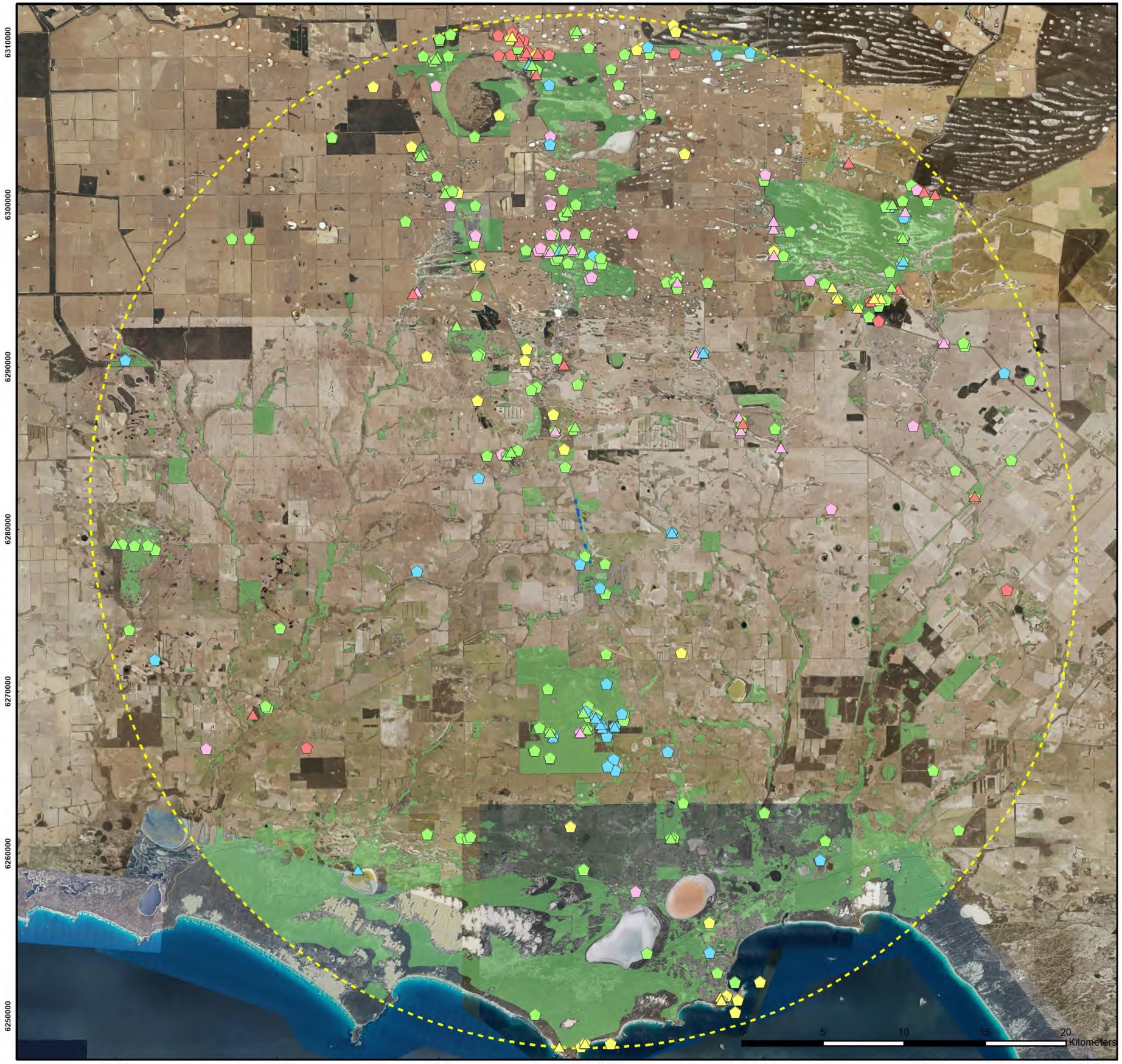
1) Occurs south of 23°37'S latitude, from the central Mackay coast on the east coast of Australia, southerly around to Shark Bay on the west coast of Australia (26° latitude), including the Tasmanian coast and islands within the above range;
2) Occurs on the coastal margin, along estuaries and coastal embayments, and on low wave-energy coasts;
3) Occurs in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences, but not areas receiving only aerosol spray;

4) Occurs on sandy or muddy substrate and may include coastal clay pans (and the like);
5) Consists of dense to patchy areas of characteristic coastal saltmarsh species (i.e., salt-tolerant herbs, succulent shrubs or grasses, that may also include bare sediment as part of the mosaic); and
6) Proportional cover by tree canopy such as mangroves, *Melaleucas* or *Casuarinas* is not greater than 50%, nor is proportional ground cover by seagrass greater than 50%.

Table 6: Minimum patch size analysis for CSM PEC/TEC diagnostic criteria.

Patch size	Condition category	Inclusion in community
<0.1ha and occur in isolation	Patches or areas >50% weeds	**Do not** form part of the CSM TEC/PEC
<0.1ha patches within 30m of each other collectively forming 0.1ha, considered as a mosaic	Patches or areas <50% weeds	**Do** form part of the CSM TEC/PEC

The approved conservation advice, available spatial mapping for the ecological community, and description above indicates that this TEC / PEC is unlikely to occur within the survey area, being 15 km away from the coastline or distinct hydrological features that would allow for tidal interaction.



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Overview Map Scale 1:5,000,000

Legend

Survey Area

30 km Study Area

Threatened & Priority Flora (TPFL)

- P1
- P2
- P3
- P4
- T

Threatened & Priority Flora (Herbarium)

- 1
- 2
- 3
- 4
- T

Threatened & Priority Ecological Communities

- P3, EN
- P3, VU

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:230,000@ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
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Figure 3: Desktop Flora & TEC/PEC Data

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS	*FILE*	*DATE*
FINAL	**AI005_015**	**11/01/2023**

4.3. Threatened and Priority Fauna

The desktop assessment identified 83 species of conservation significance within 30 km of the survey area. Of these, 42 were Threatened taxa under the *BC Act 2016* and / or *EPBC Act 1999* (critically endangered, endangered, vulnerable or specially protected), 12 were Priority listed taxa and 29 were migratory species protected under international agreements. Of the 42 Threatened and 12 Priority taxa, 21 are also migratory species protected under international agreements (Table 14, Appendix B). Conservation categories for Threatened and Priority fauna are presented in Tables 15 and 16 in Appendix C. PMST database searches (DCCEEW, 2022) are provided in Appendix F.

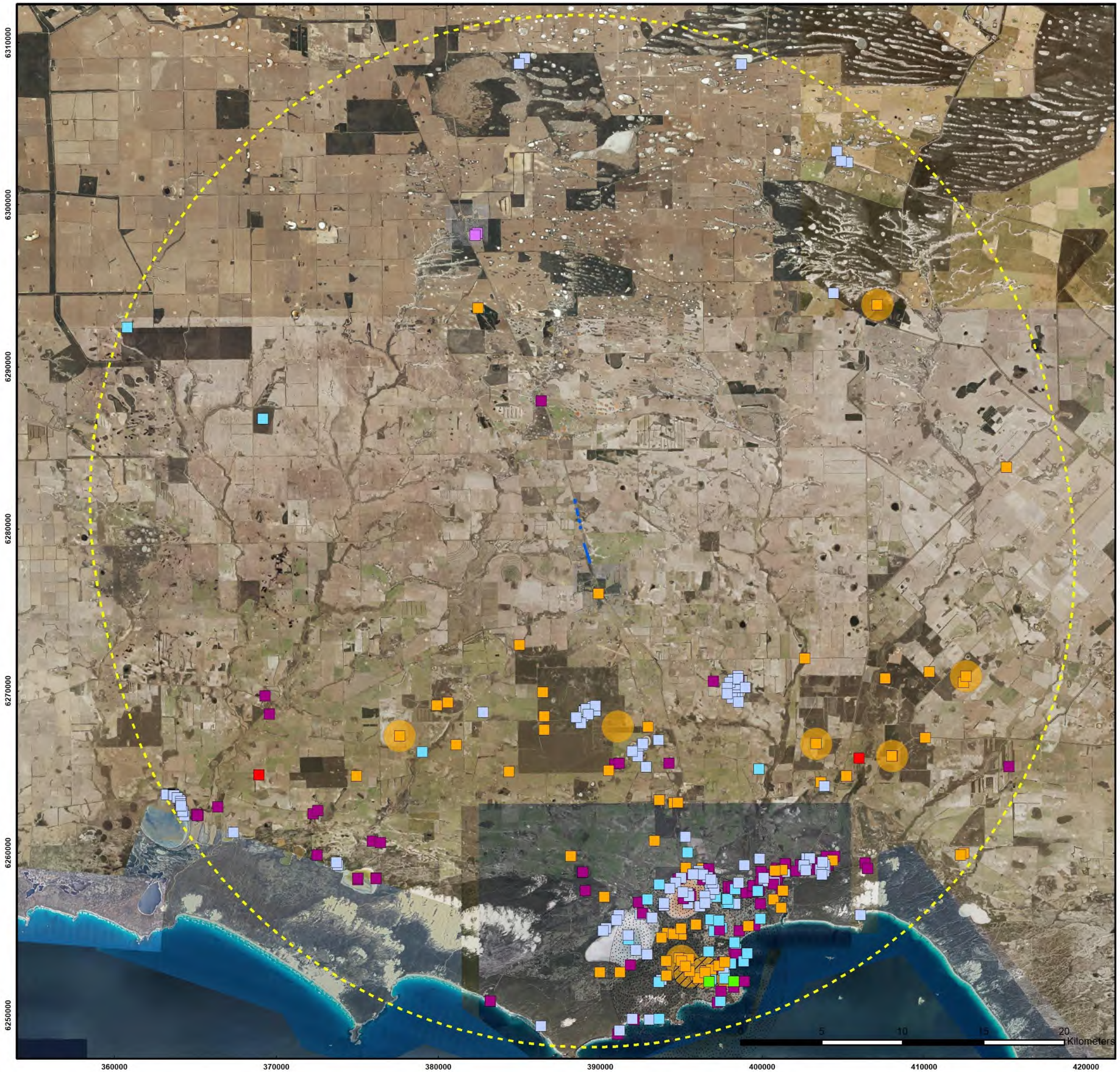
Of these 83 species, two were assessed as being 'Likely' and 16 as 'Possible' to occur prior to the survey being undertaken, based on the possibility of potential habitat being present within the survey area. Refer to Table 14, Appendix B for more detail. Species assessed as 'Likely' to occur included:

- Quenda (*Isoodon fusciventer,* P4); and
- Carnaby's Cockatoo (*Zanda latirostris,* EN / EN).

Species assessed as 'Possible' to occur included:

- Fork-tailed swift (*Apus pacificus,* MI / MI);
- Sharp-tailed sandpiper (*Calidris acuminata,* MI / MI);
- Curlew sandpiper (*Calidris ferruginea,* CR / MI);
- Pectoral sandpiper (*Calidris melanotos*, MI / MI);
- Red-necked stint (*Calidris ruficollis,* MI / MI);
- Double-banded plover (*Charadrius bicinctus,* MI / MI);
- Letter-winged kite (*Elanus scriptus,* P4);
- Western brush wallaby (*Notamacropus Irma,* P4);
- Western mouse (*Pseudomys occidentalis,* P4);
- Heath mouse, Dayang (*Pseudomys shortridgei,* VU / EN);
- Hooded plover (*Thinornis rubricollis,* P4);
- Common greenshank (*Tringa nebularia,* MI / MI);
- Southern death adder (*Acanthophis antarcticus,* P3);
- Bar-tailed godwit (*Limosa lapponica,* MI / MI);
- Spectacled hooded snake (*Parasuta spectabilis* subsp. *bushi,* P1); and
- Cape Le Grand assassin spider (*Zephyrarchaea marki,* VU).

The full species list compiled from all available data (Table 14, Appendix B) is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct.



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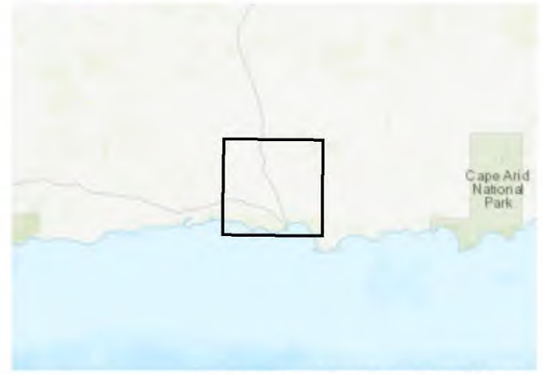

Overview Map Scale 1:5,000,000

Legend

- Survey Area
- 30 km Study Area

Threatened & Priority Fauna

- P1
- P2
- P3
- P4
- MI
- OS
- VU
- EN
- CR
- Carnabys Cockatoo Confirmed Roost Sites (DBCA-050)
- Black Cockatoo Roosting Sites Buffered (DBCA-064)
- Carnabys Cockatoo Confirmed Roost Sites Buffered 6km (DBCA-052)

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:230,000@ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 4: Desktop Fauna Data.

	QA Check	Drawn by
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

5. Results – Field Survey

5.1. Flora Diversity

During the survey 218 flora species, consisting of 45 families and 139 genera were found. The most commonly occurring families were Myrtaceae (27 species), Fabaceae (22 species), and Proteaceae (21 species). High number of Asteraceae, Poaceae and Orchidaceae species were also present. The list includes 187 native species (refer to Table 20 Appendix D), and 31 introduced / alien species. The site is considered to have high and complex species richness. It is noted that species richness is the simplest measure of diversity, and only provides a broad indication of diversity within a community. No formal analysis, such as the Shannon-Weiner Diversity Index or Simpson's index, has been conducted to factor in abundance, structural diversity or change in species composition.

Plant identification was undertaken using through the most relevant, currently available taxonomic literature, keys and herbarium reference specimens available (AVH, n.d.; Bell, 2018; Blackall & Grieve, 1980; Blake, 2021; Brophy, 2013; Cooke, 1986; Cooke, 1992; Euclid, n.d.; Hammer & Thiele, 2021; Hollister & Thiele, n.d.; Hollister & Thiele, 2021; Hollister *et al.*, n.d.; JSTOR, 2000-; Lamp and Collett 1976; Maslin, B.R. 2018-; Moore and Wheeler, n.d; Ng, 2022; Rye, 2007; Rye, 2021; Thompson, 1989; Trudgen & Rye, 2005; WAH 1998 -; Weber, 2007; Williams, 2022; Young, 2021). Nomenclature used through this report follows the most recent scientific names as adopted in the Census of Plants of Western Australia curated by the Western Australian Herbarium (WAH, 1998-).

5.2. Vegetation Units

Eight vegetation units were identified during the survey. Vegetation descriptions can be found in the following sections, with relevé data presented in Appendix D. Refer to Figures 5 – 12 for photographs of vegetation units and Figure 13 for extent.

Cleared areas were also present throughout the survey area, occurring as bare ground along access tracks or hardened laydown areas. A total of 1.99 ha (44%) of cleared area was present within the survey area. Minor, invasive herbs or agricultural grasses were often present within these bare areas.

1. Vegetation unit: Mixed Myrtaceous and Proteaceous Shrubs [MyPrS]

Vegetation Unit 1: Mixed Myrtaceous and Proteaceous Shrubs (MyPrS) was characterised as a dense, mixed, tall shrubland, dominated by Myrtaceous and Proteaceous species, such as *Lambertia inermis* (chittick / native honeysuckle), *Phymatocarpus maxwelli, Adenanthos cuneatus* (coastal jug flower) and *Tetrapora preissiana.* The mid-storey shrubs formed multiple structural layers and was highly diverse. Sparse- to open *Nuytsia floribunda* (munji / Christmas tree) formed the upper-storey. The understorey consisted of closed sedgeland, dominated by *Hypolaena humilis*. An open herb layer was also present within the understorey, comprised of native *Chamaescilla corymbosa* (blue squill) and *Trachymene pilosa* (native parsnip), with scattered non-native **Lysimachia arvensis* (pimpernel). Grass weed invasion was common within Vegetation Unit 1: MyPrS, including **Eragrostis curvula* (African lovegrass), **Avena fatua* (wild oats) and *Briza maxima* (blowfly grass). Vegetation Unit 1: MyPrS is a common ecological community associated with Esperance sandplains region, and was the vegetation unit with the greatest area within the survey area. Evidence of *Phytophthora cinnamomi* was incidentally observed within Vegetation Unit 1: MyPrS, by the death of *Xanthorrhoea platyphylla* (grass tree) plants. Whilst Proteaceae species were present and a key component of the vegetation unit, cover was well below the 30% criteria, and therefore did not meet Kwongkan TEC / PEC criteria. Further analysis is provided in Section 5.6. P3 *Austrobaeckea uncinella* was detected within Vegetation Unit 1: MyPrS.

Vegetation Description (NVIS; DoEE, 2017): U *Nuytsia floribunda*\tree\3\bc; M+ ^^*Lambertia inermis, Acacia cyclops, Adenanthos cuneatus*\shrub\2\c; G ^*Hypolaena humilis, Caustis dioica, Chamaescilla corymbosa*\^sedge, herb\1\c

Vegetation Description (Muirs, 1977): *Nuytsia floribunda* Open Low Woodland B, over *Lambertia inermis, Phymatocarpus maxwellii* and *Acacia cyclops* Scrub, over *Adenanthos cuneatus, Allocasuarina humilis, Tetrapora preissiana* Heath A and B, over *Hibbertia racemosa, Micromyrtus elobata* subsp *elobata and Leucopogon assimilis* Very Open Dwarf Scrub C and D, over *Cyathochaeta equitans* and *Caustis dioica* Open Tall Sedges, over *Hypolaena humilis* Low Sedges, over *Chamaescilla corymbosa, *Lysimachia arvensis* and *Trachymene*

pilosa Very Open Herbs, over **Eragrostis curvula* and **Avena fatua* Tall Grass and **Briza maxima* Low Grass.

Area: 1.05 ha

Site description: Flat sandplain, with white sand. Good drainage.

Condition: Excellent, Very Good, Degraded, Completely Degraded.

Represented in R1, 3, 5 and 10 (refer to Appendix D).

Associated with Fauna Habitat: HT1: Mixed Shrubland [Mixed SL].

Figure 5: Vegetation Unit 1: Mixed Myrtaceous and Proteaceous Shrubs present within the survey area.

2. Vegetation unit: Invasive Novel Ecosystem [INE]

Vegetation Unit 2: Invasive Novel Ecosystem (INE) is characterised by disturbance and the impact of historical land use. It is comprised of a range of dominant invasive species that have colonised historically disturbed areas, primarily dominated by **Eragrostis curvula* (African lovegrass) and **Pelargonium capitatum* (rose pelargonium). Scattered disturbance-opportunist natives are present, such as *Acacia cyclops* and *Acacia saligna.* It is therefore considered to be in 'Completely Degraded' condition, due to the presence of these emergent species. Vegetation Unit 2: INE commonly occurs along the periphery of access tracks, historical laydown areas or where previous maintenance zones are associated with the railway. It is below the condition thresholds to meet criteria of any TEC / PEC. No Priority or Threatened flora were detected within Vegetation Unit 2: INE.

Area: 0.47 ha

Site description: Range of abiotic conditions, soil types and landscape. Vegetation unit driven by external disturbance factors, opposed to abiotic conditions.

Condition: Completely Degraded.

Associated with Fauna Habitat: HT2: Disturbed / Cleared Vegetation [DC Veg].

Figure 6: Vegetation Unit 2: Invasive Novel Ecosystem present within the survey area.

3. Vegetation unit: *Melaleuca cuticularis* and Sedge Wetland [McSW]

Vegetation Unit 3: *Melaleuca cuticularis* and Sedge Wetland (McSW) is characterised by a semi-ephemeral, closed depression wetland system, with riparian vegetation present, indicating the presence of readily available salt or freshwater. *M. cuticularis* (saltwater paperbark) is a key species, forming the dominant species in the upper-storey. Sparse / very-open shrubs form the mid-storey, including *Tetrapora preissiana, Cyathostemon ambiguus* and *Acacia gonophylla.* A dense- to closed sedgeland is present, dominated by *Gahnia trifida* (coastal saw sedge) and *Hypolaena humilis.* Scattered *Tecticornia pergranulata* (Samphire sp.) is present. Invasive grasses occurred within Vegetation Unit 3: McSW, including **Eragrostis curvula* (African lovegrass), **Avena fatua* (wild oats) and **Briza maxima* (blowfly grass). Vegetation Unit 3: McSW did not bear similarities to any TEC / PEC, but is noted that as a riparian system, is considered environmentally sensitive. No Threatened or Priority flora were recorded as occurring within Vegetation Unit 3: McSW.

Vegetation Description (NVIS; DoEE, 2017): U+ ^*Melaleuca cuticularis*, +/- *Melaleuca brevifolia*, *Acacia cyclops*\shrub\2\i; M ^^*Tetrapora preissiana, Cyathostemon ambiguus*\shrubs\2\bc; G ^^*Gahnia trifida, Hypolaena humilis*, +/-*Eragrostis curvula*\^sedge, grass\1\d

Vegetation Description (Muirs, 1977): *Melaleuca cuticularis, Melaleuca brevifolia* and *Acacia cyclops* Scrub, over *Tetrapora preissiana, Cyathostemon ambiguus* and *Acacia gonophylla* Very Open Low Scrub A and B, over *Gahnia trifida* Open Tall Sedge, over *Hypolaena humilis* and *Lepidosperma squamata* Open Low Sedges, over **Eragrostis curvula* and **Avena fatua* Tall Grass, over **Briza maxima* Very Open Low Grass, over *Tecticornia pergranulata* Very Open Herbs.

Area: 0.06 ha

Site description: Drainage depression. Gentle slopes, to form closed depression. White sand. Poor drainage.

Condition: Good.

Represented in R2 and 11 (refer to Appendix D).

Associated with Fauna Habitat: HT3: *Melaleuca cuticularis* Shrubland [Melcut SL].

Figure 7: Vegetation Unit 3: *Melaleuca cuticularis* and Sedge Wetland present within the survey area.

4. Vegetation unit: *Eucalyptus occidentalis* Open Woodland and *Hypolaena humilis* Sedgeland [EoOWHhS]

Vegetation Unit 4: *Eucalyptus occidentalis* Open Woodland and *Hypolaena humilis* Sedgeland (EoOWHhS) is characterised by a very open overstorey of *E. occidentalis* (flat-topped yate / swamp yate) and an understorey consisting of a closed sedgeland, dominated by *H. humilis.* The midstorey was open, consisting of mixed, tall shrubs *Melaleuca cuticularis* (saltwater paperbark), *Lambertia inermis* (chittick / native honeysuckle), and *Tetrapora preissiana.* Species richness was generally low across Vegetation Unit 4: EoOWHhS. Whilst flora species were present indicating the site has a higher moisture content (eg. *E. occidentalis* and *M. cuticularis*), it wasn't considered to be riparian vegetation or to form a wetland, depression or other notable hydrological feature. It appeared to be a slightly lower in topographical position, likely resulting in winter-wet soil. Vegetation Unit 4: EoOWHhS did not bear similarity to any TEC / PEC, and no Threatened or Priority flora species were detected within it.

Vegetation Description (NVIS; DoEE, 2017): U +/-*Eucalyptus occidentalis*\tree\4\bi; M ^^*Melaleuca cuticularis, Lambertia inermis, Tetrapora preissiana*\shrub\3\r; G+ ^*Hypolaena humilis +/-Dianella brevicaulis, Ursinia anthemoides*\^Sedge, herb\1\d

Vegetation Description (Muirs, 1977): *Eucalyptus occidentalis* Open Low Woodland B, over *Melaleuca cuticularis, Lambertia inermis* and *Acacia saligna* Open Scrub, over *Tetrapora preissiana, Leucopogon assimilis* and *Acacia cupularis* Open Low Scrub A and B, over *Dianella Brevicaulis* Very Open Tall Sedge, over *Hypolaena humilis* and *Ficinia nodosa* Dense Low Sedge, over **Ursinia anthemoides, *Hypochaeris glabra* and *Romula rosea* Open Herbs, over **Eragrostis curvula, *Ehrharta longifolia* and *Avena fatua* Tall Grass.

Area: 0.09 ha

Site description: Lower slopes in landscape. Flat slopes. Light grey sand. Well drained, but higher moisture present.

Condition: Very Good.

Represented in R4 (refer to Appendix D).

Associated with Fauna Habitat: HT4: Yate Open Woodland [YOW].

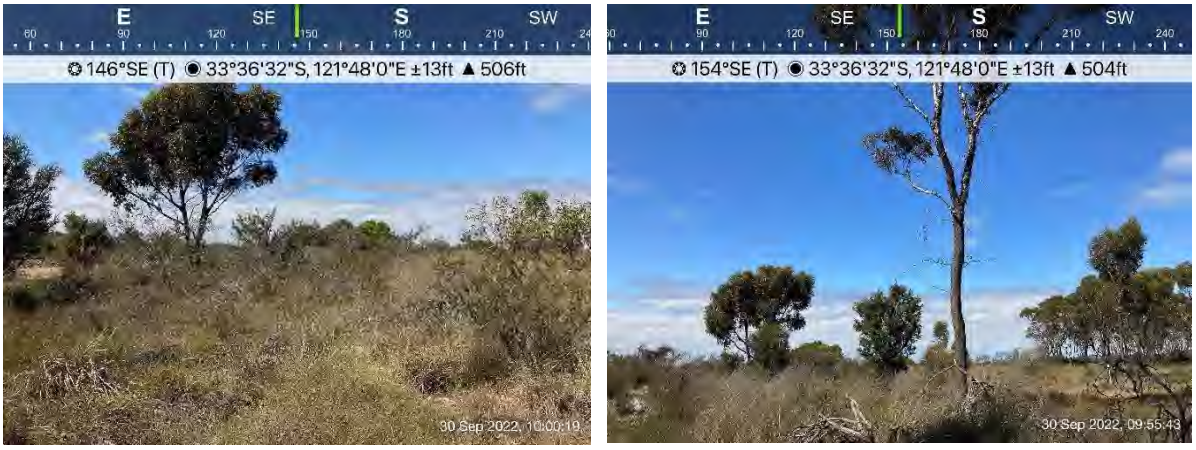

Figure 8: Vegetation Unit 4: *Eucalyptus occidentalis* Open Woodland and *Hypolaena humilis* Sedgeland present within the survey area.

5. Vegetation unit: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland [HaSHhS]

Vegetation Unit 5: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland (HaSHhS) was located on the upper/directly adjacent sandy rises and slopes of a saline drainage system / salt lakes, common in the Gibson area. Flora species observed were all known to be tolerant of salt and associated with the buffers of salt lake systems. Vegetation was therefore considered riparian. The upper-storey was characterised by open *H. adnata* and emergent *Acacia cyclops* (coastal wattle) shrubs. The midstorey was formed by a mixed shrubland of *Tetrapora preissiana, Phymatocarpus maxwelli* and *Leucopogon assimilis.* A closed to dense sedgeland characterised the understorey, dominated by *Hypolaena humilis* and scattered *Gahnia trifida* (coastal saw sedge). A relatively high cover of herbs was present, dominated by invasive **Ursinia anthemoides* (ursinia), and included natives *Trachymene pilosa* (native parsnip), *Diuris laxiflora* (bee orchid), *Caladenia cairnsiana* (zebra orchid) and **Lysimachia arvensis* (pimpernel). Vegetation Unit 5: HaSHhS did not bear similarities to any TEC / PEC, but is noted that as a riparian system, is considered environmentally sensitive. P3 *Kunzea salina* was detected within Vegetation Unit 5: HaSHhS.

Vegetation Description (NVIS; DoEE, 2017): U ^*Hakea adnata*, +/-*Acacia cyclops*\shrub\3\i; M *Tetrapora preissiana, Phymatocarpus maxwellii, Leucopogon assimilis*\shrub\2\c; G+ ^*Hypolaena humilis*, +/-*Gahnia trifida, *Ursinia anthemoides*\^sedge, herb\1\d

Vegetation Description (Muirs, 1977): *Hakea adnata* and *Acacia cyclops* Scrub, over *Tetrapora preissiana, Phymatocarpus maxwellii, Leucopogon assimilis* Heath A and B, over *Gahnia trifida* and *Dianella brevicaulis* Open Tall Sedge, over *Hypolaena humilis* and *Lepidosperma squamatum* Dense Low Sedge, over **Ursinia anthemoides, Trachymene pilosa* and *Diuris laxiflora* Very Open Herbs, over **Eragrostis curvula* and **Bromus diandrus* Very Open Tall Grass, over **Briza maxima* Very Open Low Grass.

Area: 0.17 ha

Site description: Flat. Lower slopes leading into salt lakes. Light grey sand, saline soils. Good drainage, but holding moisture.

Condition: Very Good.

Represented in R6 (refer to Appendix D).

Associated with Fauna Habitat: HT5: *Hakea adnata* Shrubland [Hakadn SL].

Figure 9: Vegetation Unit 5: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland present within the survey area.

6. Vegetation unit: Shrub and Samphire Salt Lake [SSSL]

Vegetation Unit 6: Shrub and Samphire Salt Lake (SSSL) was located at the basin of the salt lake system, occurring directly on the salt lake bed. It was present on the small dune systems directly adjacent to the seasonally inundated salt water plains. Vegetation Unit 6: SSSL was considered to be riparian vegetation. Flora species richness was low and vegetation was sparse and open. A low shrubland formed the midstorey, consisting of *Melaleuca brevifolia, Kunzea salina* and *Leucopogon ?bossiaea.* Samphire dominated the understorey, consisting of *Tecticornia pergranulata* and *Tecticornia halocnemoides.* Forbs were commonly present, including *Frankenia sessilis* var *sessilis* and *Disphyma crassifolia.* Vegetation Unit 6: SSSL did not bear similarities to any TEC / PEC, but is noted that as a riparian system, is considered environmentally sensitive. P2 *Leucopogon ?bossiaea* and P3 *Kunzea salina* commonly occurred within Vegetation Unit 6: SSSL and were a key component of the species composition.

Vegetation Description (NVIS; DoEE, 2017): M ^^*Melaleuca brevifolia, Kunzea salina, Leucopogon ?bossiaea*\shrub\2\i; G ^^*Tecticornia pergranulata, Tecticornia halocnemoides, Austrostipa juncifolia*\herb, grass\1\i

Vegetation Description (Muirs, 1977): *Melaleuca brevifolia* and *Acacia patagiata* Low Scrub A and B, over *Kunzea salina* and *Leucopogon ?bossiaea* Open Dwarf Scrub C and D, over *Hypolaena humilis* Very Open Low Sedge, over *Tecticornia pergranulata, Tecticornia halocnemoides* and *Frankenia sessilis* var *sessilis* Open Herbs, over *Austrostipa juncifolia* Open Tall Grass.

Area: 0.06 ha

Site description: Drainage Depression. Light grey clay-sand. Poor Drainage. Salt lake system common to the Gibson area.

Condition: Very Good, Good, Degraded.

Represented in R7 (refer to Appendix D).

Associated with Fauna Habitat: HT6: *Melaleuca brevifolia* Shrubland [Melbre SL].

Figure 10: Vegetation Unit 6: Shrub and Samphire Salt Lake present within the survey area.

7. Vegetation unit: Mixed Mallee Shrubland and *Anarthria scabra* sedgeland [MMSAsS]

Vegetation Unit 7: Mixed Mallee Shrubland and *Anarthria scabra* Sedgeland (MMSAsS) was associated with upper slopes above the salt lakes, prior to transitioning to sandplains or gravel duplexes within the landscape. It formed a transition and boundary ecological community. Various eucalyptus mallee species were present, including *Eucalyptus rigens* (salt lake mallee), *Eucalyptus uncinata* (hook leaved mallee), *Eucalyptus pleurocarpa* (tallerack / silver mallee) and *Eucalyptus tetraptera* (four-winged mallee). An open and mixed shrubland was present, including *Acacia cyclops* (coastal wattle), *Cyathostemon ambiguus* and *Melaleuca scabra.* A closed sedgeland was present, dominated by *Anarthria scabra.* Vegetation Unit 7: MMSAsS did not bear resemblance to any TEC / PEC. Five species of priority flora were detected within Vegetation Unit 7: MMSAsS, including P1 *Darwinia* sp. Gibson (R.D. Royce 3569), P2 *Leucopogon ?bossiaea,* P3 *Austrobaeckea uncinella,* P3 *Kunzea salina* and P3 *Persoonia scabra.*

Vegetation Description (NVIS; DoEE, 2017): U ^^*Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa*\mallee\2\i ; M+ *Acacia cyclops, Cyathostemon ambiguus, Melaleuca scabra*\shrub\2\i; G ^*Anarthria scabra*, *+/-Lepidosperma squamata, Ursinia anthemoides*\sedge, grass\1\c

Vegetation Description (Muirs, 1977): *Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa* and *Eucalyptus tetraptera* Very Open Shrub Mallee, over *Acacia cyclops* and *Allocasuarina humilis* Very Open Scrub, over *Cyathostemon ambiguus, Hakea denticulata, Melaleuca scabra* Open Low Scrub A and B, over *Hibbertia gracilipes, Persoonia scabra* and *Daviesia apiculata* Open Dwarf Scrub C and D, over *Anarthria scabra, Lepidosperma squamatum* and *Caustis dioica* Low Sedge, over **Ursinia anthemoides, Opercularia vaginata, Chamaescilla corymbosa* Very Open Herbs, over **Briza maxima, *Eragrostis curvula, Neurachne alopecuroidea* Open Tall and Low Grass.

Area: 0.44 ha

Site description: Gentle slopes. Middle of slope in topography. Light grey sand. Good drainage.

Condition: Very Good, Good, Degraded

Represented in R8 and 9 (refer to Appendix D).

Associated with Fauna Habitat: HT7: Mallee Woodland [MW].

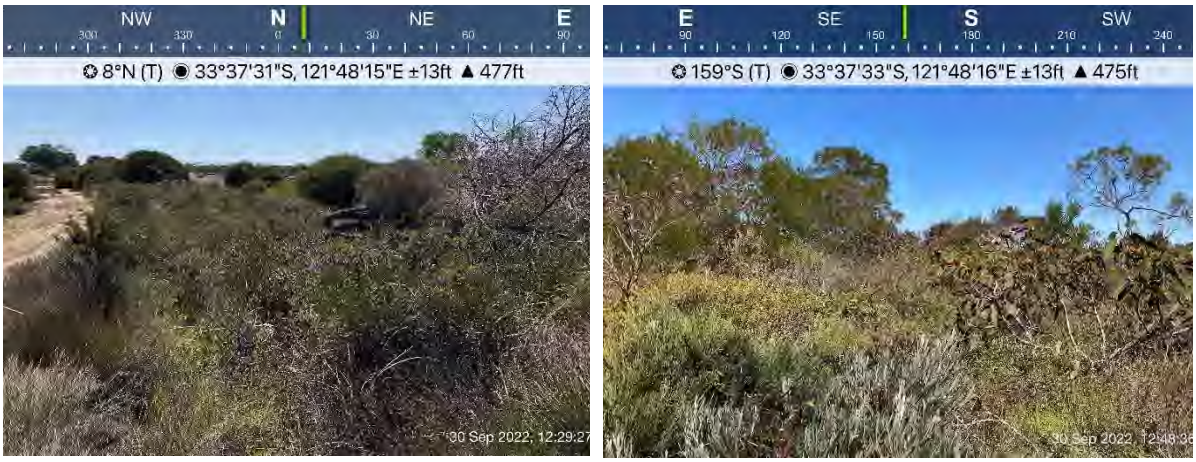

Figure 11: Vegetation Unit 7: Mixed Mallee Shrubland and *Anarthria scabra* Sedgeland present within the survey area.

8. Vegetation unit: Mixed Shrubland [MS]

Vegetation Unit 8: Mixed Shrubland was characterised by a dense, highly diverse and multi-layered structural shrubland. It was associated with a specific soil type, consisting of sand-gravel duplex. Species composition was different to the other shrublands present within the survey area, with numerous species indicating the presence of gravel. Shrubs commonly present included *Hakea trifurcata* (two leaf Hakea), *Lambertia inermis* (chittick / native honeysuckle), *Hakea nitida* (frog hakea), *Acacia cyclops* (coastal wattle), *Acacia saligna* (orange wattle), *Phymatocarpus maxwelli, Isopogon polycephalus* (clustered coneflower), *Gastrolobium spinosum* (prickly poison)*, Beaufortia schaueri, Leucopogon* sp. Coujinup (M.A. Burgman 1085), *Grevillea oligantha, Cyathostemon ambiguus, Lysinema ciliatum* (curry flower), *Thomasia petalocalyx, Micromyrtus elobata* subsp. *elobata, Synaphea petiolaris* subsp. *petiolaris, Gompholobium polymorphum, Cryptandra nutans, Stachystemon virgatus* and *Chorizema aciculare*. Scattered to open sedges and grasses were present. Vegetation Unit 8: MS bears similarity to Kwongkan TEC / PEC, with a high density and crown cover of Proteaceae species present. However, it was deemed as not meeting Kwongkan TEC / PEC criteria due to being located in an isolated patch of < 1ha and being surrounded entirely by disturbance and degradation. Further analysis is presented in Section 5.6 and Table 13, Appendix B. No Priority or Threatened flora was recorded within Vegetation Unit 8: MS.

Vegetation Description (NVIS; DoEE, 2017): U *Eucalyptus uncinata*\mallee\3\i; M+ *Hakea trifurcata, Lambertia inermis, Hakea nitida*\shrub\2\c; G ^^*Patersonia occidentalis, Gahnia trifida, Neurachne alopecuroidea*\sedge, grass\1\i

Vegetation Description (Muirs, 1977): *Eucalyptus uncinata* Open Shrub Mallee, over *Hakea trifurcata, Lambertia inermis* and *Hakea nitida* Thicket, over *Acacia saligna, Beaufortia schaueri* and *Leucopogon* sp. Coujinup (M.A. Burgman 1085) Low Scrub A and B, over *Synaphea petiolaris* subsp *petiolaris, Gompholobium polymorphum* and *Cryptandra nutans* Open Dwarf Scrub C and D, over *Gahnia trifida* Open Tall Sedge, over *Patersonia occidentalis, Lepidosperma squamatum* and *Patersonia lanata* Open Low Sedge, over *Neurachne alopecuroides, *Bromus diandrus* and *Briza maxima* Open Tall and Low Grass, over *Opercularia vaginata* Very Open Herbs.

Area: 0.16 ha

Site description: Slope. Gravel rock on surface 2-10%. Light brown sand over gravel duplex. Poor drainage.

Condition: Very Good

Represented in R12 (refer to Appendix D).

Associated with Fauna Habitat: HT8: Mixed Eucalyptus Woodland and Proteaceae Shrubland [MEWPS].

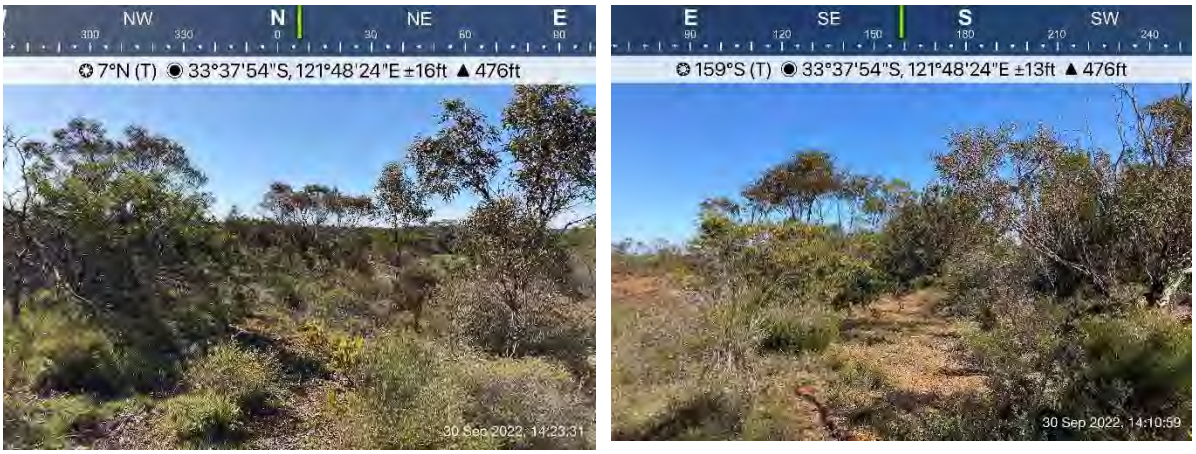

Figure 12: Vegetation Unit 8: Mixed Shrubland (MS) present within the survey area.

5.3. Vegetation Condition

The vegetation condition for the survey area (Table 7) has been mapped using the condition rating scale (adapted from Keighery 1994) outlined in *EPA Flora and Vegetation Survey Technical Guidance* (2016).

The vegetation ranged from Excellent to Completely Degraded condition throughout the survey area, with the majority of the area in Good or Very Good condition. These classification levels are related to degradation of structure and vegetation integrity by processes such as clearing, fire, weeds, grazing, Phytophthora Dieback and vehicle tracks. Degradation was primarily observed through the impact of ongoing and historical land use associated with the adjacent railway line. Indications of *Phytophthora cinnamomi* Dieback was observed within Vegetation Unit 1: MyPrS, through the death of susceptible *Xanthorrhoea platyphylla* (grass tree). This was only incidentally observed.

Table 7: Vegetation condition rating.

Vegetation unit	Condition rating	Area (ha)
1: Mixed Myrtaceous and Proteaceous Shrubs [MyPrS]	Excellent	0.132
	Very Good	0.8
	Degraded	0.085
	Completely Degraded	0.029
2: Invasive Novel Ecosystem [INE]	Completely Degraded	0.47
3: *Melaleuca cuticularis* and Sedge Wetland [McSW]	Good	0.055
4: *Eucalyptus occidentalis* Open Woodland and *Hypolaena humilis* Sedgeland [EoOWHhS]	Very Good	0.091
5: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland [HaSHhS]	Very Good	0.174
6: Shrub and Samphire Salt Lake [SSSL]	Very Good	0.02
	Good	0.019
	Degraded	0.016
7: Mixed Mallee Shrubland and *Anarthria scabra* Sedgeland [MMSAsS]	Very Good	0.314
	Good	0.038
	Degraded	0.085

Table 7 continued.

Vegetation unit	Condition rating	Area (ha)
8: Mixed Shrubland [MS]	Very Good	0.161
Cleared		1.986
Total		**4.47**

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre
- Releve Points

Vegetation Units

- 1: Mixed Myrtaceous and Proteaceous Shrubland
- 2: Invasive Novel Ecosystem
- 3: Melaleuca cuticularis and Sedge Wetland
- Cleared

Vegetation Condition

- Completely Degraded
- Good
- Very Good

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 13: Vegetation Units & Condition.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

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Denmark Office:
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Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre
- Releve Points

Vegetation Units

- 1: Mixed Myrtaceous and Proteaceous Shrubland
- 2: Invasive Novel Ecosystem
- 4: Eucalyptus occidentalis woodland and Hypolaena humilis sedgeland
- Cleared

Vegetation Condition

- Completely Degraded
- Degraded
- Very Good
- Excellent

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

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Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 13 cont.: Vegetation Units & Condition.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

Albany Office:
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Esperance Office:
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Esperance, WA 6450
(08) 9072 1382

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre
- Releve Points

Vegetation Units

- 5: Hakea adnata shrubland and Hypolaena humilis sedgeland
- 6: Shrub and Samphire Salt Lake
- 7: Mixed Mallee Shrubland and Anarthria scabra Sedgeland
- Cleared

Vegetation Condition

- Degraded
- Good
- Very Good

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

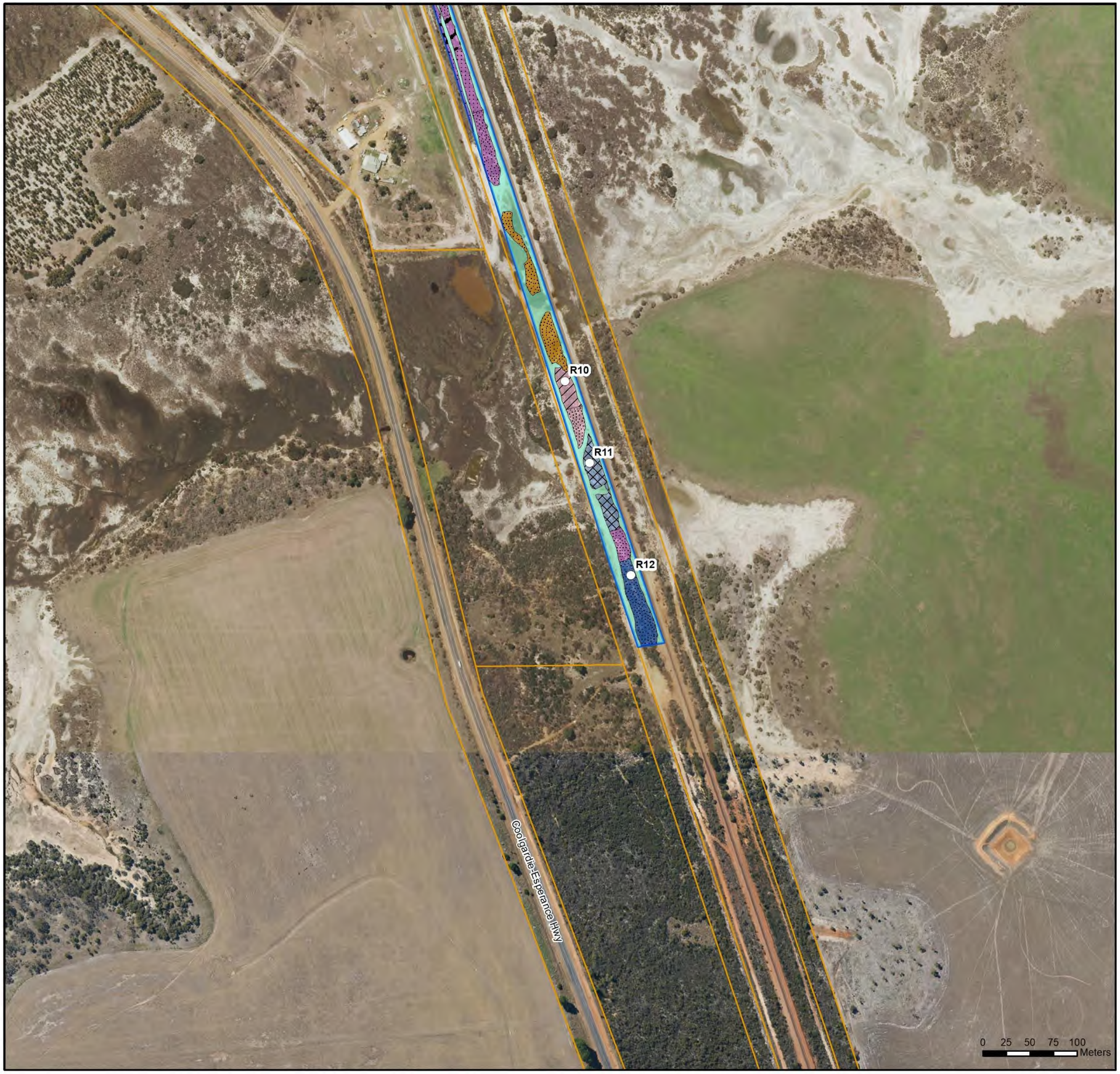
Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT

Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 13 cont.: Vegetation Units & Condition.

	QA Check	Drawn by
	KAW	CvdM
STATUS FINAL	FILE AI005-015	DATE 11/01/2023



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Esperance Office:
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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre
- Releve Points

Vegetation Units

- 1: Mixed Myrtaceous and Proteaceous Shrubland
- 2: Invasive Novel Ecosystem
- 5: Hakea adnata shrubland and Hypolaena humilis sedgeland
- 7: Mixed Mallee Shrubland and Anarthria scabra Sedgeland
- 8: Mixed Shrubland
- Cleared

Vegetation Condition

- Completely Degraded
- Degraded
- Good
- Very Good
- Excellent

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

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Figure 13 cont.: Vegetation Units & Condition.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

5.4. Weeds and disturbance

Of the 218 flora species recorded within the survey area, 32 are introduced species. The full suite of weed species recorded is listed below in Table 8, with their corresponding ratings under the Australian Weeds Strategy (IPAC, 2017), WA Weed Strategy (CALM, 1999) and the *BAM Act* (2007). The ratings given under the WA Weed Strategy (CALM, 1999) relate to determining the significance of a weed, based on the criteria of invasiveness, impacts, potential for spread and socioeconomic and environmental values, and can be either 'High', 'Moderate', 'Mild', or 'Low' (CALM, 1999).

All species except *Asparagus asparagoides* (bridal creeper) are classed as 'Permitted – s11', whilst bridal creeper is rated as a higher risk as a 'Declared Pest – s22(2)' under the *BAM Act 2007* and a Weed of National Significance (IPAC, 2017). It is also rated as 'High' threat under the Environmental Weeds Strategy of Western Australia. The location of bridal creeper within the survey is presented in Figure 14. Under the Environmental Weeds Strategy of Western Australia (CALM, 1999), *Leptospermum laevigatum* (Victorian Tea Tree), *Bromus diandrus* (Brome Grass), and *Eragrostis curvula* (Lovegrass) are also listed as 'High' threat.

It is strongly recommended that all machinery entering the survey area (if clearing is approved in the future) has rigorous and thorough biosecurity hygiene applied to limit the introduction of invasive species infestation and the potential to significantly degrade the surrounding reserve in pristine to excellent condition. Due to the various and mixed condition within the survey area, a biosecurity operational plan is recommended to limit the spread internally during operations.

Table 8: Weed species recorded from the survey area.

Family	Species	Vernacular	WA Weed Strategy rating (CALM 1999)	BAM Act (2007)	Weed of National Significance (IPAC, 2017)
Asparagaceae	*Asparagus asparagoides*	Bridal creeper	High	Declared Pest-s22(2)	Weed of National Significance
Asteraceae	*Arctotheca calendula*	Cape weed	Moderate	Permitted – s11	
Asteraceae	*Cotula bipinnata*	Ferny cotula	Low	Permitted – s11	
Asteraceae	*Cotula coronopifolia*	Water buttons	-	Permitted – s11	
Asteraceae	*Erigeron* sp.-syn. *Conyza* sp.	Fleabane	Low	Permitted – s11	
Asteraceae	*Hypochaeris glabra*	Smooth cats ear	Moderate	Permitted – s11	
Asteraceae	*Hypochaeris radicata*	Flat weed	-	Permitted – s11	
Asteraceae	*Sonchus oleraceus*	Sow thistle	Moderate	Permitted – s11	
Asteraceae	*Ursinia anthemoides*	Ursinia	Moderate	Permitted – s11	
Campanulaceae	*Wahlenbergia capensis*	Cape bluebell	Moderate	Permitted – s11	
Caryophyllaceae	*Stellaria media*	Chickweed	Low	Permitted – s11	
Fabaceae	*Acacia pycnantha*	Golden wattle	Low	Permitted – s11	

Table 8 cont.

Family	Species	Vernacular	WA Weed Strategy rating (CALM 1999)	BAM Act (2007)	Weed of National Significance (IPAC, 2017)
Fabaceae	*Ornithopus compressus*	Yellow serradella	Mild	Permitted – s11	
Iridaceae	*Moraea setifolia*		-	Permitted – s11	
Iridaceae	*Romulea rosea*	Guildford grass	High	Permitted – s11	
Juncaceae	*Juncus acutus*	Spiny rush	Moderate	Permitted – s11	
Myrtaceae	*Leptospermum laevigatum*	Victorian tea tree	High	Permitted – s11	
Orchidaceae	*Disa bracteata*	South African orchid	-	-	
Orobanchaceae	*Orobanche minor*	Lesser broomrape	Moderate	Permitted – s11	
Poaceae	*Avena fatua*	Wild oats	Moderate	Permitted – s11	
Poaceae	*Briza maxima*	Blowfly grass	Moderate	Permitted – s11	
Poaceae	*Briza minor*	Shivery grass	Moderate	Permitted – s11	
Poaceae	*Bromus diandrus*	Brome grass	High	Permitted – s11	
Poaceae	*Ehrharta longifolia*	Annual veldt grass	-	Permitted – s11	
Poaceae	*Eragrostis curvula*	African lovegrass	High	Permitted – s11	
Poaceae	*Lolium perenne*	Perennial ryegrass	Low	Permitted – s11	
Poaceae	*Parapholis incurva*	Coast barb grass	Mild	Permitted – s11	
Poaceae	*Phalaris minor*	Lesser Canary Grass	Moderate	Permitted – s11	
Poaceae	*Stenotaphrum secundatum*	Buffalo grass	-	Permitted – s11	
Polygonaceae	*Persicaria prostrata*	Creeping knotweed	-	Permitted – s11	
Primulaceae	*Lysimachia arvensis*	Pimpernel	Moderate	Permitted – s11	

5.5. Presence of Threatened and Priority Flora

In total, six species of Priority conservation status were identified within the survey area: P1 *Darwinia* sp. Gibson (R.D. Royce 3569), P2 *Leucopogon ?bossiaea,* P2 *Conostylis seorsiflora* subsp. *longissima,* P3 *Austrobaeckea uncinella,* P3 *Kunzea salina* and P3 *Persoonia scabra.* Further detail is provided in below sections and Table 9.

Populations of *K. salina* and *L. ?bossiaea* were previously recorded during 2021 reconnaissance surveys along the railway line completed by Bio Diverse Solutions (BDS, 2022). No additional specimens were therefore submitted to the WA Herbarium for verification, and the data collected during this survey and report supplement existing knowledge of the previously identified population. The populations of *D.* sp. Gibson (R.D. Royce 3569), *C. seorsiflora* subsp. *longissima, A. uncinella* and *P. scabra* were considered to be new populations and were submitted to the WA Herbarium for verification.

C. seorsiflora subsp. *longissima* and *A. uncinella* were not identified in the field during the survey, with identification only occurring during the examination of collected specimens was occurring. As a result, the GPS locations of plants was not recorded and no population counts within the survey area occurred. A further targeted flora survey within suitable habitat may be required to quantify population distribution and dynamics.

The population of *L. ?bossiaea* was first collected and verified in 2021, during a reconnaissance flora survey completed for the client in the adjacent railway corridor (BDS, 2022). Flowering was not occurring and the specimen submitted to the WA Herbarium was sterile, with identification unable to verified with full confidence, which is denoted by the prefix '?' on the species name.

Table 9: Priority flora detected within the survey area.

Family	Species	Conservation Status	Population status	Number of plants detected within survey area	Recorded Vegetation Unit
Myrtaceae	*Darwinia* sp. Gibson (R.D. Royve 3569)	P1	New	4	Vegetation Unit 7: MMSAsS
Ericaceae	*Leucopogon ?bossiaea*	P2	Existing – 31 plants counted outside of survey area in 2021.	83	Vegetation Unit 6: SSSL Vegetation Unit 7: MMSAsS
Haemodoraceae	*Conostylis seorsiflora* subsp. *longissima*	P2	New	Not counted	Not detected at time of field survey.
Myrtaceae	*Austrobaeckea uncinella*	P3	New	Not Counted	Vegetation Unit 1: MyPrS Vegetation Unit 7: MMSAsS

Table 9 continued.

Family	Species	Conservation Status	Population status	Number of plants detected within survey area	Recorded Vegetation Unit
Myrtaceae	*Kunzea salina*	P3	Existing – 36 plants counted outside of survey area in 2021.	92	Vegetation Unit 5: HaSHhS Vegetation Unit 6: SSSL Vegetation Unit 7: MMSAsS
Proteaceae	*Persoonia scabra*	P3	New	2	Vegetation Unit 7: MMSAsS

Additionally, numerous non-Threatened species were identified with close similarities to conservation listed species that were identified in the 30 km radius survey. Key rationale behind identification as non-Threatened are listed below, and are noted in Table 12 of Appendix B:

- *Cyathostemon ambiguus* – bears similarity to P1 *Cyathostemon* sp. Esperance (A. Fairall 2431), which is undescribed with limited information available. Due to the survey area being within the vicinity of a known record, the vegetation similar to where previous plants have been recorded and the taxonomic review required for the Cyathostemon genus, precautionary principles were applied and the specimen submitted to the WA Herbarium for confirmation (KW193, Accession 9826, specimen not retained). It was determined as non-threatened *C. ambiguus.*
- *Schoenus subflavus* subsp. *subflavus* - bears similarity to P1 *Schoenus* sp. Grey Rhizome (K.L. Wilson 2922), which is undescribed with limited information available. Due to the survey area being within the vicinity of a known record, the vegetation similar to where previous plants have been recorded and the taxonomic review required for the Schoenus genus, precautionary principles were applied and the specimen submitted to the WA Herbarium for confirmation (KW238, Accession 9330). It was determined as non-threatened *S. subflavus* subsp. *subflavus.*
- *Centrolepis humillima* – bears similarity to P3 and poorly known *Centrolepis cephaloformis* subsp. *murrayi*. The species present was determined as common, non-threatened *C. humillima* due to the shape of the flower head and pigmentation on bracts.
- *Cryptandra nutans* – bears similarity to P2 *Cryptandra polyclada* subsp, *polyclada.* It was determined as non-threatened *C. nutans* due to the glabrous nature and shape of bracts.

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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Vegetation Units

- 1: Mixed Myrtaceous and Proteaceous Shrubland
- 2: Invasive Novel Ecosystem
- 3: Melaleuca cuticularis and Sedge Wetland
- Cleared

0 25 50 75 100 Meters

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 14: Priority Flora & Declared Pests.

	QA Check	*Drawn by*
	KAW	**CvdM**
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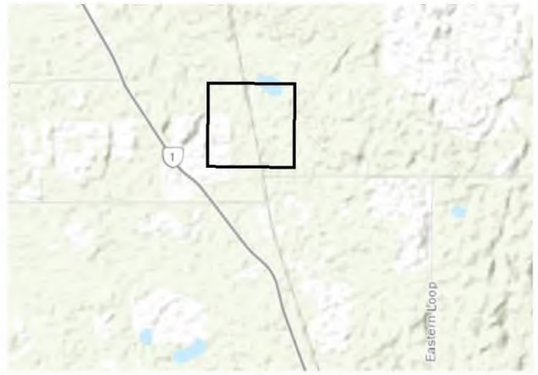

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Vegetation Units

- 1: Mixed Myrtaceous and Proteaceous Shrubland
- 2: Invasive Novel Ecosystem
- 4: Eucalyptus occidentalis woodland and Hypolaena humilis sedgeland
- Cleared

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
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Figure 14 cont.: Priority Flora & Declared Pests.

	QA Check	*Drawn by*
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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Vegetation Units

- 5: Hakea adnata shrubland and Hypolaena humilis sedgeland
- 6: Shrub and Samphire Salt Lake
- 7: Mixed Mallee Shrubland and Anarthria scabra Sedgeland
- Cleared

Priority Flora Observed

- *Darwinia* sp. Gibson, P1
- *Kunzea salina*, P3
- *Leucopogon bossiaea*, P2
- *Persoonia scabra*, P3

Declared Pests

- *Asparagus asparagoides*, DP/WoNS

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
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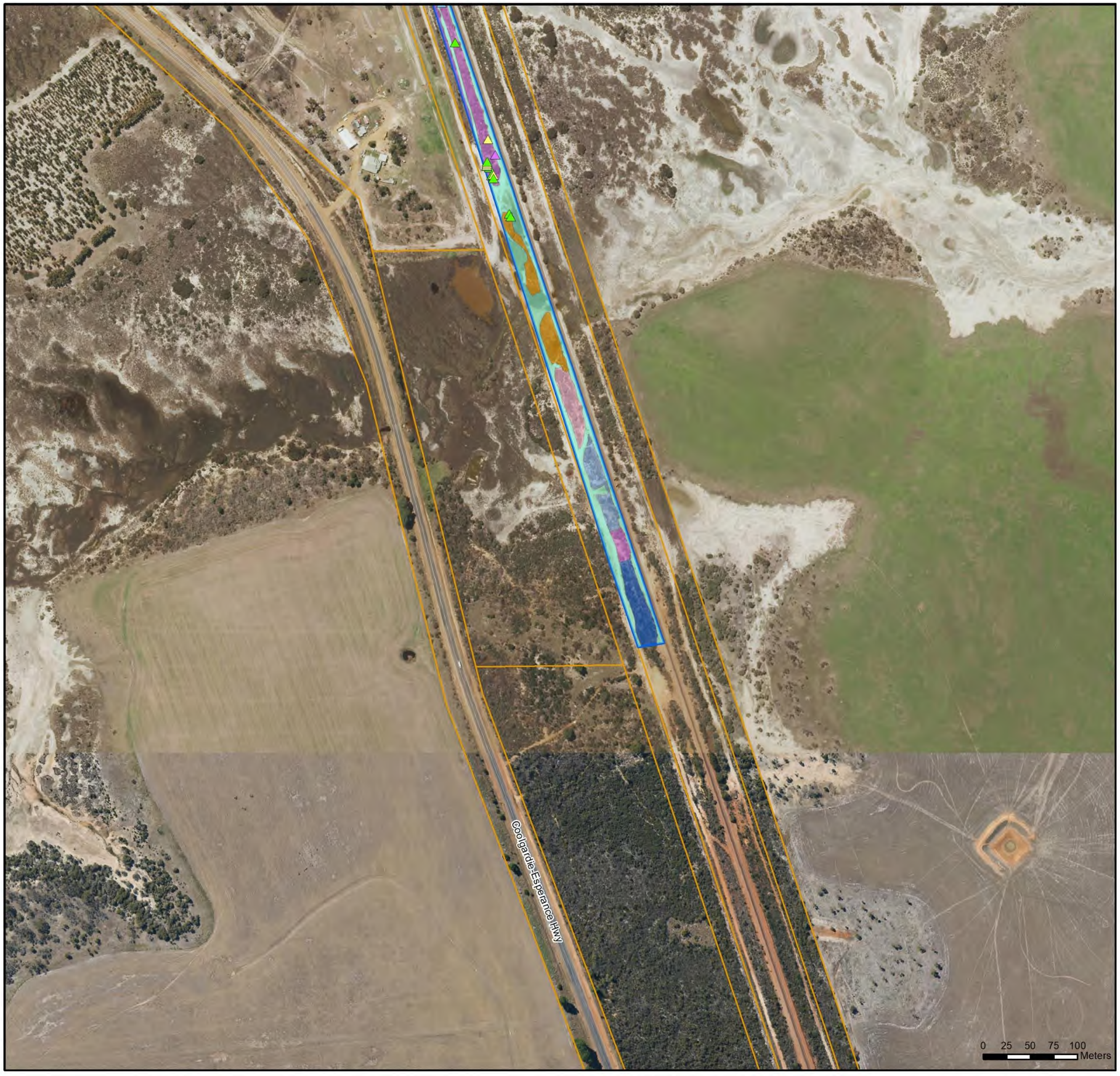
Figure 14 cont.: Priority Flora & Declared Pests.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**



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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Vegetation Units

- 1: Mixed Myrtaceous and Proteaceous Shrubland
- 2: Invasive Novel Ecosystem
- 5: Hakea adnata shrubland and Hypolaena humilis sedgeland
- 7: Mixed Mallee Shrubland and Anarthria scabra Sedgeland
- 8: Mixed Shrubland
- Cleared

Priority Flora Observed

- *Darwinia* sp. Gibson, P1
- *Kunzea salina*, P3
- *Leucopogon bossiaea*, P2
- *Persoonia scabra*, P3

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
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Figure 14 cont.: Priority Flora & Declared Pests.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

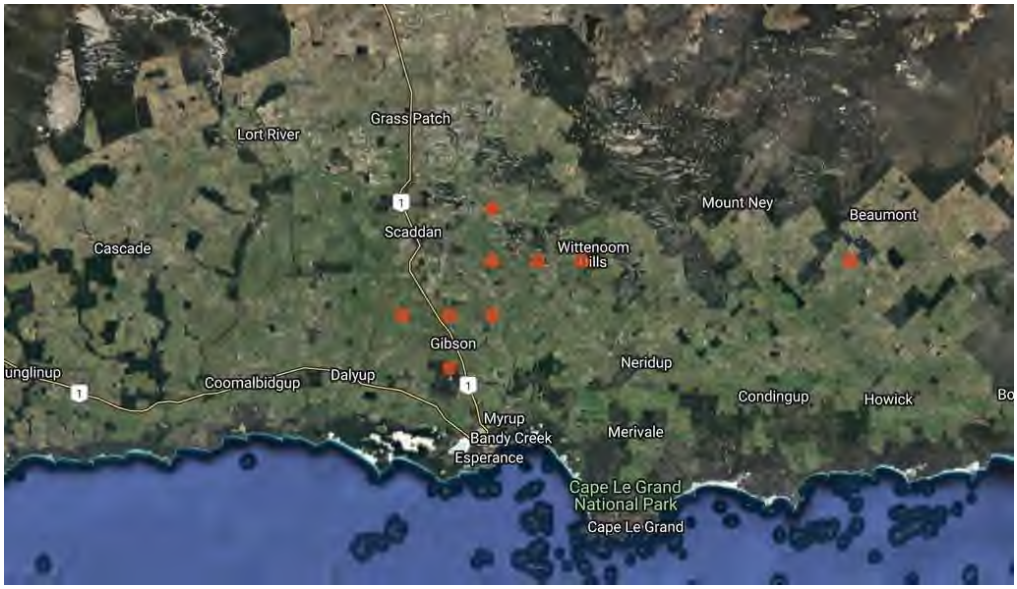
***Darwinia* sp. Gibson (R.D. Royce 3569) – P1 (New)**

The plants of *Darwinia* sp. Gibson (R.D. Royce 3569) represent a new population, after being assessed as 'Likely' to occur on the LOO. A specimen was submitted to the WA Herbarium for verification (KW195, Accession 9826, specimen not retained; Figure 15). It was recorded within Vegetation Unit 7: MMSAsS, consistent with the known requirements of the species, being within the vicinity and slopes surrounding salt lakes of the area. A total of four plants were detected, located within one isolated patch 1.3 km south of the Degrussa Road railway crossing at 353.663 KM, on the western railway corridor. A Threatened and Priority Report Form (TPFL) was submitted to DBCA District Flora Conservation Officer (Emma Adams) and Species and Communities Branch on 13/12/2022.

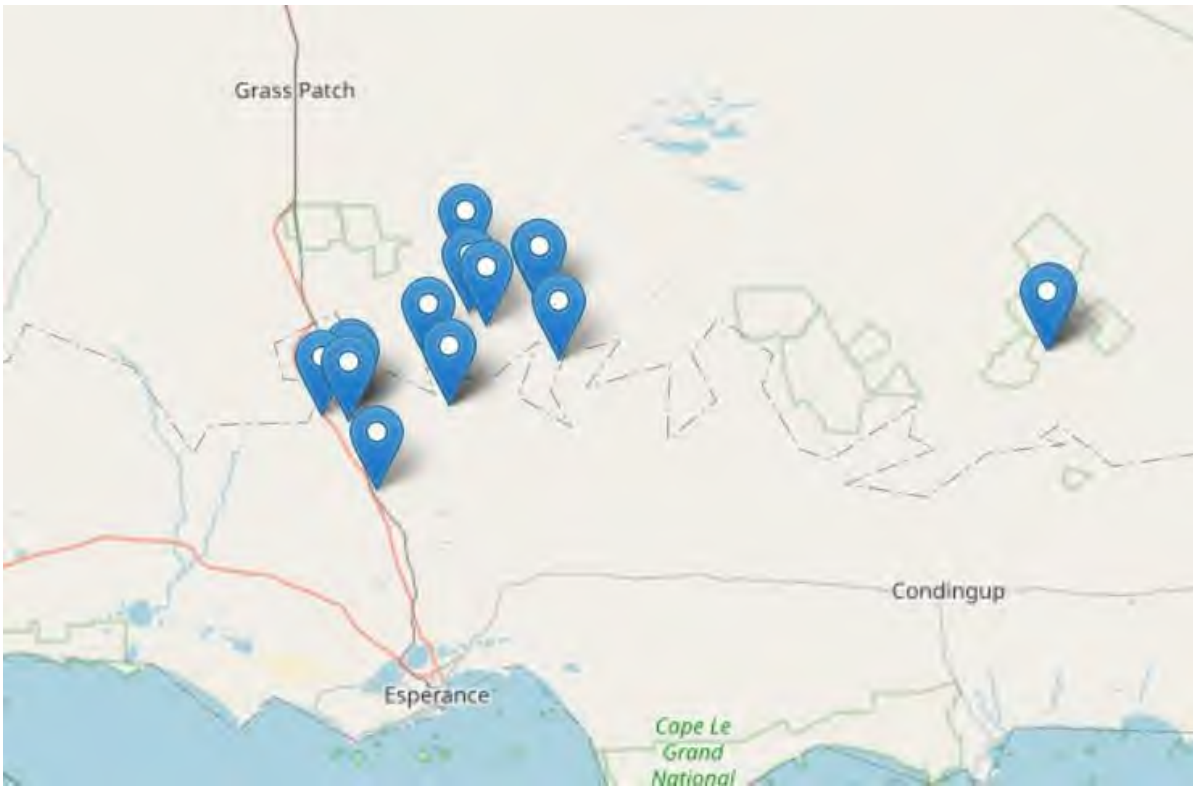
The plants of *D.* sp. Gibson (R.D. Royve 3569) counted represent a partial or edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into surrounding suitable habitat and that the total population number is therefore much higher than recorded in the survey. Further surveys may be required to quantify impact of proposed clearing on this population.

The known distribution and records of *D.* sp. Gibson (R.D. Royce 3569) within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998-) indicate that *D.* sp. Gibson (R.D. Royce 3569) is known from twelve records, located within the Gibson to Scaddan region, within a 30 km radius of hydrologically associated salt lakes (Figure 16). It has been recorded within the Local Government Areas of Esperance and Kalgoorlie-Boulder, and IBRA subregions of Eastern Mallee, Eastern Murchison and Recherche.

Figure 15: *Darwinia* sp. Gibson (R.D. Royce 3569) present within the survey area.



a)



b)

Figure 16: Regional distribution of *Darwinia* sp. Gibson (R.D. Royce 3569) a) AVH, n.d. and b) WAH, 1998 –

***Leucopogon bossiaea*, P2 (Existing)**

The population of *Leucopogon ?bossiaea* was detected during the 2021 Spring Reconnaissance Survey along the railway line; plants detected within the survey area are part of a larger and known population. In 2021 the species was verified by the WA Herbarium (KW178, Accession 9281, specimen not retained), and was considered a significant range extension due to the nearest population being in Cape Arid, 300 km to the east. It was noted by the WA Herbarium at time of verification that the specimen was sterile and identification could not be formally completed, it is therefore referenced throughout the report as *L. ?bossiaea* to indicate that verification is still required. No plants were in flower at the time of the 2022 survey, so no further collections to resolve the identification query could occur. Flowering of *L. bossiaea* occurs between May and July. A Threatened and Priority Report Form (TPFL) was submitted to DBCA District Flora Conservation Officer (Emma Adams) and Species and Communities Branch on 13/12/2022.

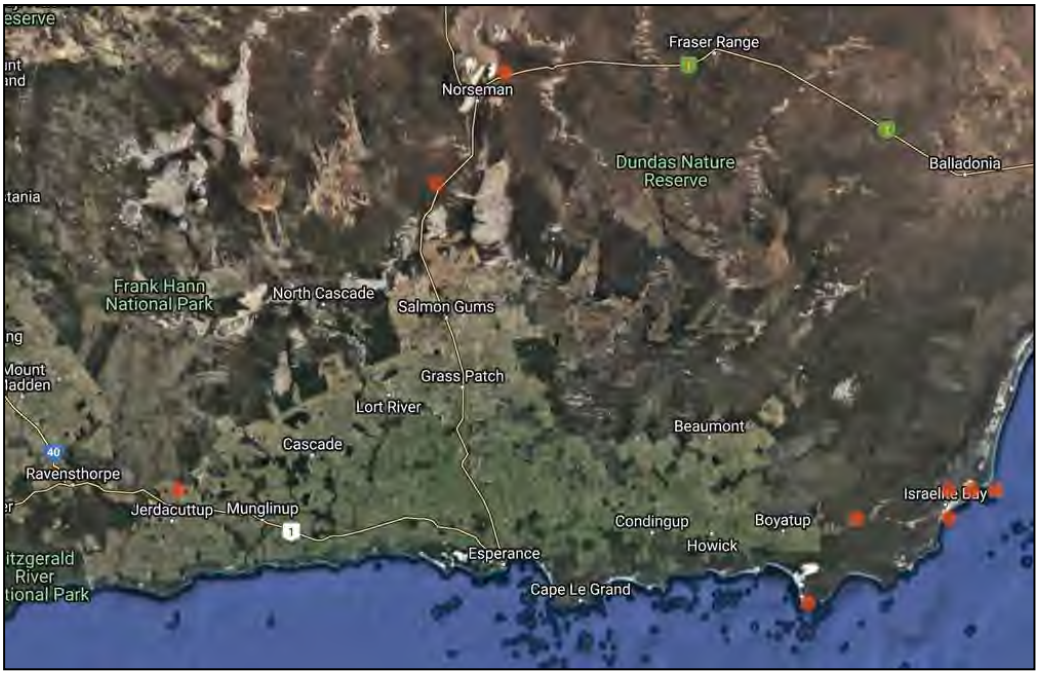
The population of *L. ?bossiaea* within the survey area was specifically located along the western railway corridor, from 710 m to 1.3 km south of Degrussa Road. The previously known population had been detected at 690 m south of the railway crossing on the eastern railway corridor. A total of 83 plants were detected within the survey area, supplementing the previously recorded 31 plants. Plants of *L. ?bossiaea* were detected within Vegetation Unit 6: SSSL, and Vegetation Unit 7: MMSAsS.

The plants of *L. ?bossiaea* counted represent an edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding suitable habitat of the adjacent reserve within the vicinity, and the total population number is much higher. Further surveys may be required to quantify impact of proposed clearing on areas identified in the survey area, within the context of the total population.

The known distribution and records of *L. bossiaea* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998 -) indicate that *L. bossiaea* has a total of 16 records, located in a 200 km north-south and 400 km east-west distribution. It has been recorded within the Local Government Areas of Esperance and Dundas, and IBRA regions of Esperance Plains and Mallee. See Figure 17 for the species known distribution.

a)

Figure 17: Regional distribution of *Leucopogon bossiaea* a) WAH, 1998 - b) AVH, n.d.



b)
Figure 17 continued.

***Conostylis seorsiflora* subsp. *longissima*, P2 (new)**

A new population of *Conostylis seorsiflora* subsp. *longissima* (P2) was detected within the survey area (Figure 18). This species was not identified as likely to occur during the desktop assessment. Limited information and records of *C. seorsiflora* subsp. *longissima* are available, and additionally the non-threatened *Conostylis seorsiflora* subsp. *seorsiflora* is locally highly common and variable. The existence of subspecies was known to the botanist, so that when variation in the *Conostylis seorsiflora* plants present within the survey area was noted, a number of samples were collected to be keyed out. One specimen met the taxonomic description for *C. seorsiflora* subsp. *longissima* and was submitted to the WA Herbarium for verification (KW236, Accession 9330). As such, the precise location, associated vegetation or number of plants of *C. seorsiflora* subsp. *longissima* was not captured during the reconnaissance survey. A targeted flora survey may be required to quantify population distribution and dynamics. Prior records of this taxon indicate that flowering occurs in November and December (WAH, 1998 -), so any further targeted survey should be conducted during those months. A Threatened and Priority Report Form (TPFL) was submitted to DBCA District Flora Conservation Officer (Emma Adams) and Species and Communities Branch on 27/01/2023.

The known distribution and records of *C. seorsiflora* subsp. *longissima* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998 -) indicate that *C. seorsiflora* subsp. *longissima* has only 2 records, collected in 1971 and 1960. Specimens were collected in Cape Le Grand National Park and Fitzgerald National Park. It has been recorded within the Local Government Areas of Esperance and Ravensthorpe, and IBRA subregions of Fitzgerald and Recherche. See Figure 19.

Figure 18: Scanned specimen of *Conostylis seorsiflora* subsp. *longissima* within the Survey Area.

a)

Figure 19: Regional distribution of *Conostylis seorsiflora* subsp. *longissima* a) WAH, 1998 b) AVH, n.d.

b)
Figure 19 continued.

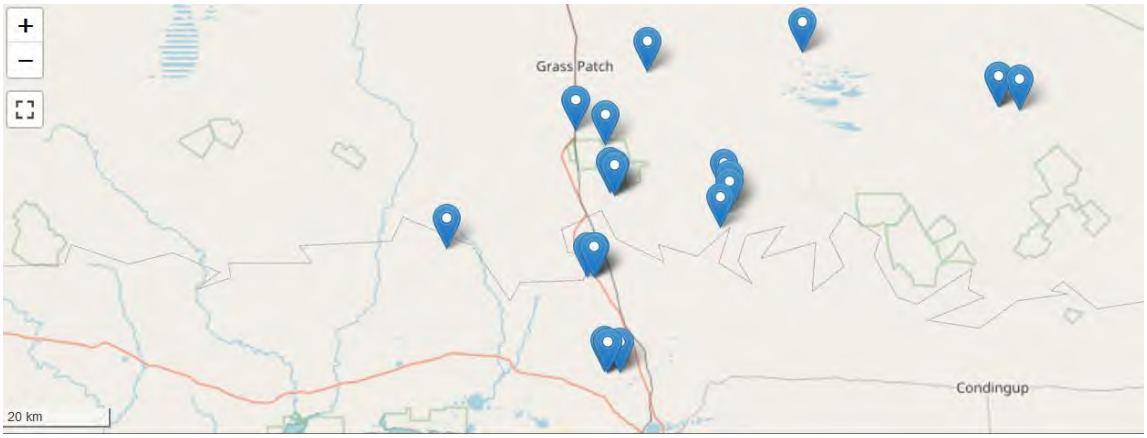
***Kunzea salina*, P3 (Existing)**

The population of *Kunzea salina* was detected during the 2021 Spring Reconnaissance Survey along the railway line; plants detected within the survey area are therefore part of a larger and known population (Figure 20). In 2021 the species was verified by the WA Herbarium (KW148, Accession 9059, specimen not retained). The population of *K. salina* within the survey area was located along the western railway corridor, from 720 m to 1.4 km south of Degrussa Road. The previously known population had been detected at 720 m south of the railway crossing on the eastern railway corridor. A total of 92 plants were detected within the survey area, supplementing the previously recorded 36 plants. Plants of *K. salina* were detected within Vegetation Unit 5: HaSHhS, Vegetation Unit 6: SSSL, and Vegetation Unit 7: MMSAsS, which is consistent vegetation with the known associated habitat for the species. A Threatened and Priority Report Form (TPFL) was submitted to DBCA District Flora Conservation Officer (Emma Adams) and Species and Communities Branch on 13/12/2022.

The plants of *K. salina* counted represent an edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding suitable habitat of the adjacent reserve within the vicinity, and the total population number is much higher. Further surveys may be required to quantify impact of proposed clearing on the overall population.

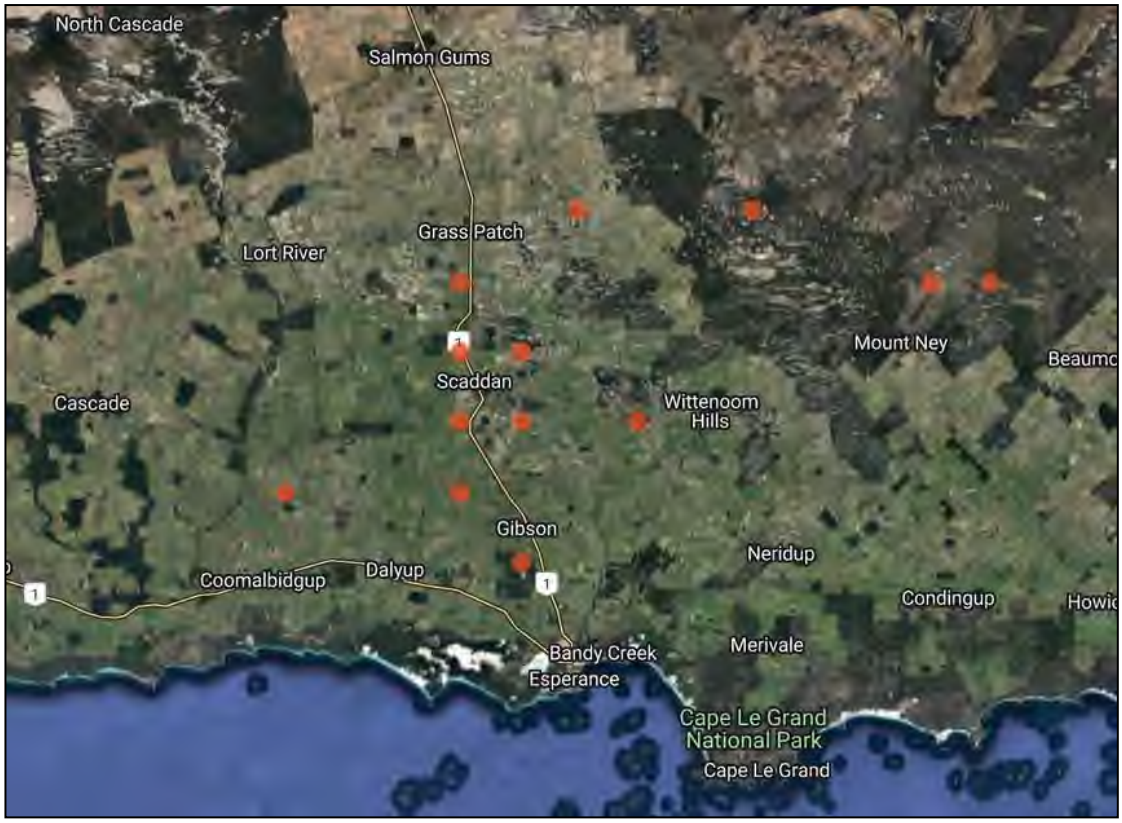
The known distribution and records of *K. salina* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998 -) indicate that *K. salina* has a total of 32 records, located in a 60 km north-south and 80 km east-west distribution. It has been recorded within the Local Government Areas of Esperance, and IBRA regions of Esperance Plains and Mallee. See Figure 21.

Figure 20: Photos of *Kunzea salina* within the Survey Area.



a)

Figure 21: Regional distribution of *Kunzea salina* a) WAH, 1998 – b) AVH, n.d.



b)
Figure 21 continued.

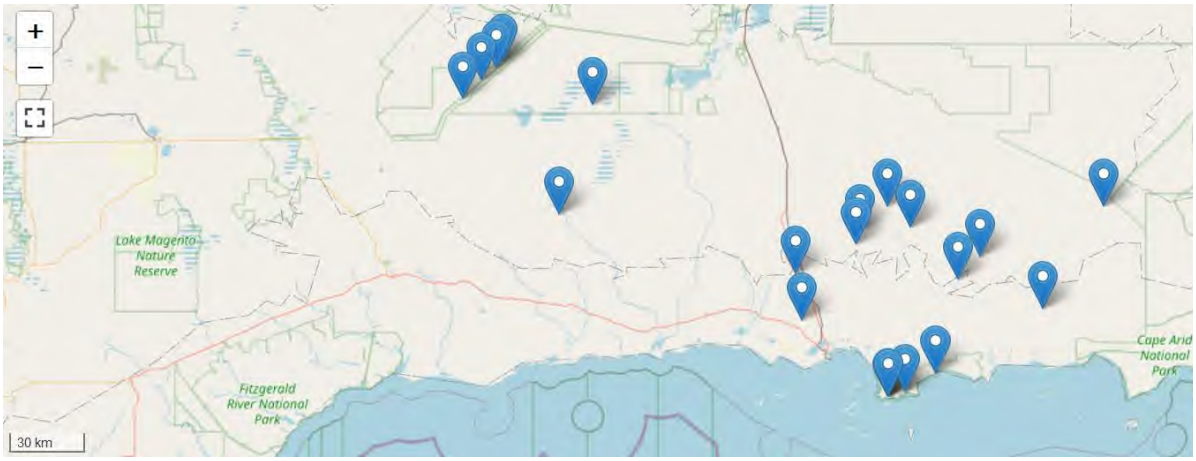
***Persoonia scabra*, P3 (new)**

A new population of *Persoonia scabra* (P3) was detected within the survey area, after being identified as 'Likely' to occur in the LOO (Table 12, Appendix B; Figure 22). Due to being a new population recorded, a specimen was collected and submitted to the WA Herbarium for verification of identification (KW194, Accession 9826, not retained by WA Herbarium). The population of *P. scabra* was located on the western railway corridor, 1.08 km south of Degrussa Road railway crossing. It was recorded within Vegetation Unit 7: MMSAsS, which is consistent with the known associated habitat of the species. A total of two plants were recorded. A Threatened and Priority Report Form (TPFL) was submitted to DBCA District Flora Conservation Officer (Emma Adams) and Species and Communities Branch on 13/12/2022.

The plants of *P. Scabra* counted represent a partial or edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding suitable habitat of the adjacent reserve, and the total population number is therefore much higher. Further surveys may be required to quantify impact of proposed clearing on the overall population.

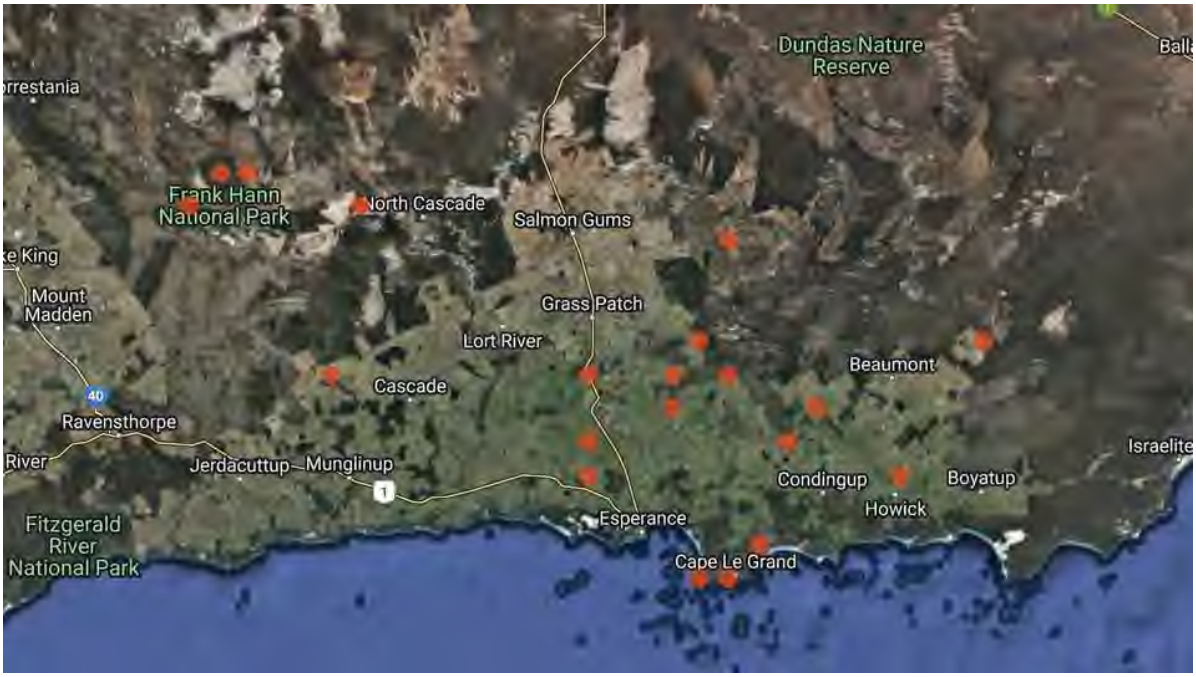
The known distribution and records of *P. scabra* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998 -) indicate that *P. scabra* has a total of 21 records, and is largely located in a 250 km east-west and 150 km north distribution around the Esperance townsite. It has been recorded within the Local Government Areas of Esperance, Kalgoorlie-Boulder, Lake Grace and Ravensthorpe, and IBRA regions of Esperance Plains, Mallee and Murchinson. See Figure 23.

Figure 22: Photos of *Persoonia scabra* within the Survey Area.



a)

Figure 23: Regional distribution of *Persoonia scabra* a) WAH, 1998 b) AVH, n.d.



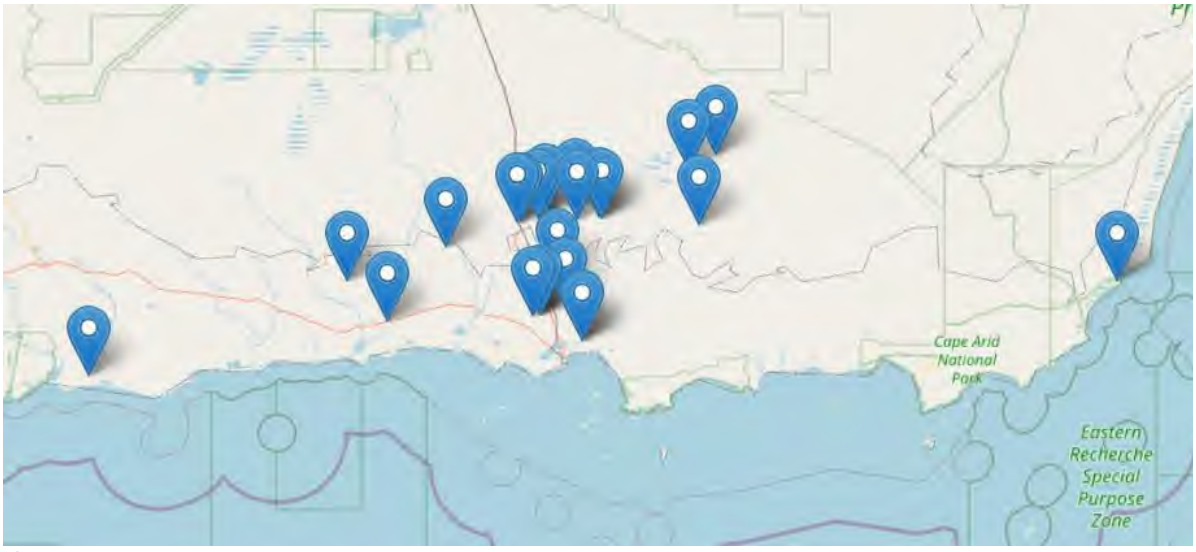
b)
Figure 23 continued.

***Austrobaeckea uncinella*, P3 (new)**

A new population of *Austrobaeckea uncinella* (P3) was detected within the survey area, after being identified as 'Likely' to occur in the LOO (Table 12, Appendix B; Figure 24). It was not recognised as a priority species at the time in the field, likely due to the large number of non-threatened Myrtle species with minor or microscopic features differentiating species. Following the identification of specimens collected, it was submitted to the WA Herbarium for verification of identification (KW237, Accession 9330, unknown if specimen retained). The precise location, number of plants or other population dynamics of *A. uncinella* within the survey area were therefore not ascertained. It was recorded as occurring within Vegetation Unit 1: MyPrS and Vegetation Unit 7: MMSAsS. A targeted flora survey may be required to quantify population distribution and dynamics specifically within these recorded vegetation units. It is recommended this occurs during flowering period of *A. uncinella,* between September and January and peaking from October to December (Rye, 2021). A Threatened and Priority Report Form (TPFL) was submitted to DBCA District Flora Conservation Officer (Emma Adams) and Species and Communities Branch on 27/01/2023.

The records of *A. uncinella* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998 -) indicate that *A. uncinella* has a total of 26 records, and is located in a 300 km east-west and 100 km north-south distribution centring around the Gibson townsite in the Esperance locality, and extending from the Fitzgerald to Cape Arid. There is also a single outlier record north of Kalgoorlie. It has been recorded within the Local Government Areas of Esperance and Ravensthorpe, and IBRA subregions of Eastern Mallee and Recherche. See Figure 25.

Figure 24: Scanned specimen of *Austrobaeckea uncinella* within the Survey Area.



a)

Figure 25: Regional distribution of *Austrobaeckea uncinella* a) WAH, 1998 b) AVH, n.d.

b)
Figure 25 continued.

5.6. Threatened and Priority Ecological Communities

Two Threatened (TEC) and Priority (PEC) ecological communities were identified in the LOO, with 'Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC / PEC the only one identified as 'Likely' to occur (Section 4.2; Table 13, Appendix B).

A single vegetation unit bore similarity to Kwongkan TEC / PEC criteria, Vegetation Unit 8: MS. Vegetation Unit 8: MS was highly diverse and contained a large number of Proteaceae species that represented a significant portion of the floristic composition. However, it was determined as not meeting Kwongkan TEC / PEC criteria due to being a small, isolated patch (0.161 ha) and surrounded entirely by Completely Degraded or Degraded vegetation. No other vegetation units bore similarity to TEC / PECs.

5.7. Fauna Survey Results

A description of the eight vegetation units identified, which correlate with fauna habitat units present, is provided in Section 5.2. Each fauna habitat unit is presented below in Table 10.

Table 10: Fauna habitat units within the survey area.

Description	Photograph
HT1: Mixed Shrubland [Mixed SL] Area: 1.04 ha. This habitat unit comprises approximately 23.3% of the survey area, and is located on the western and eastern linear corridors along the railway in the northern portion of the survey area. Mixed tall shrubland dominated by *Lambertia inermis* and *Phymatocarpus maxwelli,* with scattered *Nuytsia floribunda* forming the upper canopy strata. The midstorey is dominated by *Adenanthos cuneatus* with *Tetrapora preissiana*, *Acacia saligna* and *Acacia cyclops*. Dense sedge understorey dominated by *Hypolaena humilis, Chamaescilla corymbosa* and *Trachymene pilosa,* with an invasion of *Eragrostis curvula, Avena fatua* and *Briza maxima.* Habitat value for Threatened and Priority fauna species: This habitat unit provides suitable habitat for quenda and low-quality foraging habitat for Carnaby's Cockatoo. The habitat unit also provides low quality habitat for the western heath mouse *Pseudomys occidentalis (*western mouse, P4), *Pseudomys shortridgei* (heath mouse / dayang, VU / EN), *Notamacropus Irma* (western brush wallaby, P4), *Apus pacificus* (fork-tailed swift, MI), and *Elanus scriptus* (letter-winged kite, MI). Corresponding to Vegetation Unit 1: Mixed Myrtaceous and Proteaceous Shrubs	 
HT2: Disturbed / Cleared Vegetation [DC Veg] Area: 0.42 ha. This habitat type comprises approximately 9.40% of the survey area, and tended to occur as a buffer around remnant vegetation along the railway corridor. Disturbed and previously cleared vegetation consisting of invasive, non-native *Eragrostis curvula, Ehrharta longiflora, Avena fatua* and *Briza maxima*. Habitat value for Threatened and Priority fauna species: This habitat type contains hunting habitat for the *Elanus scriptus* (letter-winged kite, P4), and low quality foraging habitat for *Isoodon fusciventer (*quenda, P4). Corresponding to Vegetation Unit 2: Invasive Novel Ecosystem.	

Table 10 cont.

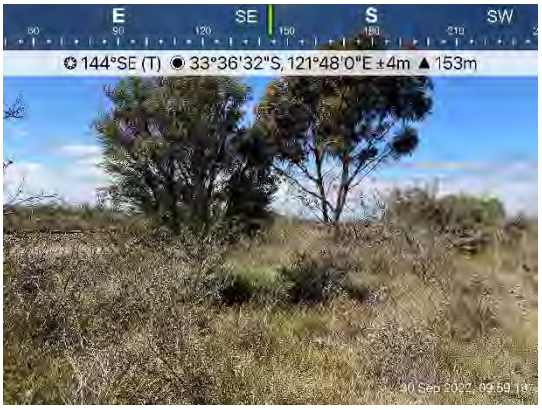
Description	Photograph
HT3: *Melaleuca cuticularis* Shrubland [Melcut SL] Area: 0.06 ha. This habitat type comprises approximately 1.34% of the survey area, and is primarily located in the low-lying, seasonally-inundated areas within the northern portion of the survey area. Located in a drainage basin area with an overstorey dominated by *Melaleuca cuticularis* and scattered *Melaleuca brevifolia*. Understorey consists of non-native *Eragrostis curvula* and *Ehrharta longiflora,* and native *Gahnia trifida.* Habitat value for Threatened and Priority fauna species: This habitat provides suitable habitat for *Isoodon fusciventer* (quenda, P4) and low quality habitat for *Pseudomys occidentalis (*western mouse, P4), *Apus pacificus* (fork-tailed swift, MI) and *Elanus scriptus* (letter-winged kite, P4). Corresponding to Vegetation Unit 3: *Melaleuca cuticularis* and Sedge Wetland.	 
HT4: Yate Open Woodland [YOW] Area: 0.14 ha. This habitat unit comprises approximately 3.13% of the survey area. The habitat unit is characterised by an open woodland dominated by *Eucalyptus occidentalis* and an understorey consisting of *Melaleuca cuticularis and Lambertia inermis,* with a dense mixed sedgeland of *Tetrapora preissiana* and *Hypolaena humilis*. Habitat value for Threatened and Priority fauna species: This habitat unit provides suitable habitat for *Isoodon fusciventer (*quenda, P4), low quality habitat for *Pseudomys occidentalis* (western mouse, P4), *Notamacropus Irma* (western brush wallaby, P4), *Apus pacificus* (fork-tailed swift, MI), *Elanus scriptus* (letter-winged kite, P4) and low-quality foraging habitat for *Zanda latirostris (*Carnaby's Cockatoo, EN). Corresponding to Vegetation Unit 4: *Eucalyptus occidentalis* Woodland and *Hypolaena humilis* Sedgeland.	 

Table 10 cont.

Description	Photograph
HT5: *Hakea adnata* Shrubland [Hakadn SL] Area: 0.17 ha. This habitat type comprises approximately 3.80% of the survey area. Dense shrubland located on the periphery of salt lakes. Overstorey dominated by *Hakea adnata* and occasional *Acacia cyclops*. Understorey consists of a dense shrubland of *Tetrapora preissiana* and occasional *Phymatocarpus maxwellii*, *Leucopogon assimilis* and *Verticordia plumosa* subsp. *grandiflora*. Dense sedgeland understorey of *Hypolaena humilis, Lepidosperma squamatum*, *Dianella brevicaulis, Gahnia trifida*, and non-native species *Ursinia anthemoides*, *Eragrostis curvula, Briza maxima* and *Bromus diandrus*. Habitat value for Threatened and Priority fauna species: This habitat provides suitable habitat for *Isoodon fusciventer* (quenda / Southern western bandicoot, P4), *Pseudomys occidentalis* (western mouse, P4), *Pseudomys shortridgei* (heath mouse / dayang, VU / EN) and low-quality foraging habitat for *Zanda latirostris* (Carnaby's Cockatoo / EN). This habitat type also contains low quality habitat for the *Notamacropus irma (*western brush wallaby, P4), *Apus pacificus* (fork-tailed swift, MI) and *Elanus scriptus* (letter-winged kite, P4). Corresponding to Vegetation Unit 5: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland.	
HT6: *Melaleuca brevifolia* Shrubland [Melbre SL] Area: 0.06 ha. This habitat type comprises approximately 1.34% of the survey area. Vegetation type is found within the salt lake and drainage system basin areas of the survey area. The overstorey is dominated by *Melaleuca brevifolia* with *Leucopogon* sp. Coujinup. Understorey consists of *Kunzea salina* and *Austrostipa juncifolia* and *Hypolaena humilis* sedgeland.	

Table 10 cont.

Description	Photograph
HT6: *Melaleuca brevifolia* Shrubland [Melbre SL] Continued. Habitat value for Threatened and Priority fauna species: This vegetation type is typically associated with the seasonally inundated areas and therefore contains marginally suitable habitat for the *Calidris acuminata* (sharp-tailed sandpiper, MI), *Calidris canutus (*red knot, EN / MI), *Calidris ferruginea* (curlew sandpiper / CR / MI), *Calidris melanotos* (pectoral sandpiper / MI), *Calidris ruficollis (*red-necked stint / MI), *Charadrius bicinctus (*double-banded plover, MI), *Thinornis rubricollis* (hooded plover, P4) and *Tringa nebularia* (common greenshank / MI). This habitat provides marginally suitable habitat for *Isoodon fusciventer* (quenda / southern brown bandicoot, P4), *Apus pacificus* (fork-tailed swift, MI) and *Elanus scriptus (*letter-winged kite, P4). Corresponding to Vegetation Unit 6: Shrub and Samphire Salt Lake.	
HT7: Mallee Woodland [MW] Area: 0.44 ha. This habitat type comprises approximately 9.85% of the survey area. Mixed eucalyptus mallee overstorey consisting of *Eucalyptus uncinata* and *Eucalyptus rigens*. Midstorey dominated by *Hakea denticulata, Hakea lissocarpha* and *Acacia cyclops*, with a dense understorey of *Anarthria scabra, Caustis dioica, Dianella brevicaulis, Lepidosperma squamatum, Hypolaena humilis,* and non-native *Eragrostis curvula, Briza maxima* and *Neurachne alopecuroidea*. Habitat value for Threatened and Priority fauna species: This habitat provides suitable habitat for *Isoodon fusciventer* (quenda / southern brown bandicoot, P4), *Pseudomys occidentalis (*western mouse, P4), *Pseudomys shortridgei* (heath mouse / dayang, VU / EN), *Notamacropus lrma* (western brush wallaby, P4) and low quality foraging habitat for *Zanda latirostris* (Carnaby's Cockatoo, EN). This habitat type also contains low quality habitat for the *Apus pacificus (*fork-tailed swift, MI) and *Elanus scriptus* (letter-winged kite, P4). Corresponding to Vegetation Unit 7: Mixed Mallee Shrubland and *Anarthria scabra* sedgeland.	 

Table 10 continued.

Description	Photograph
HT8: Mixed Eucalyptus Woodland and Proteaceae Shrubland [MEWPS] Area: 0.16 ha. This habitat type comprises approximately 3.58% of the survey area. Mixed eucalyptus mallee woodland and Proteaceae shrubland. Overstorey dominated by *Eucalyptus uncinata*, *Eucalyptus rigens,* and *Eucalyptus tetraptera*. Midstorey consists of *Hakea trifurcata, Hakea nitida, Acacia saligna, Lambertia inermis, Phymatocarpus maxwellii*, and *Isopogon polycephalus.* Understorey consists of *Leucopogon* sp. Coujinup (M. A. Burgman 1085), *Cyathochaeta equitans*, *Synaphea petiolaris* subsp. *petiolaris*, *Gompholobium polymorphum, Cryptandra nutans*, *Stachystemon virgatus*, *Chorizema aciculare*, *Patersonia occidentalis*, *Gahnia trifida* and *Neurachne alopecuroidea*. Habitat value for Threatened and Priority fauna species: This habitat provides suitable habitat for *Isodoon fusciventer (*quenda / southern brown bandicoot, P4), *Pseudomys occidentalis* (western mouse, P4), *Pseudomys shortridgei* (heath mouse, VU / EN), *Notamacropus irma* (western brush wallaby, P4) and low-quality foraging habitat for *Zanda latirostris* (Carnaby's Cockatoo, EN). This habitat type also contains low quality habitat for the *Apus pacificus (*fork-tailed swift, MI) and *Elanus scriptus (*letter-winged kite, P4). Corresponding to Vegetation Unit 8: Mixed Shrubland	

A total of 25 species of fauna were recorded during the survey, including 17 birds, four mammals, two reptiles and two invertebrates. Refer to full fauna species list in Table 21 in Appendix D. Of these, one was a listed species, *Isoodon fusciventer* (quenda, P4). Additionally, potential habitat was detected for 14 species including: *Apus pacificus (*fork-tailed swift, MI), *Elanus scriptus (*sharp-tailed sandpiper, P4), C*alidris canutus* (red knot, EN / MI), C*alidris ferruginea* (curlew sandpiper, CR / MI), *Calidris melanotos* (pectoral sandpiper, MI), *Calidris ruficollis* (red-necked stint, MI), *Zanda latirostris* (Carnaby's Cockatoo, EN), *Charadrius bicinctus* (double-banded plover, MI), *Elanus scriptus* (letter-winged kite, P4), *Notamacropus irma (*western brush wallaby, P4), *Pseudomys occidentalis* (western mouse, P4), *Pseudomys shortridgei (*heath mouse / dayang, EN / CR), *Thinornis rubricollis* (hooded plover, P4) and *Tringa nebularia* (common greenshank, MI).

All fauna habitat units contain suitable habitat for quenda, with units 1, 3, 4, 5, 7 and 8 providing the highest quality habitat, and units 2 and 6 providing low-quality habitat for this species. The quenda was observed indirectly through observation of diggings, and the presence of suitably sized runnels throughout the survey area (Figures 26 and 28).

Potential foraging habitat for the EN Carnaby's Cockatoo is present throughout the survey area within HT1: Mixed SL, HT4: YOW, HT5: Hakadn SL, HT7: MW, and HT8: MEWPS. Known food plant species, predominantly within the Myrtaceous and Proteaceae families, although present, were not observed in high diversity or abundance. There was no evidence of foraging observed within the survey area. Similar fauna habitat is present adjacent to the survey area, with larger, more intact areas of remnant vegetation present predominantly to the east and southwest of the survey area. The larger patch size and higher quality of these remnants are likely to provide more suitable habitat for the cockatoos. The survey area lacks breeding habitat for Carnaby's Cockatoo in the form of suitable DBH trees or any suitably sized breeding hollows.

Suitable habitat is available for the P4 western mouse within fauna habitat units HT1: Mixed SL, HT3: Melcut SL, HT4: YOW, HT5: Hakadn SL, HT7: MW and HT8: MEWPS, and for the EN / CR heath mouse / dayang within units HT1: Mixed SL, HT5: Hakadn SL, HT7: MW, and HT8: MEWPS. The cryptic behaviour of both species results in diurnal survey techniques yielding low detection rates of individuals. The observation of murid-sized runnels and burrow entrances within the survey area, indicate

that similar-sized taxa are present. Tracks of bush rat (*Rattus fuscipes*) were detected in the southern portion of the survey area. Runnels and burrows detected are likely to belong to this species.

Low quality habitat is present within fauna habitat units HT1: Mixed SL, HT2: DC Veg, HT4: YOW, HT5: Hakadn SL, HT7: MW and HT8: MEWPS for the P4 western brush wallaby. No evidence of species presence (scats or tracks) was observed within the survey period, with all indicators of macropod presence determined to be that of western grey kangaroo (*Macropus fuliginosus*). Similar vegetation types are present adjacent to the survey area, which are likely to provide more suitable areas of habitat this species. The linear nature of the habitat available within the survey area suggests that if the species is present is likely to be transient.

Suitable habitat is present throughout the survey area for the MI fork-tailed swift, and the P4 letter-winged kite. These species were not observed during the survey, but may be using the area for hunting/ foraging.

The seasonally inundated area located within the southern portion of the survey area predominantly associated with HT6: Melbre SL provides low quality habitat for a range of migratory birds, including *Calidris acuminata (*sharp-tailed sandpiper, MI), EN / MI red knot, CR / MI curlew sandpiper, MI pectoral sandpiper, MI red-necked stint, MI double-banded plover, P4 hooded plover and MI common greenshank. None of these species were observed during the survey period, and it is noted that the suitability of habitat available for these species is likely to be restricted to times when the area is inundated.

High incidence of western grey kangaroo activity was observed throughout the survey area through the presence of scats, tracks / prints and large runnel systems. High levels of rabbit (*Oryctolagus cuniculus*), and fox (*Vulpes vulpes*) activity, was also observed, as evidenced from scats, scrapes and diggings, prints, and warrens (Figure 27).

No suitable habitat was present within the survey area for the southern death adder (*Acanthophis antarcticus,* P3), bar-tailed godwit (*Limosa lapponica,* MI / MI), spectacled hooded snake (*Parasuta spectabilis* subsp. *bushi,* P1) or Cape Le Grand assassin spider (*Zephyrarchaea marki,* VU).

Refer to Figure 26 for photographs of indicators of quenda presence observed during the survey, Figure 27 for photographs of general fauna habitat present within the survey area and Figure 28 for locations of species detected.

a)

b)

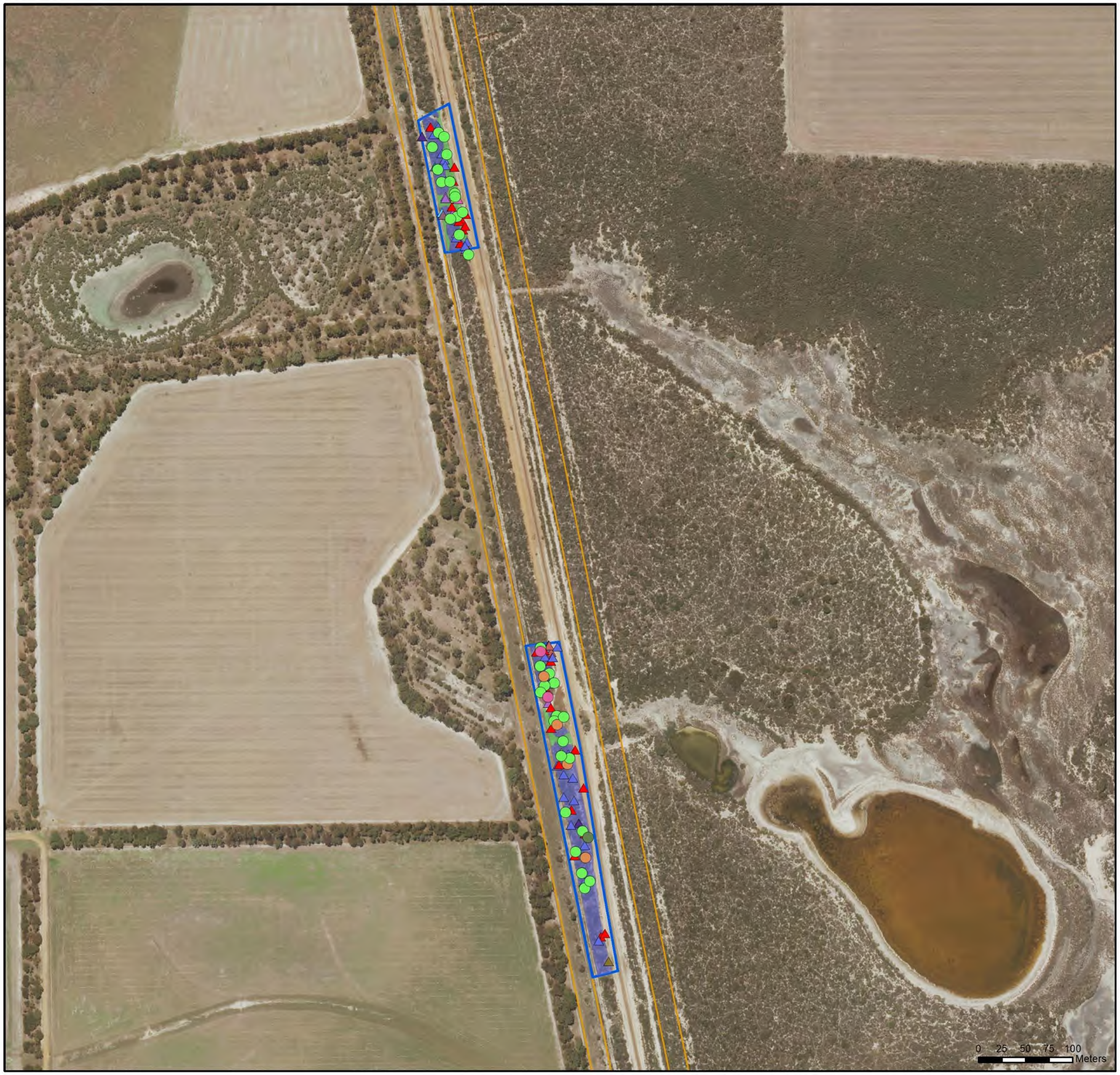
c)

d)

Figure 26: Photographs of evidence of Threatened or Priority fauna presence within the survey area.
a) and b) quenda diggings; c) and d) quenda sized runnels (also suitable for rabbit)

Figure 27: Photographs of evidence of non-Threatened and Priority fauna presence and habitat within the survey area.

a) rabbit diggings / scrapes (old); b) rabbit scat (old); c) kangaroo tracks; d) bush rat tracks; and e) fox scat.



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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

Survey Area
Cadastre

Fauna Habitat Units

1: Mixed Shrubland [Mixed SL]
2: Disturbed / Cleared Vegetation [DC Veg]
3: Melaleuca cuticularis Shrubland [Melcut SL]

Fauna Habitat

Rabbit Warren
Reptile Burrow
Runnel
Snake Burrow

Observed Fauna

Anthochaera lunulata
Barnardius zonarius
Coracina novaehollandiae
Grallina cyanoleuca
Isoodon fusciventer, P4
Macropus fuliginosus
Manorina flavigula
Oryctolagus cuniculus
Phaps chalcoptera
Phylidonyris novaehollandiae
Pogona minor
Tiliqua rugosa
Trichonephila edulis
Vanellus miles

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 28: Observed Fauna.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

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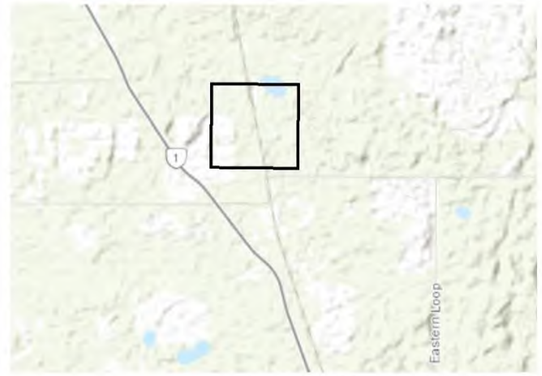

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Fauna Habitat Units

- 1: Mixed Shrubland [Mixed SL]
- 2: Disturbed / Cleared Vegetation [DC Veg]
- 4: Yate Open Woodland [YOW]

Fauna Habitat

- Macropod Runnel / Track
- Reptile Burrow
- Runnel
- Snake Burrow

Observed Fauna

- *Anas superciliosa*
- *Anthochaera lunulata*
- *Chrysococcyx basalis*
- *Gerygone fusca*
- *Isoodon fusciventer*, P4
- *Lichmera indistincta*
- *Macropus fuliginosus*
- *Manorina flavigula*
- *Oryctolagus cuniculus*
- *Phylidonyris novaehollandiae*
- *Pogona minor*
- *Rhipidura leucophrys*

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 28 cont.: Observed Fauna.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **11/01/2023**

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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Fauna Habitat Units

- 5: Hakea adnata Shrubland [Hakadn SL]
- 6: Melaleuca brevifolia Shrubland [Melbre SL]
- 7: Mallee Woodland [MW]

Fauna Habitat

- Rabbit Warren
- Reptile Burrow
- Runnel
- Snake Burrow

Observed Fauna

- *Austracantha minax*
- *Barnardius zonarius*
- *Cincloramphus mathewsi*
- *Egretta novaehollandiae*
- *Grallina cyanoleuca*
- *Himantopus himantopus*
- *Isoodon fusciventer*, P4
- *Macropus fuliginosus*
- *Oryctolagus cuniculus*
- *Rattus fuscipes*
- *Rhipidura leucophrys*
- *Tiliqua rugosa*
- *Vanellus miles*
- *Vulpes vulpes*

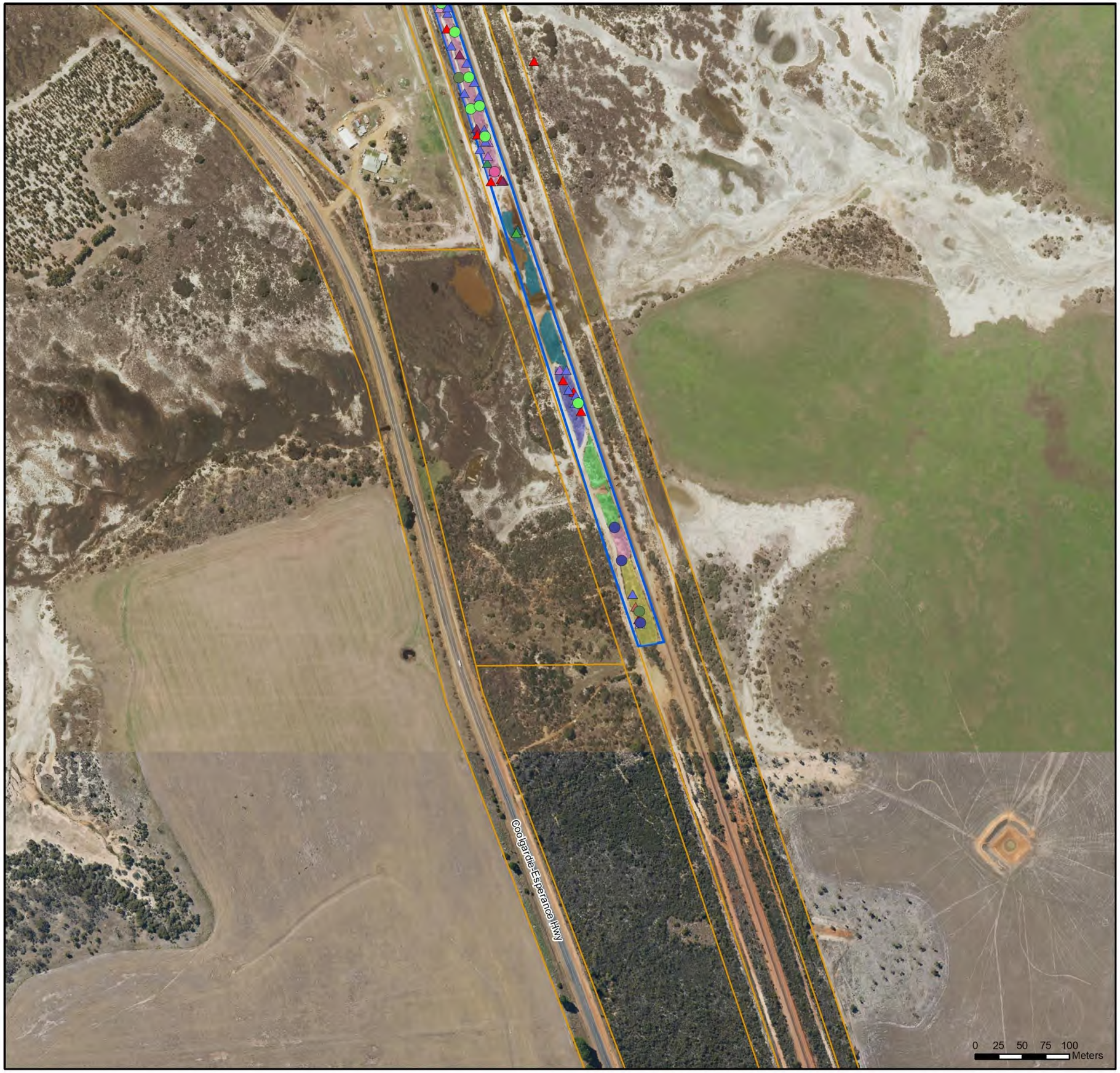
Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 28 cont.: Observed Fauna.

	QA Check	*Drawn by*
	KAW	**CvdM**
STATUS **FINAL**	*FILE* **AI005-015**	*DATE* **18/01/2023**



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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Fauna Habitat Units

- 1: Mixed Shrubland [Mixed SL]
- 2: Disturbed / Cleared Vegetation [DC Veg]
- 5: Hakea adnata Shrubland [Hakadn SL]
- 7: Mallee Woodland [MW]
- 8: Mixed Eucalyptus Woodland and Proteace Shrubland [MEWPS]

Fauna Habitat

- Rabbit Warren
- Reptile Burrow
- Reptile Habitat - Woody Debris
- Runnel

Observed Fauna

- *Austracantha minax*
- *Cincloramphus mathewsi*
- *Himantopus himantopus*
- *Isoodon fusciventer*, P4
- *Macropus fuliginosus*
- *Manorina flavigula*
- *Oryctolagus cuniculus*
- *Phaps elegans*
- *Tiliqua rugosa*
- *Vanellus miles*
- *Vulpes vulpes*

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 28 cont.: Observed Fauna.

	QA Check	Drawn by
	KAW	CvdM
STATUS: FINAL	FILE: AI005-015	DATE: 18/01/2023

6. Discussion

6.1. Vegetation, Threatened and Priority Flora and Ecological Communities

The scope for this survey was to provide the client with information on any Threatened or Priority flora species that are potentially present within the survey area, as well as Threatened/Priority ecological communities, and to provide an assessment on vegetation units and their general condition.

Eight vegetation units were recorded within the survey area, primarily associated with changes in topography, hydrology and soil type. Ecosystem richness was therefore considered to be high within the survey area, indicating a high landscape-level diversity. Numerous vegetation units were significantly related to hydrological systems (primarily salt lakes) and contained riparian vegetation, specifically Vegetation Unit 3: *Melaleuca cuticularis* and Sedge Wetland (McSW), Vegetation Unit 5: *Hakea adnata* Shrubland and *Hypolaena humilis* Sedgeland (HaSHhS) and Vegetation Unit 6: Shrub and Samphire Salt Lake (SSSL). Condition of vegetation ranged from 'Completely Degraded' to 'Excellent' condition, with the majority of the survey area being in 'Very Good' to 'Good' condition. Due to the range of vegetation conditions present and high biological value, it is strongly recommended that a biosecurity operational plan is developed to limit the spread of plant pathogens and non-native species internally within the survey area.

The desktop assessment and 'Likelihood of Occurrence (LOO)' detected 7 Threatened and 73 Priority flora within the study area (30 km buffer surrounding the survey area). Of these, 10 were assessed as 'likely' and 31 as 'possible' to occur. Six species identified in the LOO as 'possible' to occur were not expected to be flowering at the time of the survey. P1 *Pimelea pelinos,* P2 *Thysanotus brachiatus,* P2 *Hibbertia turleyana,* P3 *Brachyloma mogin,* P3 *Astartea reticulata* and P4 *Frankenia glomerata* are all small species that could readily be obscured by dense vegetation, are similar in appearance to other species present when not in flower, and which would therefore be difficult to detect.

A total of 218 flora species were recorded, indicating a high level of floral diversity. This consisted of 187 native species and 31 introduced / non-native species. One of these weeds, *Asparagus asparagoides* (Bridal Creeper) was of high concern, being a Declared Pest under the *BAM Act 2007* and a Weed of National Significance. In total, six species of priority flora were detected within the survey area: P1 *Darwinia* sp. Gibson (R.D. Royce 3569), P2 *Leucopogon ?bossiaea,* P2 *Conostylis seorsiflora* subsp. *longissima,* P3 *Austrobaeckea uncinella,* P3 *Kunzea salina* and P3 *Persoonia scabra.* Populations of *D.* sp. Gibson (R.D. Royce 3569) and *L. ?bossiaea* were already known, and the remaining four priority species were considered new populations. Four plants of *D.* sp. Gibson (R.D. Royce 3569), 83 plants of *L. ?bossiaea,* 92 plants of *K. salina* and two plants of *P. scabra* were detected within the survey area. The total number of plants of *C. seorsiflora* subsp. *longissima* and *A. uncinella* is unknown, due to not being recognised as priority flora at the time of the field survey, and thus no count of the population occurred. A targeted flora survey specifically for these two species may be required to determine population dynamics and level of impact proposed. The population of *L. ?bossiaea* was first collected and verified in 2021, during a reconnaissance flora survey completed for the client in the adjacent railway corridor (BDS, 2022). Flowering was not occurring and the specimen submitted to the WA Herbarium was sterile, with identification unable to be verified with full confidence, which is denoted by the prefix '?' on the species name. Flowering was also not occurring during 2022 so no further collections were made. Priority flora were detected within Vegetation Unit 5: HaSHhS, Vegetation Unit 6: SSSL and Vegetation Unit 7: Mixed Mallee Shrubland and *Anarthria scabra* Sedgeland (MMSAsS). Vegetation Unit 7: MMSAsS, was noted to contain all priority flora recorded during the field survey indicating the high habitat value for priority flora of the vegetation unit.

Two Threatened (TEC) and Priority (PEC) ecological communities were identified in the desktop assessment, with TEC / PEC 'Subtropical and Temperate Coastal Saltmarsh' assessed as 'Unlikely' to occur and TEC / PEC 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' assessed as 'Likely' to occur. A single vegetation unit bore similarity to Kwongkan TEC / PEC criteria; specifically, Vegetation Unit 8: Mixed Shrubland (MS). It was highly diverse and contained a large number of Proteaceae species that represented a significant portion of the floristic composition. However, it was determined as not meeting Kwongkan TEC / PEC criteria due to being a small, isolated patch (0.16 ha) surrounded entirely by Completely Degraded or Degraded vegetation.

6.2. Basic Fauna Survey and Significant Tree Survey

The aim of the basic and targeted fauna survey was to assess and map the fauna habitat within the survey area, assess the likelihood of Threatened or Priority fauna being present within the survey area and/or particular fauna habitat units, record

actual presence of Threatened and Priority listed species, and undertake opportunistic inventory of fauna species encountered whilst traversing the survey area on foot.

Eight different fauna habitats were identified within the survey area, described as '1: Mixed Shrubland [Mixed SL]', '2: Disturbed / Cleared Vegetation [DC Veg]', '3: *Melaleuca cuticularis* Shrubland [Melcut SL]', '4: Yate Open Woodland [YOW]', '5: *Hakea adnata* Shrubland [Hakadn SL]', '6: *Melaleuca brevifolia* Shrubland [Melbre SL]', '7: Mallee Woodland [MW]' and '8: Mixed Eucalyptus Woodland and Proteaceae Shrubland [MEWPS]'. During the survey, 25 species of fauna were recorded, including 17 birds, four mammals, two reptiles and two invertebrates. *Isoodon fusciventer (*quenda, P4) was the only Threatened and Priority species detected during the survey. Of the initial 18 species assessed as 'Likely' or 'Possible' to occur pre-survey, 15 were assessed as having a LOO of 'Possible' following the survey, including *Apus pacificus (*fork-tailed swift, MI), *Calidris acuminata* (sharp-tailed sandpiper, MI), *Calidris canutus* (red knot, EN / MI), *Calidris ferruginea* (curlew sandpiper, CR / MI), *Calidris melanotos (*pectoral sandpiper, MI), *Calidris ruficollis* (red-necked stint, MI), *Zanda latirostris* (Carnaby's Cockatoo, EN), *Charadrius bicinctus* (double-banded plover, MI), *Elanus scriptus* (letter-winged kite, P4), *Notamacropus irma* (western brush wallaby, P4), *Pseudomys occidentalis* (western mouse, P4), *Pseudomys shortirdgei* (heath mouse / dayang, CR / EN), *Thinornis rubricollis (*hooded plover, P4), and *Tringa nebularia* (common greenshank, MI).

The quenda was observed within the survey area through the presence of diggings and suitably sized runnels. All fauna habitat units provide suitable habitat for the species, with higher quality habitat within HT1: Mixed SL, HT3: Melcut SL, HT4: YOW, HT5: Hakadn SL, HT7: MW and HT8: MEWPS. Suitable habitat is available for the western mouse (habitat units HT1: Mixed SL, HT3: Melcut SL, HT4: YOW, HT5: Hakadn SL, HT7: MW and HT8: MEWPS), heath mouse (HT1: Mixed SL, HT5: Hakadn SL, HT7: MW, and HT8: MEWPS) and low quality habitat for the western brush wallaby (units HT1: Mixed SL, HT2: DC Veg, HT4:YOW, HT5: , 7 and 8). The survey area is a linear strip of remnant vegetation with limited connectivity to immediately adjacent vegetation. There are other narrow linear strips of similar vegetation to the west of the survey area. However, the larger areas of intact remnant vegetation to the east of the survey area (and east of the existing railway line) are likely to provide suitable habitat for these species. The thin linear nature of the survey area indicates that although these taxa and suitable habitat is present, any individuals are likely to be utilising the broader surrounding remnant vegetation as part of their home range of which the linear remnant forms a component. In addition, the linear nature of the survey area also allows for individuals to move throughout the larger areas of vegetation within the landscape. Given the cryptic nature of the *Pseudomys occidentalis (*western mouse, P4) and *Pseudomys shortridgei* (heath mouse / dayang), the diurnal nature of this survey is unlikely to have resulted in detection of these species. However, the nature of the habitat and significant level of fox activity is likely a limiting factor for their presence. Both *Isoodon fuesciventer* (quenda, P4) and *Notamacropus irma* (western brush wallaby, P4) are mobile species, and have the ability to move throughout the landscape. Given the larger areas of remnant vegetation surrounding the survey area are likely to contain suitable habitat for both these species, it would be expected that the clearing of vegetation is unlikely to 'significantly' impact either species.

Suitable habitat is present throughout the survey area for the *Apus pacificus* (fork-tailed swift, MI), and potential hunting habitat is also present across the survey area for the letter-winged kite. No indicators of either species were observed. Given both of these species are almost entirely aerial, and are likely to be utilising the narrow linear vegetation strips for hunting, the clearing of vegetation is unlikely to significantly impact either species.

The seasonally inundated area located within the southern portion of the survey area predominantly associated with HT6: Melbre SL provides marginal habitat for a range of migratory birds being the *Calidris aduminata* (sharp-tailed sandpiper, MI), *Calidris canutus* (red knot, EN / MI), *Calidris ferruginea* (curlew sandpiper, CR / MI), *Calidris melanotos* (pectoral sandpiper, MI), *Calidris ruficollis* (red-necked stint, MI), *Charadrius bicinctus* (double-banded plover, MI), *Thinornis rubricollis* (hooded plover, P4) and *Tringa nebularia (*common greenshank, MI). None of these species were observed during the survey period, and it is noted that the available habitat for these species is likely to be restricted to times when the area is inundated providing the wetland / riparian conditions they prefer. As is the case with the mammal species mentioned above, more suitable areas of habitat are available in the surrounding landscape for these species. The clearing of the relatively small area of suitable habitat available within the survey area is therefore unlikely to significantly impact these species. Given the potential for threatened and migratory species, activities should avoid seasonally inundated areas where possible, and should ensure that local hydrology is not altered.

No evidence of foraging or roosting from *Zanda latirostris* (Carnaby's Cockatoo, EN) was observed within the survey area. Given the low diversity and overall low quantity of known food plant species available in the survey area, the habitat is considered to be low-quality and is unlikely to provide significant foraging opportunities for the species. In addition, the lack of any foraging evidence (new or old) indicates the area is not a favoured feeding site and is most likely to offer opportunistic foraging opportunities to transient individuals. The vegetation within the survey area does not provide roosting or breeding habitat for the species.

The new cockatoo referral guidelines (DAWE, 2022) stipulates that a proposal should be referred under the federal *EPBC Act 1999* for assessment if:

- Any loss of / impact upon known, suitable or potential nesting trees, and the habitat around these trees;
- More than 1 ha of high-quality habitat is to be removed; or
- >10 ha of low-quality foraging habitat.

Approximately 1.94 ha of potential foraging habitat is present within the survey area, however as it is not of high-quality, it is unlikely that works at this location alone would need to be referred for assessment under the *EPBC Act 1999*. Regardless, the cumulative total and potential impact across the entire Esperance Branch Line project should be taken into consideration. Potential impacts to all fauna can be minimised by containing proposed clearing within previously cleared or disturbed areas.

7. References

AVH, Australasian Virtual Herbarium (n.d.) *Australian Virtual Herbarium.* Accessible: https://avh.chah.org.au/

Archer, W (2016). *Esperance Wildflower Blogspot.* Accessible: http://esperancewildflowers.blogspot.com/

Beard, J. S., Beeston, G.R., Harvey, J.M., Hopkins, A. J. M. and Shepherd, D. P. (2013). The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition. *Conservation Science Western Australia* 9: 1-152.

Bell, U (2018). *Native Grasses of Perth Hills: A field guide to Identification.* EMRC and Western Australian Herbarium.

BDS, Bio Diverse Solutions (2022). *Reconnaissance Flora, Vegetation and Basic Fauna Survey Report. Line 51, Esperance Branch Line – North of Gibson. Degrussa road, 351.24 to 352.91, Site 8.* Unpublished prepared for Arc Infrastructure.

Blackall, B.J. and Grieve, W.E. (1980). *How to know Western Australian Wildflowers Part IIIA.* University of Western Australia Press

Blake, T.L. (2021). *Lantern Bushes of Australia; Thomasias and Allied Genera. A Field and Horticultural Guide.* APS Keilor Plains Inc.

BoM, Bureau of Meteorology Australia (2022) Climate Statistics for Australian Locations – Esperance Aero (Station #009542) Accessed: September 2022 www.bom.gov.au

Brophy, J.J, Craven, L.A. and Doran J.C. (2013) Melaleucas, their Botany, Essential Oils and Uses, Australian Government, Australian Centre for International Agricultural Research, Rural Industries Research and Development Corporation

CALM, Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia,* Department of Conservation and Land Management, Como.

CoA, Commonwealth of Australia (2013), *Draft Survey Guidelines for Australia's Threatened Orchids,* Commonwealth of Australia. Accessible: http://www.environment.gov.au/system/files/resources/e160f3e7-7142-4485-9211-2d1eb5e1cf31/files/draft-guidelines-Threatened-orchids.pdf

Comer, S., Gilfillan, S., Barrett, S., Grant, M., Tiedemann, K., and Anderson, L. (2001). *Esperance 2 (ESP2 – Recherche subregion). A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002.* Department of Conservation and Land Management.

Cooke, D.A. (1986). *Patersonia: In Flora of Australia 46.* ABRS, Canberra. KeyBase, teaching old keys new tricks. Accessible: https://keybase.rbg.vic.gov.au/keys/show/10803

Cooke, D.A. (1992). *A taxonomic revision of Centrolepis (Centrolepidaceae) in Australia.* Journal of the Adelaide Botanical Gardens. 15(1): 1-63. Keybase. Accessible: https://keybase.rbg.vic.gov.au/keys/show/10389

DAWE, Department of Agriculture, Water and Environment (2022). *Referral guideline for 3 WA Threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black- cockatoo,* Department of Agriculture, Water and the Environment, Canberra, February.

DBCA (2007 –) *NatureMap: Mapping Western Australia's Biodiversity*. Department of Parks and Wildlife. URL: https://naturemap.dbca.wa.gov.au/

DBCA, Department of Biodiversity, Conservation and Attractions (2017). South Coast Significant Wetlands (DBCA-018) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018a). Carnaby's Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018b). Carnaby's Cockatoo Confirmed Roost Sites (DBCA-050) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018c). Carnaby's Cockatoo Unconfirmed Roost Sites (DBCA-051) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018d). Carnaby's Cockatoo Confirmed Roost Sites Buffered 6km (DBCA-052) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018e). Carnaby's Cockatoo Unconfirmed Roost Sites Buffered 6km (DBCA-053) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018f). Carnaby's Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2018g). Carnaby's Cockatoo Unconfirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-055) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2019a). Black Cockatoo Breeding Sites - Buffered (DBCA-063) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2019b). Black Cockatoo Roosting Sites - Buffered (DBCA-064) dataset.

DBCA, Department of Biodiversity, Conservation and Attractions (2021). Priority Ecological Communities for Western Australia Version 32. Species and Communities Program. Available from: https://www.dpaw.wa.gov.au/images/documents/plants-animals/Threatened-species/Listings/Priority%20Ecological%20Communities%20list.pdf

DBCA, Department of Biodiversity, Conservation and Attractions (2022a), *Threatened and Priority Flora Database Search for Line 51 (350.284 to 354.231) Degrussa Road.* Prepared and supplied by Arc Infrastructure for Bio Diverse Solutions in July 2022.

DBCA, Department of Biodiversity, Conservation and Attractions (2022b), *Threatened and Priority Ecological Community Database Search for Line 51 (350.284 to 354.231) Degrussa Road.* Prepared and supplied by Arc Infrastructure for Bio Diverse Solutions in July 2022.

DBCA, Department of Biodiversity, Conservation and Attractions (2022c) *Threatened and Priority Fauna Database Search for Line (350.284 to 354.231) Degrussa Road.* Prepared and supplied by Arc Infrastructure for Bio Diverse Solutions in July 2022.

DCCEEW, Department of Climate Change, Energy, the Environment and Water (2022). *EPBC Act Protected Matters Search Tool*. URL: https://pmst.awe.gov.au/#/map?lng=131.52832031250003&lat=-28.6905876542507&zoom=5&baseLayers=Imagery,ImageryLabels.

DEWHA, Department of the Environment, Water Heritage and the Arts (2010). *Survey guidelines for Australia's Threatened birds. Guidelines for detecting birds listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999.*

DoE, Department of the Environment (2015a). *Approved Conservation advice for Subtropical and Temperate Coastal Saltmarsh.* Canberra, Department of the Environment. Accessible: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/118-conservation-advice.pdf

DoE, Department of the Environment (2015b). *Approved Conservation Advice for Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/126-conservation-advice.pdf. In effect under the EPBC Act from 04-Dec-2015.

DoEE, Department of Environment and Energy (2017). *Australian Vegetation Attribute Manual Version 7.0.* NVIS Technical Working Group, Australian Government

DPaW, Department of Parks and Wildlife (2013). *Carnaby's cockatoo (Calyptorhynchus latirostris) Recovery Plan.* Department of Parks and Wildlife, Perth, Western Australia.

DPLH, Department of Planning, Lands and Heritage (2022). Aboriginal Heritage Inquiry System (AHIS). Viewed October 2020.

DPIRD, Department of Primary Industries and Regional Development (2019). Pre-European Vegetation (DPIRD-006) dataset.

DPIRD, Department of Primary Industries and Regional Development (2022a). Soil Landscape Mapping - Systems (DPIRD-064) dataset.

DPIRD, Department of Primary Industries and Regional Development (2022b). Soil landscape land quality - Zones (DPIRD-017) dataset.

DPIRD, Department of Primary Industries and Regional Development (2022c). Soil Landscape Mapping - Best Available (DPIRD-027) dataset.

DPIRD, Department of Primary Industries and Regional Development (2022d). Hydrological Zones of Western Australia (DPIRD-069) dataset.

DSEWPaC, Department of Sustainability, Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's Threatened mammals. Guidelines for detecting mammals listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999*. Government of Australia.

DSEWPaC, Department of Sustainability, Environment, Water, Populations and Communities (2011). *Survey guidelines for Australia's Threatened reptiles. Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.*

DSEWPaC, Department of Sustainability, Environment, Water, Population and Communities (2012). *EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species: Carnaby's Cockatoo (Calyptorhynchus latirostris), Baudin's Cockatoo (Calyptorhynchus baudinii), Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso).* Government of Australia.

DWER, Department of Water and Environmental Regulation (2018a). Hydrographic Catchments - Catchments (DWER-028) dataset accessed from https://maps.slip.wa.gov.au/landgate/locate/

DWER, Department of Water and Environmental Regulation (2018b). Hydrographic Catchments - Subcatchments (DWER-030) dataset accessed from https://maps.slip.wa.gov.au/landgate/locate/

DWER, Department of Water and Environmental Regulation (2021). Clearing Regulations - Environmentally Sensitive Areas (DWER-046) dataset

DWER, Department of Water and Environmental Regulation (2022) Public Drinking Water Source Areas (DWER033) dataset accessed January 2021 from https://maps.slip.wa.gov.au/landgate/locate/

EPA, Environmental Protection Authority (2016). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, EPA, Western Australia.

EPA, Environmental Protection Authority (2020). *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*, EPA, Western Australia.

Euclid (n.d.) *Eucalypts of Australia, Fourth Edition, Commonwealth Science Industry Research Organisation, Australian Biological Resources Study*, Centre of Australian National Biodiversity Research, Department of Agriculture, Water and the Environment. Accessible: https://apps.lucidcentral.org/euclid/text/intro/index.html

GoWA, Government of Western Australia (2019). 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth.

Hammer, T.A. and Thiele, K.R. (2021). *Key to Hibbertia in Australia (Draft).* In KeyBase, Flora of Australia, vascular plants.

Hislop, M (2014). *New species from the Leucopogon pulchellus group (Ericaceae: Styphelioidea: Styphelieae).* Nuytsia, 24: 71 – 93.

Hislop, M (2022). *Identifications of Accession 9826 (KW193, KW194, KW195).* Western Australian Herbarium, Department of Biodiversity, Conservation and Attractions

Hollister, C and Thiele, K. (2021). *Pea flowers of Western Australia: A key to the flowering pea flowers in the family Fabaceae.* Florabase. Accessible: https://florabase.dpaw.wa.gov.au/science/key/fabaceae/

Hollister, C and Thiele, K. (n.d.). *Goodeniaceae: A key to the Western Australian species in the family Goodeniaceae.* Florabase. Accessible: https://florabase.dpaw.wa.gov.au/science/key/goodeniaceae/

Hollister, C., Lander, N., and Thiele, K (n.d.) *Proteaceae: A key to the Western Australian Species in the family Proteaceae.* Florabase. Accessible: https://florabase.dpaw.wa.gov.au/keys/

Hopper S and Gioia P (2004). The southwest Australian floristic region: Evolution and conservation of a global hot spot of biodiversity. Annual Review of Ecology, Evolution, and Systematics, 35, p 623-50.

IPAC, Invasive Plants and Animals Committee (2017). *Australian Weeds Strategy 2017 – 2027.* Commonwealth of Australia

Johnstone, R.E. and Storr, G.M. (1998). *Handbook of Western Australian Birds, Volume I, Non-passerines (Emu to Dollarbird)*. Western Australian Museum, Perth.

Johnstone, R.E., Johnstone, C. and Kirkby, T. (2011). *Black Cockatoos on the Swan Coastal Plain*. Report for the Department of Planning, Western Australia.

Johnstone, R., Kirby, T. and Sarti, K. 2013, *The breeding biology of the forest red-tailed black cockatoo Calyptorhynchus banksii naso Gould in south-western Australia. I. Characteristics of nest trees and nest hollows.* Pacific Conservation Biology, 19(2): 121-142.

JSTOR (2000 -). *Global Plants, Herbarium Specimens.* Accessible: https://plants.jstor.org/collection/TYPSPE

Keighery, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA (Inc.) Nedlands, WA.

Lamp, C and Collet, F. (1976). *Field Guide to Weeds in Australia.* Inkata Press.

Maslin, B.R. (2018 -) *Wattles of Australia, Version 3.* Australian Biological Resources Study, Department of Biodiversity, Conservation and Attractions, Identic Pty Ltd. Accessible: https://apps.lucidcentral.org/wattle/identify/key.html

Moore, J and Wheeler, J. (n.d.). *Southern Weeds and their control.* South Coast Natural Resource Management, Department of Agriculture and Food, Department of Environment and Conservation.

Muir, B.G. (1977). *Biological Survey of the Western Australian Wheatbelt, Part 2. Vegetation and habitat of Bendering Reserve.* Records of the Western Australian Museum Supplement. No. 3.

NMRT, National Malleefowl Recovery Team (2022). National Malleefowl Monitoring Database.

Ng, B. (2022). *Fierce Flora: Index to Australian Carnivorous Plants.* Accessible: https://www.fierceflora.com/about/

Rycken, S.J. (2019) *Movement ecology of the three species of threatened black cockatoo (Calyptorhynchus latirostris, Calyptorhynchus baudinii, Calyptorhynchus banksii naso) endemic to Western Australia: Implications for the species' conservation management*. PhD thesis, Murdoch University.

Rye, B.L. (2007). *New species and keys for Cryptandra and Stenanthemum (Rhamnaceae) in Western Australia.* Nuytsia, 16(2): 325-382. KeyBase.

Rye, B.L. (2021). *Austrobaeckea, a new south-western Australian genus of Myrtaceae (Chamelaucieae: Hysterobaeckeinae).* Nuytsia, Western Australian Herbarium. 32: 173 - 197

Sandiford, E.M. and Barrett, S. (2010) *Albany Regional Vegetation Survey, Extent Type and Status.* A project funded by the Western Australian Planning Commission (EnviroPlanning "Integrating NRM into Land Use Planning" and State NRM Program), South Coast Natural Resource Management Inc. and City of Albany for the Department of Environment and Conservation. Unpublished report. Department of Environment and Conservation, Western Australia.

Saunders, D.A., Mawson, P.R. and Dawson, R. (2014a) *Use of tree hollows by Carnaby's Cockatoo and the fate of large hollow-bearing trees at Coomallo Creek, Western Australia 1969–2013*. Biological Conservation 117: 185–193.

Saunders, D.A., Dawson, R., Doley, A., Lauir, J., Le Souëf, A., Mawson, P.R, Warren, K., and White, N. (2014b). *Nature conservation on agricultural land: a case study of the endangered Carnaby's Cockatoo Calyptorhynchus latirostris breeding at Koobabbie in the northern wheatbelt of Western Australia*. Nature Conservation 9: 19–43.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002). *Native Vegetation in Western Australia, extent Type and Status*. Technical Report 249, Department of Agriculture WA.

Thompson, J (1989). *A revision of the genus Leptospermum (Myrtaceae).* Telopea 3(3): 301 – 449. KeyBase. Accessible: https://keybase.rbg.vic.gov.au/keys/show/11044

Trudgen, M.E. and Rye, B.L. (2005). *Astus, a new Western Australian genus of Myrtaceae with heterocarpidic fruits.* Nuytsia 15(3): 495-512.

WAH, Western Australian Herbarium (1998-). *FloraBase*: The Western Australian Flora. Available online at: https://florabase.dpaw.wa.gov.au/

WAH, Western Australian Herbarium (2022). *Identifications of flora for Accession 9826.* Mike Hislop.

WAH, Western Australian Herbarium (2023). *Identifications of flora for Accession 9330.* Mike Hislop.

WANOSCG, Western Australian Native Orchid Study and Conservation Group (Inc) (1974 -). *Species profiles.* Accessible: https://wanoscg.com/orchid-news/

Weber, J.Z. (2007). *Cassytha.* In: Flora of Australia 2, pp. 117 – 136. ABRS, Canberra. Accessible: https://keybase.rbg.vic.gov.au/keys/show/10870

Wheeler, J.R. (2004). *Miscellaneous new Hibbertia species (Dilleniaceae) from the south coast and adjacent interior of Western Australia.* Nuytsia, 15(2), 299 - 310

Wilkins, P., Gilfillan, S., Watson, J. and Sanders, A. (2006) *The Western Australian South Coast Macro Corridor Network – a bioregional strategy for nature conservation.* Department of Conservation and Land Management (CALM) and South Coast Regional Initiative Planning Team (SCRIPT), Albany, Western Australia.

Williams, A.R. (2022). *Austrostipa (Poaceae) in Western Australia: new species, new records, keys and character notes.* Nuytsia, 33: 39-101.

Young, J.A. (2021). *A field guide to Melaleucas of South-west Western Australia.* Self-published.

8. Appendices

Appendix A – Maps

Appendix B – Likelihood of Occurrence Analysis and Black Cockatoo Scoring Matrix

Appendix C – Conservation Status Definitions and Condition Scale

Appendix D – Species Lists and Relevé Data

Appendix E – Threatened and Priority Reporting Forms

Appendix E - DCCEEW PMST reports

Appendix A

Maps

Albany Office:
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Esperance Office:
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(08) 9072 1382

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Environmental Risk Assessment - Arc Infrastructure

- Green
- Yellow
- Red

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:4,000 @ A3
GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
Line 51 (350.284 to 354.231 KM) Degrussa Road
Gibson, WA 6448

Figure 29: Environmental Risk Assessment.

	QA Check	*Drawn by*
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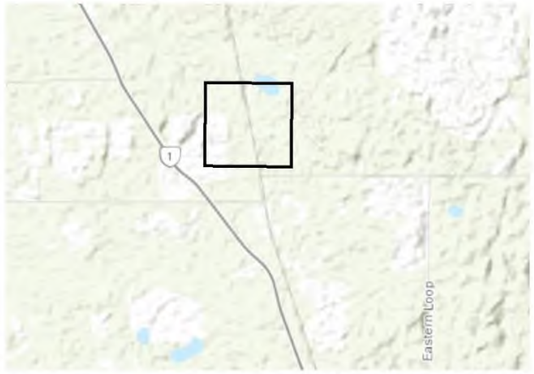

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Figure 29 cont.: Environmental Risk Assessment.

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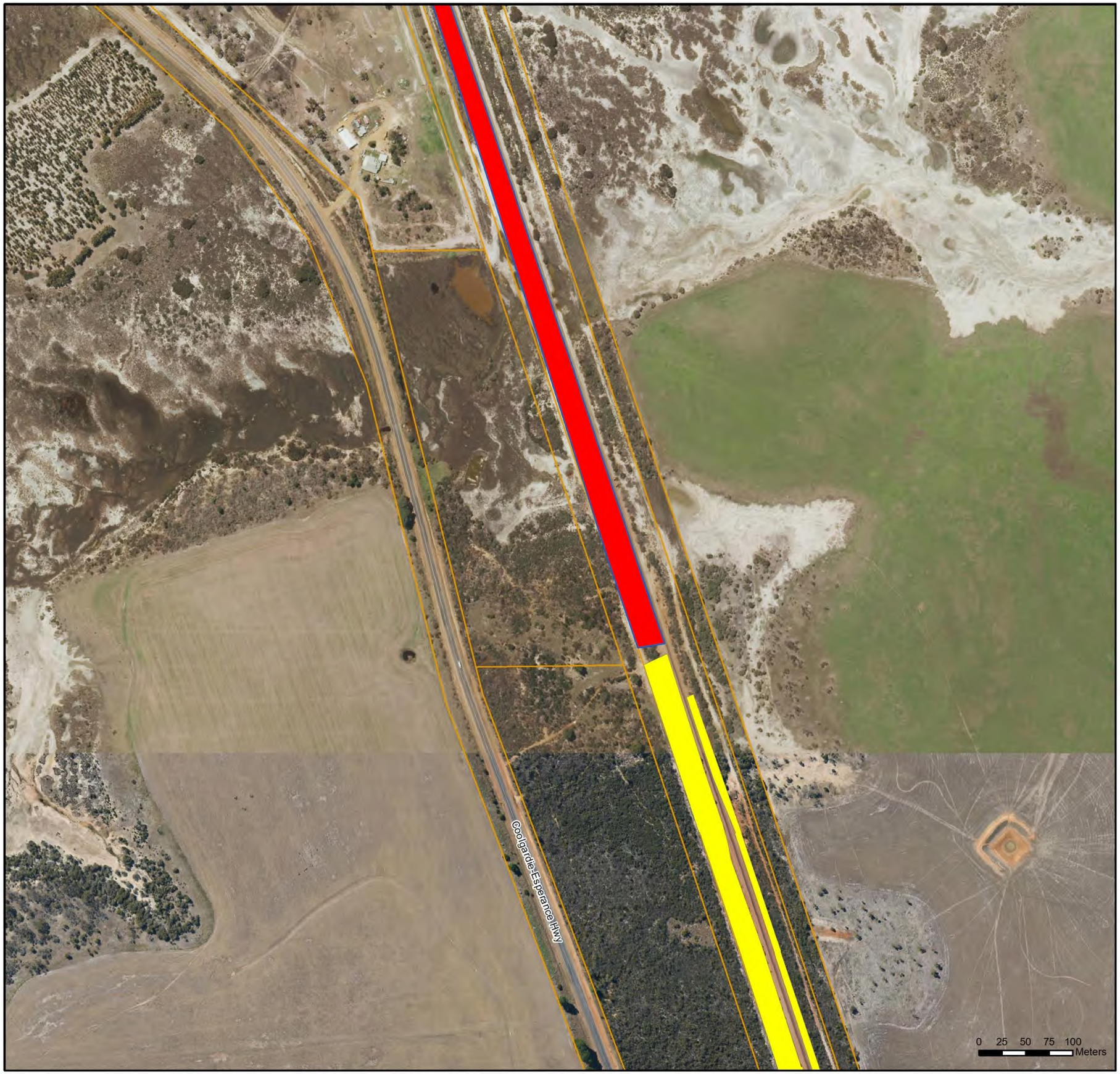

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Overview Map Scale 1:100,000

Legend

Survey Area

Cadastre

Pre European Vegetation (DPIRD-006)

Esperance, 47

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
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GDA MGA 2020 Zone 51

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Figure 30: Desktop Historical Vegetation.

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Figure 30 cont.: Desktop Historical Vegetation.

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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Pre European Vegetation (DPIRD-006)

- Esperance, 47
- Esperance, 6048

Data Sources
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Overview Map: World Topographic map service, ESRI 2012

Scale
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GDA MGA 2020 Zone 51

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Figure 30 cont.: Desktop Historical Vegetation.

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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

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- Esperance, 6048

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Figure 30 cont.: Desktop Historical Vegetation.

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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Survey Effort

- Flora and Vegetation Survey
- Fauna Survey

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
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GDA MGA 2020 Zone 51

CLIENT
Arc Infrastructure
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Gibson, WA 6448

Figure 31: Survey Effort.

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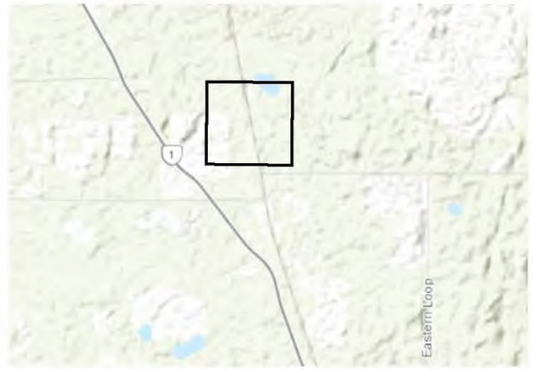

Overview Map Scale 1:100,000

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Survey Effort

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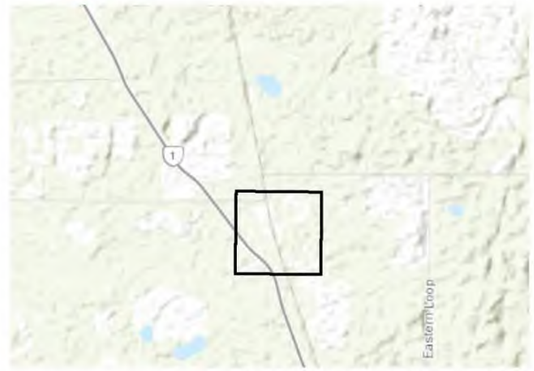

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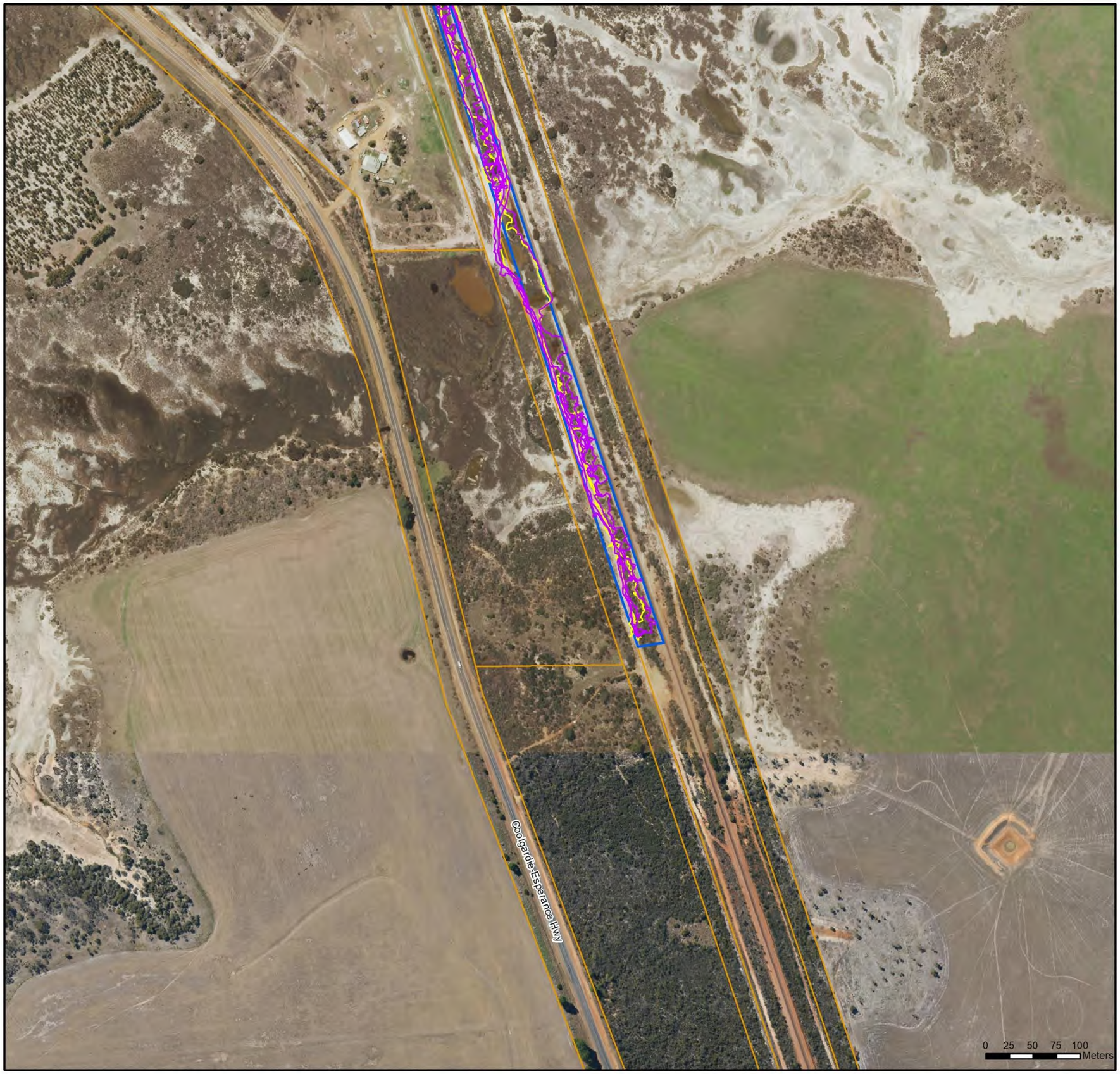

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BIO DIVERSE SOLUTIONS

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Figure 31 cont.: Survey Effort.

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Appendix B

Likelihood of Occurrence Analysis and Black Cockatoo Scoring Matrix

Table 11: Criteria for assessing the likelihood of occurrence of Threatened or Priority flora and fauna within a 10km radius of the survey area.

Likelihood	Criteria
Present	Species is recorded within the survey area.
Likely	Species has been previously recorded in close proximity and suitable habitat occurs within the survey area.
Possible	Species previously recorded within 10 km and suitable habitat occurs in the survey area.
Unlikely	The species has been recorded locally through database searches. However, suitable habitat for the species does not occur at the survey area or suitable habitat may occur but the species has a highly restricted distribution, is very rare and only known from a limited number of populations. Species is unlikely to occur due to the site lacking critical habitat, only containing marginally suitable habitat, and/or the survey area is considerably degraded. The species has not been recorded in the survey area despite adequate survey effort.
Highly Unlikely	No suitable habitat within the survey area or the survey area is outside the species' natural distribution.

Table 12: Potential Threatened or Priority flora located within 30 km of the survey area and likelihood of occurrence analysis (post survey).
NB - Species are sorted by likelihood of presence. Numerous resources specific to Threatened and Priority flora listed below were used in the likelihood assessment (Archer, 2016; Brophy, 2013; Euclid, n.d.; Hislop, 2014; JSTOR, 2000 - ;Maslin, 2018 - ; WAH, 1998 – WANOSCG, 1974 - ; Wheeler, 2004).

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Pre-Survey Likelihood of Occurrence Analysis	Post-Survey Likelihood of Occurrence Flora Survey Outcome
Myrtaceae	*Darwinia* sp. Gibson (R.D. Royce 3569)		P1	Compact shrub to 0.4 m high. Flowers yellow/orange. Small succulent looking shrub.	Grey-brown sandy clay and white sand on margins of salt lakes and road verges. Locally common on sandy rises immediately around normally dry lakes.	Jun to July	Likely	Detected – KW195, Accession 9826
Myrtaceae	*Kunzea salina*		P3	Low shrub <1 m. Very small leaves. Spreading shrub. Flowers white.	Adjacent to salt lake periphery in low shrub margin. Winter wet lowlands with grey/white and sands and clay. Saline water bodies. Low heathland.	Dec to Jan	Likely	Detected – Known population
Proteaceae	*Persoonia scabra*		P3	Clumped, spreading shrub. Fl. yellow.	Gravelly loam, sandy soils. Slopes. Mixed soil types. Eucalyptus, Allocasuarina or Agonis woodlands.	Sep to Nov.	Likely	Detected – KW195, Accession 9826
Myrtaceae	*Austrobaeckea uncinella (*syn. *Baeckea uncinella)*		P3	Shrub. White flowers. Prominently pointed leaves with point distinctively recurved. Prominently protruding connective gland.	Salt lakes and watercourses.	Sept to Jan	Likely	Detected – KW237, Accession 9330
Ericaceae	*Brachyloma mogin*		P3	Compact shrub, 0.4 m high. Flowers red/pink/white.	Grey clayey sand. Swamp flat. Open woodland in areas that become inundated in winter. Field observations occur on sand banks surrounding salt lakes.	Jun	Likely	Possible - Minor limitation present that not flowering at time of surrey.
Myrtaceae	*Astartea reticulata*		P3	Single-stemmed or basally branched shrub 0.7–1.5 m tall. Fl. pale pink or white.	Occurs in winter-wet depressions or near watercourses along the coastal plain, commonly associated with the paperbark species *Melaleuca cuticularis.*	late November to January.	Possible	Possible - not flowering at time of survey and minor limitation present. Single Myrtle flowering species present that similar, but submitted to Herbarium and confirmed as *A. uncinella.*
Frankeniaceae	*Frankenia glomerata*		P4	Prostrate shrub. Fl. pink-white.	White sand.	Nov	Possible	Possible - not flowering at time of survey, minor limitation present. Similar non-threatened Frankenia sessilis var sessilis identified, distinguished as not being F. glomerata due to size, shape and strongly acute leaf shape.
Dilleniaceae	*Hibbertia turleyana*		P2	Procumbent shrub to 0.2 m high, to 0.35 m wide. Flowers yellow.	Dry white sand. Flats, seasonally wet areas.	August	Possible	Possible - not flowering at time of survey. Minor limitation present.
Thymelaeaceae	*Pimelea pelinos*		P1	Erect, scraggly shrub, 0.3-0.6 m high. Flowers Cream.	Sandy clay, salt lakes.	Jun to Jul	Possible	Possible - not flowering at time of survey. Significant limitation present.
Asparagaceae	*Thysanotus brachiatus*		P2	Rhizomatous, leafless perennial, herb, to 0.3 m high. Fl. Purple.	Grey sand.	Nov - Dec	Possible	Possible - not flowering at time of survey. Minor limitation present.
Loganiaceae	*Adelphacme minima*		P3	Annual.	Small post fire.	Sept -Oct; Nov-Jan	Possible	Possible - persisting as soil seed bank and undetectable unless fire occurs.
Fabroniaceae	*Fabronia hampeana*		P2	Moss species. Silver green species.	Often growing on Macrozamia species. Mixed woodlands.		Possible - outside of expertise of surveyors	Unlikely - lack of host plants (Macrozamia sp.).
Cyperaceae	*Schoenus* sp. Grey Rhizome (K.L. Wilson 2922)		P1	Grass-like or herb (sedge), 0.06-0.08 m high.	Sandy clay, sand. Scattered subcoastal (<30 km of coastline) from Cape Arid to Albany.		Possible	Unlikely – not detected. Schoenus specimen submitted to WA Herbarium for confirmation, verified as non-threatened *Schoenus subflavus* subsp. *subflavus.*
Polygalaceae	*Comesperma calcicola*		P3	Soft perennial herb, to 0.3 m high. Flowers pink.	Calcareous or semi-saline clay loams, limestone. Areas around saline water.	Oct to Dec or Jan	Likely	Unlikely - not detected
Goodeniaceae	*Dampiera sericantha*		P3	Erect, slender perennial, herb, 0.05-0.3(-0.6) m high, stems with blunt angles. Fl. blue.	Sand, sometimes with gravel. Plains. Associated with disturbance.	May or Aug to Dec.	Likely	Unlikely - not detected
Fabaceae	*Daviesia pauciflora*		P3	Diffuse, many stemmed, sprawling shrub. 0.3-0.8 m high. Lacking formal leaves. Flowers Yellow and red.	White or grey sand over laterite or limestone. Flats. Associated with deep sands, often with *Banksia speciosa* or Kwongkan shrublands.	Oct to Dec or Jan	Likely	Unlikely - not detected

Table 12 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Pre-Survey Likelihood of Occurrence Analysis	Post-Survey Likelihood of Occurrence Flora Survey Outcome
Proteaceae	*Isopogon alcicornis*	Elkhorn Coneflower	P3	Low, lignotuberous shrub, 0.3-0.5 m high to 0.6 m wide. Flowers yellow, white, pink. Distinctive shaped leaves forming cluster. No distinct stems.	Sandy soils, skeletal loam, sandhills, sandplains.	Oct to Dec or Feb	Likely	Unlikely - not detected
Ericaceae	*Leucopogon corymbiformis*		P2	Open or erect low shrub with white flowers. <0.5 m high.	Associated with *Banksia speciosa* woodland and deep white sands.	Aug to Sept	Likely	Unlikely - not detected
Myrtaceae	*Baeckea* sp. Gibson (K.R. Newbey 11084)		P1	Spreading, erect, mid-dense shrub, to 2 m high. Fl. Pink.	Brown sandy loam over laterite & granite. Moderately exposed hills, cleared bushland.	Jun or Nov to Dec.	Possible	Unlikely - not detected. Myrtle flowering species present that similar, but determined as not being *B.* sp. Gibson (K.R. Newbey 11084) due to lack of pustules and rough leaves
Polygalaceae	*Comesperma griffinii*		P2	Annual or perennial herb to 0.15 m high. Flowers white.	Yellow or grey sands, plains. Very wide and scattered distribution from Geraldton to Esperance.	Oct	Possible	Unlikely - not detected
Malvaceae	*Commersonia rotundifolia*		P3	Shrub to 1.5 m high. Semi-erect. Cream flowers, white calyx with green base. Petals cream, ligule on green base, staminodes white. Dull green leaves.	Open Eucalyptus woodland and shrubs, with *Eucalyptus platypus* or other Mallee or Mallet species. Well drained grey brown loams.	Aug to Nov	Possible	Unlikely - not detected
Ericaceae	*Conostephium marchantiorum*		P3	Erect, much branched shrub. 0.4-1.8 m high. Red, purple, brown and yellow flower. Bright green and hairy leaves.	White/grey or light yellow sand. Plains on edges of salt lakes, plains, creek lines. Open Mallee and scrub heath communities.	Mar or Jul or Nov	Possible	Unlikely - not detected
Myrtaceae	*Cyathostemon* sp. Esperance (A. Fairall 2431)		P1	Shrub, 2-4 m tall. Leaves pointed. Flowers white; free part of stamens longer than fused part.	Shrubland. Salt Lake Margin. Sandy gravel.	Sept - Oct	Possible	Unlikely - not detected. Specimen bearing similarity. Precautionary principles applied and submitted to WA Herbarium and confirmed as non-threatened *Cyathostemon ambiguus.*
Goodeniaceae	*Dampiera triloba*		P3	Erect, perennial herb or shrub to 0.5 m high. Flowers blue.	Lowlands or semi-wet areas, slopes on edge of lakes.	Aug to Dec	Possible	Unlikely - not detected
Restionaceae	*Desmocladus biformis*		P3	Rhizomatous, densely tufted perennial, herb (sedge-like), 0.1-0.2 m high.	Sand, sandy clay, lateritic soils. Dry sites.	Sep to Oct.	Possible	Unlikely - not detected. All Desmocladus species present did not bear similarity.
Scrophulariaceae	*Eremophila glabra* subsp. Scaddan (C. Turley s.n. 10/11/2005)		T - Cr En	Large shrub, flowers green.	Associated with habitat for salt lakes in the Scaddan/Esperance region.	August to November	Possible	Unlikely - not detected
Myrtaceae	*Eucalyptus foliosa*		P3	Mallee to 4 m high, bark smooth.	Grey/white sandy clay. Flats adjacent to salt lake. Distribution between Grass Patch and Gibson.	Unknown	Possible	Unlikely - not detected. All Eucalyptus species present did not bear similarity.
Myrtaceae	*Eucalyptus semiglobosa*		P3	Mallee to 6 m, bark smooth grey over tan. Flowers cream-white-yellow.	White sand over laterite, silty sand on edge of granite shelf, limestone. Hillslopes, gullies, cliffs.	Jun, Oct to Dec	Possible	Unlikely - not detected. All Eucalyptus species present did not bear similarity.
Haloragaceae	*Gonocarpus pycnostachyus*		P3	Erect annual herb, 0.1-0.15 m high. Flowers green-red.	Sand or clay soils. Wet depressions, granite rock.	Oct	Possible	Unlikely - not detected
Goodeniaceae	*Goodenia exigua*		P2	Perennial, prostrate, compact and rhizomatous shrub. 3 cm high x 4 cm wide. Yellow flowers. Perennial herb, ground hugging, flowers white with purplish brown markings.	Edge of salt lakes or seasonally inundated plains. Grey clay. Occurs in the Stirling Ra. and at Moirs Inlet, W.A. Grows in saline clays.	Jan, Oct to Nov	Possible	Unlikely - not detected

Table 12 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Pre-Survey Likelihood of Occurrence Analysis	Post-Survey Likelihood of Occurrence Flora Survey Outcome
Araliaceae	*Hydrocotyle tuberculata*	Bumpy fruited Pennywort	P2	Small herb, 1-3 cm high, 2-4 cm wide, reddish green colour. Simple umbel flowers.	Low shrubs and samphire with Disphyma and *Wilsonia humilis.* Full sun area.	Oct	Possible	Unlikely - not detected
Brassicaceae	*Lepidium fasciculatum*	Bundled Peppercress	P3	Erect annual, herb, (0.1-)0.3-0.6 m high.	Widespread but scattered. Across southern Australia.	Spring	Possible	Unlikely - not detected
Ericaceae	*Leucopogon remotus*		P1	Woody shrub of 1 m high x 8 m wide.	Associated with mixed woodlands and variety of soil types. Sand or sandy loam. Slopes, flats or edges of plains near salt lakes.	Jul	Possible	Unlikely - not detected. All Leucopogon species present did not bear similarity.
Ericaceae	*Leucopogon* sp. Lake Magenta (K.R. Newbey 3387)		P1		Uplands; sand or sand over laterite.	Nov	Possible	Unlikely - not detected. All Leucopogon species readily identifiable and were unlikely to be a undescribed, informal species.
Orchidaceae	*Paracaleana parvula*		P2	Perennial, herb to 0.18 m high. Flowers yellow/green.	Deep white sands, plains. Distribution clustered towards Cape Arid and only single record in Esperance townsite vicinity.	Oct to Nov	Possible	Unlikely - not detected
Proteaceae	*Persoonia cymbifolia*		P3	Erect, spreading shrub, 0.20.6 (1) m high. Flowers yellow.	Sandy soils. On flats or in rock crevices.	Dec or Jan	Possible	Unlikely - not detected. Similar non-threatened species submitted to WA Herbarium for verification, identified as P3 *Persoonia scabra.*
Lamiaceae	*Pityrodia chrysocalyx*		P3	Erect, branched shrub, 0.3-0.75(-1) m high. Fl. White.	Sandy soils.	Aug to Oct.	Possible	Unlikely - not detected
Orchidaceae	*Pterostylis faceta*	*Bird Orchid*	P3	Annual herb. Flowers green.	Mallee dominated shrubland, dense low heath. Mixed soil types.	Aug to Sept	Possible	Unlikely - not detected
Euphorbiaceae	*Stachystemon vinosus*		P4	Compact shrub, to 0.1 m high. Flowers purple - red/white.	Fine loamy sand, stony soils. Sandplains, rock crevices on breakaways.	Sep to Nov	Possible	Unlikely - not detected
Ericaceae	*Styphelia rotundifolia*		P3	Erect, compact shrub to 1.5 m high x 1.5 m wide. Flowers cream and erect.	Mixed heath and shrublands. Mostly recorded in coastal areas.	April	Possible	Unlikely - not detected
Chenopodiaceae	*Tecticornia indefessa*		P2	Prostrate, perennial shrub, 0.05-0.15 m high.	White to brown-grey sand. Near the edges of salt lakes.		Possible	Unlikely - not detected
Fabaceae	*Acacia bartlei*		P3	Erect shrub or tree from 1.5-7 m tall. Narrow phyllodes, oblong to elliptic. Glabrous. Pods linear 20-65 mm long, 2.5-3.5 mm wide.	Uncommon, around Esperance. Flat or gently undulating landscape. Waterlogged depressions in brown or grey, sandy loam or clay-loam or in grey sand over clay adjacent to depressions. Tolerates level of salinity.	Late June ot Mid Oct	Unlikely	Unlikely - lack of suitable habitat
Fabaceae	*Acacia diminuta*		P1	Intricately branched, spreading or glabrous shrub to 0.2 m high. Flowers yellow-cream.	Sandy clay or sandy loam. Sometimes over shallow ironstone gravel. Occurs 200km from West River to west of Truslove Nature Reserve. Shrub mallee.	Oct to Nov	Unlikely	Unlikely - lack of suitable habitat
Fabaceae	*Acacia euthyphylla*		P3	Shrub, 0.7-2 m high. Flowers yellow.	Grey/white sand, clay loam. Margins of salt lakes and marshes. Seasonal swamps in tall Myrtaceous shrubland and Mallee Woodland.	Aug to Sept	Unlikely	Unlikely - lack of suitable habitat
Haemodoraceae	*Anigozanthos bicolor* subsp. *minor*	Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw	T - En	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. Green & red.	White Sand. Well-watered or winter-wet sites. Subcoastal freshwater sumps, off granite. Moist sandy soils in heath communities dominated by Thryptomene, Borya sp, Leptospermum sp. And *Diuris laxiflora* and in shallow soils over granite.	Aug to Oct	Unlikely	Unlikely - lack of suitable habitat

Table 12 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Pre-Survey Likelihood of Occurrence Analysis	Post-Survey Likelihood of Occurrence Flora Survey Outcome
Ericaceae	*Stenanthera lacsalaria* - Syn *Astroloma sp. Grass Patch (A.J.G. Wilson 110)*		P2	Multi-stemmed, domed shrub. 0.2-0.4 m high. Red flowers. Flowers facing upwards, very skinny leaves.	White/grey sand, edge of salt lake in Melaleuca thickets.	June to August	Unlikely	Unlikely - lack of suitable habitat
Poaceae	*Austrostipa mundula*		P3	Perennial caespitose grass to 0.5 m.	Sandy to clay loams and limestone in grassland, heathland, shrubland and mallee.		Unlikely	Unlikely - lack of suitable habitat
Proteaceae	*Banksia prolata* subsp. *calcicola*		P4	Non-lignotuberous shrub, 0.4-1 m high. Fl. Yellow.	White sand over limestone. Coastal areas.	Jul to Sep.	Unlikely	Unlikely - lack of suitable habitat
Euphorbiaceae	*Beyeria physaphylla*		P1	Shrub, to 0.5 m high. Scraggly. Flowers axial, separate male and female flowers.	Restricted to Scaddan. Grows in Mallee Eucalypt with Melaleuca, Hakea and Leptospermum sp. On grey sandy soil on edge of salt lakes.	Sept	Unlikely	Unlikely - lack of suitable habitat
Fabaceae	*Bossiaea flexuosa*		P3	Compact shrub to 0.6 m high. Flower yellow-orange-red-brown.	Deep sandy soil.	Sept to Nov	Unlikely	Unlikely - lack of suitable habitat
Haemodoraceae	*Conostylis lepidospermoides*	Sedge Conostylis	T - En	Rhizomatous, tufted perennial, grass-like or herb, 0.17-0.36 m high. Fl. Yellow.	Grey or yellow-brown sand over laterite.	Sep to Oct	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Darwinia polycephala*		P4	Diffuse shrub, 0.1-0.5 m high. Flowers red-purple.	Sand, clay or clayey sand. Flats near Salt Lakes, edges or dunes upslope of salt lakes. Shrub and Mallees, with herbs and sedges.	Mar or May to Jul or Sept	Unlikely	Unlikely - lack of suitable habitat
Scrophulariaceae	*Eremophila chamaephila*	Earth Loving Eremophila	P3	Low, dome shaped Shrub, 0.1-0.25 m high. 0.2-0.8 m wide. Flowers blue-purple.	White sand, clay or sandy clay. Sandplains, flats and disturbed road verges. Sometimes winter wet. Associated with Eucalyptus woodlands.	Nov to Dec	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Eucalyptus dolichorhyncha*	Fuschia Mallee	P4	Mallee or tree, 1-5 m high. Flowers yellow. Distinct elongated operculum bud caps, differentiating from non-threatened *Eucalyptus forrestiana.*	White or yellowish sandy clay or clay. Flats or slightly rising ground. Mallee Woodlands.	Jan to Mar or May	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Eucalyptus merrickiae*	Goblet Mallee	T - Vu	Mallee, 2-4(6) m high. Bark rough and flaky. Distinguished by extremely red bud caps. Silver sheen to leaves.	Sandy clay, grey sand. Associated strongly with salt lakes in the Scaddan to Salmon Gums area, Esperance.	Aug to Nov	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Eucalyptus misella*		P1	Mallee, 1-3 m high. Bark smooth. Flowers cream.	White, yellow or grey sand. Low lying sandplain.	Nov	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Eucalyptus preissiana* subsp. *lobata*		P4	Mallee to 2.5 m high. Bark smooth. Flowers yellow.	Sand. Coastal limestone rises and sand dunes.	Nov	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Eucalyptus sweedmaniana*	Cape Arid Four Winged Mallee	P2	Prostrate Mallee, smooth silver grey bark, large winged and pink fruit. Flowers red to pink.	Restricted to east of Esperance in coastal habitat.	Sporadic	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Eucalyptus x missilis*		P4	Mallee to 3 m high. Bark smooth. Flowers yellow / cream-white.	Sand over limestone or granite. Coastal sites.	Jan-Apr	Unlikely	Unlikely - lack of suitable habitat
Frankeniaceae	*Frankenia brachyphylla*	Short Leaved Frankenia	P2	Small, decumbent shrub. Flower white/pink.	Salt Lake margins.	Nov	Unlikely	Unlikely - lack of suitable habitat

Table 12 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Pre-Survey Likelihood of Occurrence Analysis	Post-Survey Likelihood of Occurrence Flora Survey Outcome
Goodeniaceae	*Goodenia laevis* subsp. *laevis*		P3	Erect, woody shrub or subshrub. 0.1-0.25 m high. Largest leaves 15-25 x 1-3 mm, entire. Flowers yellow.	Brown sandy loam or clay, underlying geology of limestone, gypsum content or laterite. On flats or plains. Often associated strongly with disturbance and road verges. Often associated with Acacia, *Bossiaea leptacantha, Eucalyptus dissimulata* and *Grevillea huegelii.*	Aug to Dec	Unlikely	Unlikely - lack of suitable habitat
Goodeniaceae	*Goodenia turleyae*		P1	Annual herb, 0.03-0.04 m high. White or grey-brown sand over clay, yellow-brown gravelly clay and granite.	Moist sheltered areas near salt lakes.	Sept to Nov	Unlikely	Unlikely - lack of suitable habitat
Proteaceae	*Grevillea baxteri*	Cape Arid Grevillea	P4	Erect to spreading shrub. 0.8-4 m high. Large and bushy form. Toothbrush grevillea form, flower colour yellow-orange-brown-red.	Sand, sandplains, often acidic soils. Wide associated vegetation type; scrubby heathland. Often associated with gravel or overlying heavier soils.	Feb or May to Jul or Sept to Dec	Unlikely	Unlikely - lack of suitable habitat
Anarthriaceae	*Hopkinsia adscendens*		P3	Rhizomatous, perennial, herb to 0.4 m high.	Sand. Dry or seasonally damp habitats along streams.	Oct	Unlikely	Unlikely - lack of suitable habitat
Araliaceae	*Hydrocotyle asterocarpa*	Starry Pennywort	P2	Small annual herb, trilobed and toothed leaves. Bright green with purple stem.	Sandy loam soils on margins of inland salt lakes, in low open shrubland often in sheltered positions of Tecticornia and Frankenia sp. Common on salt lakes and winter-wet flats between Salmon gums and Scaddan.	Winter annual - Sept to Nov	Unlikely	Unlikely - lack of suitable habitat
Proteaceae	*Lambertia echinata* subsp. *echinata*	Prickly Honeysuckle	T- En	Prickly, much branched, non-lignotuberous shrub. 1.5 m high. Flower orange, red to pink. Leaves with tridentate shape	Gravely sandy loam, brown sandy loam, white grey sand, granite, laterite. Entirely restricted or known from Cape Le Grand National Park.	Sept to Oct	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Melaleuca dempta*		P3	Shrub, 0.2-0.6 m high. White cream flowers. Rounder and more circular leaves to similar non-threatened *Melaleuca calycina.*	Shrubland and mallee. White clayey soils. Sometimes recorded on salt lakes.	Aug	Unlikely	Unlikely - lack of suitable habitat
Myrtaceae	*Melaleuca fissurata*		P4	Shrub, 0.5-2 (4) m. Flowers white/yellow.	White/grey sand or aeolian loamy sand, well drained. Margins of salt lakes, samphire flats, drainage lines, and salt pans. Open shrub Mallee and tall Shrubs.	Jul to Aug	Unlikely	Unlikely - lack of suitable habitat
Haloragaceae	*Myriophyllum muelleri*	Hooded Water Milfoil	P1	Slender, aquatic annual, herb. Stems to 0.6 m long. Flowers red.	Lagoons. Two records - Nambung River near Gingin and pond off South Coast Hwy.		Unlikely	Unlikely - lack of suitable habitat
Iridaceae	*Patersonia inaequalis*	Unequal Bract Patersonia	P2	Rhizomatous, tufted perennial, herb, 0.2-0.4 m high. Fl. White.	Sandy clay, lateritic or granitic sand.	Aug to Oct.	Unlikely	Unlikely - lack of suitable habitat
Euphorbiaceae	*Ricinocarpos trichophorus*	Barrens Wedding Bush	T - En	Erect, openly branching shrub, 0.3-1 m high. Fl. white.	Sandy clay, loam. Breakaways, among sandstone rocks.	May or Aug to Sep	Unlikely	Unlikely - lack of suitable habitat
Goodeniaceae	*Scaevola archeriana*		P1	Erect, resprouting, multi-stemmed, clonal herb, to 0.45 m high.	Sandy and sandy-clay loam soils. Sandplains, road verges.	Jan- Feb	Unlikely	Unlikely - lack of suitable habitat
Rhamnaceae	*Spyridium mucronatum* subsp. *multiflorum*		P2	Erect or spreading shrub, 0.15-0.6 m high. Fl. white-cream-yellow.	Gravelly loam or clay.	Oct to Dec or Jan.	Unlikely	Unlikely - lack of suitable habitat

Table 12 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Pre-Survey Likelihood of Occurrence Analysis	Post-Survey Likelihood of Occurrence Flora Survey Outcome
Araliaceae	*Trachymene anisocarpa* var. *trichocarpa*	Native Parsnip	P3	Upright, spreading annual, herb, 0.3-1.5 m high. Peduncles up to 140 mm long. Distinguished by hairlike bristles on the fruits. Flowers blue-white.	Flat, dry, brown sand loam. Potentially on granite. Eucalyptus woodland with mixed shrub understorey. Associated species of Acacia, *Melaleuca uncinata*, Pimelea, Dodonaea and Cassytha sp. Often associated with recently burnt or disturbed.	Oct to Nov.	Unlikely	Unlikely - lack of suitable habitat
Asteraceae	*Haegiela tatei*		P4	Ascending to erect annual, herb, 0.02-0.08(-0.2) m high. Fl. white-yellow.	Clay, sandy loam, gypsum. Saline habitats.	Aug to Nov	Unlikely	Unlikely - lack of suitable habitat
Fabaceae	*Acacia glaucissima*		P3	Dense, bushy shrub, 0.3-1.5 m high. Flower yellow.	Sand or clay. Flats, low-lying areas.		Unlikely	Unlikely - lack of suitable habitat
Fabaceae	*Kennedia beckxiana*	Cape Arid Kennedia	P4	Prostrate or twining shrub or climber. Fl. Red.	Sand, loam. Granite hills & outcrops.	Sep to Dec.	Unlikely	Unlikely - lack of suitable habitat
Proteaceae	*Conospermum quadripetalum*		P2	Diffuse, straggly shrub, 0.3-1 m high. Flower blue/white.	Sandy clay, grey sand. Flats behind coastal hills.	Sept-Nov	Highly Unlikely	Unlikely - lack of suitable habitat
Fabaceae	*Kennedia glabrata*	Northcliffe Kennedia	T - Vu	Prostrate shrub, 0.05-0.5 m high, to 5 m wide. Fl. red.	Soil pockets, sandy soils. Granite outcrops.	Aug to Nov.	Highly Unlikely	Unlikely - lack of suitable habitat

Table 13: Potential Threatened and Priority Ecological Communities located within 30 km of the survey area and likelihood of occurrence analysis (post survey).

Community Name	Status	Description	Pre-Survey Likelihood of Occurrence	Post-Survey Likelihood of Occurrence and Survey Outcome
Subtropical and Temperate Coastal Saltmarsh	Priority 3 (WA) VU (EPBC Act)	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23oS latitude). The habitat is coastal areas under tidal influence. In southern latitudes saltmarsh are the dominant habitat in the intertidal zone and often occur in association with estuaries. It is typically restricted to the upper intertidal environment, generally between the elevation of the mean high tide, and the mean spring tide. The community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, reeds, sedges and shrubs. Succulent herbs and grasses generally dominate and vegetation is generally <0.5m tall with the exception of some reeds and sedges. Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats. Saltmarsh consists of many vascular plant species but is dominated by relatively few families. There is also typically a high degree of endemism at the species level. The two most widely represented coastal saltmarsh plant families are the Chenopodiaceae and Poaceae. Four structural saltmarsh forms are currently recognised based on dominance of a particular vegetation type: • dominance by succulent shrubs (e.g. Tecticornia) • dominance by grasses (e.g. Sporobolus virginicus) • dominance by sedges and grasses (e.g. Juncus kraussii, Gahnia trifida) • dominance by herbs (e.g. low-growing creeping plants such as Wilsonia backhousei, Samolus repens, Schoenus nitens).	Unlikely – coastline 15 km south of survey area. No tidal interaction likely or possible.	Not detected.
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Priority 3 (WA) EN (EPBC Act)	Consists of predominantly obligate seeding Proteaceous shrubland and heath (kwongkan) and mallee heath on sandplain, duplex sand/clay and gravels overlying Eocene sediments, quartzite, schist, Yilgarn and Albany Fraser granite and greenstone ranges. Its flora is characterised by high species diversity and a high degree of endemism, particularly in the Stirling Range, Fitzgerald River National Park, Ravensthorpe Range and Russell Ranges. Due to the high levels of endemism, there are few species that exist across the entire range of the dense, obligate seeding Proteaceae dominated shrublands and kwongkan of the Esperance Sandplains, however particular species have been identified as common dominant species in each of its ecodistricts (DBCA, 2017a).	Likely	Not detected - A single vegetation unit bore similarity to Kwongkan TEC / PEC criteria, Vegetation Unit 8: MS. Vegetation Unit 8: MS was highly diverse, contained a large number of Proteaceae species that represented a significant portion of the floristic composition. However, it was determined as not meeting Kwongkan TEC / PEC criteria due to being a small patch (0.161 ha) isolated and surrounding entirely by Completely Degraded or Degraded vegetation. No other vegetation unit's bore similarity to TEC / PEC's.

Table 14: Potential Threatened or Priority fauna located within 20km of the survey area and likelihood of occurrence analysis (post survey).
Note: Species are presented based on likelihood of occurrence. Habitat information taken from publicly available resources such as: DSEWPaC (2011) Survey guidelines for Australia's Threatened mammals; DEWHA (2010) Survey guidelines for Australia's Threatened birds; SPRAT profiles and species-specific recovery plans.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Peramelidae	*Isoodon fusciventer*	Quenda, southwestern brown bandicoot	P4 / -	Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeding in adjacent forest and woodland that is burnt on a regular basis. Forest, woodlands, heath and coastal scrub, usually on sandy combination soils.	Likely	Present	Y	High	Y	Suitable habitat found throughout the survey area in all fauna habitat units. Diggings and suitably size runnels detected.
Apodidae	*Apus pacificus*	Fork-tailed Swift	MI / MI	Dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground over inland plains but sometimes above foothills or in coastal areas.	Possible	Possible	Y	High	N	Species not observed. Suitable habitat across the entire survey area, providing hunting habitat and marginal daytime refuge.
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	MI / MI	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beach cast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs.	Possible	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Scolopacidae	*Calidris canutus*	Red Knot	EN / EN & MI	Intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. Occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps.	Unlikely	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR / CR & MI	Intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. Also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.	Possible	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	MI / MI	Shallow fresh to saline wetlands. Found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. Usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetland.	Possible	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	MI / MI	Coastal areas, including sheltered inlets, bays, lagoons and estuaries with intertidal mudflats; ephemeral or permanent shallow wetlands near the coast or inland, and sometimes flooded paddocks or damp grasslands (Higgins & Davies 1996).	Possible	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Cacatuidae	*Zanda latirostris*	Carnaby's Cockatoo	EN / EN	Eucalypt woodlands, especially those that contain salmon gum and wandoo, and in shrubland or kwongan heathland dominated by hakea, dryandra, banksia and grevillea species. It also occurs in remnant patches of native vegetation on land otherwise cleared for agriculture. It also forages in forests containing marri, jarrah or karri.	Likely	Possible	Y	High	N	No breeding hollows or potential roosting habitat observed. Low quality foraging habitat present across the survey area in fauna habitat units 1, 4, 5, 7 and 8.
Charadriidae	*Charadrius bicinctus*	Double-banded Plover	MI / MI	Littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. The species is sometimes associated with coastal lagoons, inland salt lakes and saltworks. It is also found on seagrass beds, especially Zostera, which, when exposed at low tide, remain heavily saturated or have numerous water-filled depressions. This species sometimes utilises kelp beds found on open grassy areas including short pasture, ploughed or newly cropped paddocks, swards, airstrips, and sports grounds such as golf courses or race-tracks near the coast and further inland.	Possible	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Accipitridae	*Elanus scriptus*	Letter-winged kite	P4 / -	Semi-desert and desert along tree-lined creeks; hunts over grasslands and other low vegetation.	Possible	Possible	Y - marginal	High	N	Species not observed. Suitable marginal habitat across the entire survey area, providing hunting habitat and marginal daytime refuge.
Macropodidae	*Notamacropus irma*	Western Brush Wallaby	P4 / -	Preferred habitat includes open forest or woodland, particularly open, seasonally-wet flats with low grasses and open scrubby thickets.	Possible	Possible	Y - marginal	High	N	Marginal habitat available within the survey area in fauna habitat units 1, 2, 4, 5, 7 and 8. No signs of species presence observed, with all macropod indicators present identified as western grey kangaroo.

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Muridae	*Pseudomys occidentalis*	Western Mouse	P4 / -	Historical distribution. Preference for long unburnt habitat (between 30 and 50 yrs) on sandy clay loam or sandy loam. Vegetation in suitable habitats is variable and includes sparse low shrubland, tall dense shrubland, sparse to dense shrub mallee and mid-dense woodland. All sites where the western mouse has been collected have had patches of extremely dense vegetation.	Possible	Possible	Y	Low	N	Suitable habitat present within fauna habitat units 1, 3, 4, 5, 7 and 8. Some smaller sized runnels and murid (rodent) sized burrow entrances observed within the survey area. Prints / track observed within the southern portion of the survey area indicate these are likely attributed to bush rat.
Muridae	*Pseudomys shortridgei*	Heath mouse, Dayang	VU/EN	Historical distribution. Closest recent record Ravensthorpe. Floristically-rich, dry heathland in long unburnt vegetation.	Possible	Possible	Y	Low	N	Suitable habitat present within fauna habitat units 1, 5, 7 and 8. Some smaller sized runnels and murid (rodent) sized burrow entrances observed within the survey area. Prints / track observed within the southern portion of the survey area indicate these are likely attributed to bush rat.
Charadriidae	*Thinornis rubricollis*	Hooded Plover	P4 / -	Ocean sandy beaches and coastal lakes, also occur around salt and freshwater lakes that range from close to the coast to inland areas.	Possible	Possible	Y - marginal	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Scolopacidae	*Tringa nebularia*	Common Greenshank	MI / MI	Found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. Uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and salt flats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees.	Possible	Possible	Y	High	N	Seasonally inundated waterlogged areas within the survey area, predominantly surrounding drainage points that is present due to the larger lake system(s) in the surrounding areas. Some dry samphire / salt flats observed during survey period, which could also provide marginal season habitat for the species when wet. No indicators of species presence observed during survey period.
Elapidae	*Acanthophis antarcticus*	Southern Death Adder	P3 / -	Mallee and coastal vegetation. Prefers sites with deep fixed leaf litter.	Possible	Unlikely	N	Low	N	Survey area does not contain deep layers of leaf litter.

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	MI / MI	Wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. Has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags.	Unlikely	Unlikely	Y	High	N	
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	MI / MI	Prefers coastal regions with exposed rock coast lines or coral reefs, platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. Occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats.	Unlikely	Unlikely	N	High	N	
Iulomorphidae	Atelomastix anancita	Cape Arid atelomastix millipede	VU/-	Currently known from Le Grand National Park within the soil and beneath rocks in montane habitat.	Unlikely	Unlikely	No	Moderate	N	
Iulomorphidae	Atelomastix brennani, sp. nov	Brennan's atelomastix millipede	VU/-	Currently known from the soil or under granite rocks within Le Grand National Park.	Unlikely	Unlikely	No	Moderate	N	
Iulomorphidae	Atelomastix grandis	Le Grand atelomastix millipede	VU/-	Currently known from Le Grand National Park under rocks or in soil on granite outcrops and within Agonis heath.	Unlikely	Unlikely	Yes	Moderate	N	
Iulomorphidae	Atelomastix melindae	Moir's atelomastix millipede	VU/-	Currently known from the rocky outcrops and heath near the summit of Mount Arid in the Cape Arid National Park, and granite outcrop and eucalypt forest of Mount Belches, near the Duke of Orleans Bay.	Unlikely	Unlikely	No	Moderate	N	
Iulomorphidae	Atelomastix sarahae	Comer's atelomastix millipede	VU/-	Currently only known from rocky outcrops near the summit of Mount Arid in the Cape Arid National Park.	Unlikely	Unlikely	No	Moderate	N	
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN / EN	Wetlands, permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over a muddy or peaty substrate.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Calidris canutus* subsp. *rogersi*	Red Knot (north-eastern Siberia)	CR / CR & MI	Intertidal mudflats and sandflats in sheltered coasts, including bays harbours and estuaries.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Calidris tenuirostris*	Great Knot	CR / CR & MI	Sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, saltlakes and non-tidal lagoons. Rarely occurs on inland lakes and swamps.	Unlikely	Unlikely	N	High	N	
Anatidae	*Cereopsis novaehollandiae*	Cape Barren Goose	VU / VU	It occurs on offshore islands with scrub or pasture, ocean beaches, headlands, margins of lakes, swamps and farm pastures.	Unlikely	Unlikely	N	High	N	
Anatidae	*Cereopsis novaehollandiae* subsp. *grisea*	Recherche Cape Barren Goose	VU / VU	It occurs on offshore islands and rocks, and at adjacent sites on the mainland. It inhabits grasslands and low fields of succulent herbs (comprised of Carpobrotus sp.), and occasionally occurs in open areas in taller and denser vegetation.	Unlikely	Unlikely	N	High	N	

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Charadriidae	*Charadrius leschenaultii*	Greater Sand Plover	VU / VU & MI	Almost entirely coastal, inhabiting littoral and estuarine habitats. Mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons. Seldom occur at shallow freshwater wetlands.	Unlikely	Unlikely	N	High	N	
Dasyuridae	*Dasyurus geoffroii*	Chuditch, Western Quoll	VU / VU	Woodland or forest. Logs must have a diameter > 30 cm and a hollow with 7–20 cm diameter and 1 m length (Dunlop and Morris 2012). Burrows are constructed beneath habitat features such as stumps, logs, trees or rock outcrops.	Unlikely	Unlikely	N	High	N	
Falconidae	*Falco hypoleucos*	Grey Falcon	VU / -	Usually in lightly timbered country, especially stony plains and lightly timbered acacia shrublands.	Unlikely	Unlikely	N	High	N	
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS / -	It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Gallinago megala*	Swinhoe's Snipe	MI / MI	Dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Gallinago stenura*	Pin-tailed Snipe	MI / MI	Occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. Also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands.	Unlikely	Unlikely	N	High	N	
Geotriidae	*Geotria australis*	Pouched Lamprey	P3 / -	Species is anadromous and requires estuaries and coastal waters connected to freshwater rivers and streams with slow flowing, fine sediment microhabitats where spawning and development of ammocoetes occurs.	Unlikely	Unlikely	N	High	N	Waterlogged areas not suitable for this species.
Laridae	*Hydroprogne caspia*	Caspian Tern	MI / MI	Sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks.	Unlikely	Unlikely	N	High	N	
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU / VU	Arid and semi-arid areas dominated by mallee eucalypts on sandy soils. They are known to also occur in Mulga (*Acacia aneura*), Broombush (*Melaleuca uncinata*), Scrub Pine (*Callitris verrucosa*), Eucalyptus woodlands and coastal heathlands. Malleefowl require abundant leaf litter and a sandy substrate for the successful construction of nest mounds.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Limicola falcinellus*	Broad-billed Sandpiper	MI / MI	Sheltered parts of the coast, favouring estuarine mudflats but also occasionally occur on saltmarshes, shallow freshwater lagoons, saltworks and sewage farms, and in areas with large soft intertidal mudflats, which may have shell or sandbanks nearby. Occasionally they occur on reefs or rocky platforms. They have also been recorded in creeks, swamps and lakes near the coast, particularly those with bare mudflats or sand exposed by receding water. They are rarely recorded inland.	Unlikely	Unlikely	N	High	N	

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	MI (& VU or CR at subsp. level) / MI (& VU or CR at subsp. level)	Coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas.	Possible	Unlikely	N	High	N	
Scolopacidae	*Limosa lapponica menzbieri*	Northern Siberian Bar-tailed Godwit	CR (& MI at sp. level) / CR (& MI at sp. level) /	Occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats.	Unlikely	Unlikely	N	High	N	
Scolopacidae	Limosa limosa	Black-tailed godwit	MI / MI	Sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, salt flats, river pools, swamps, lagoons and floodplains.	Unlikely	Unlikely	N	High	N	
Motacillidae	*Motacilla cinerea*	Grey Wagtail	MI / MI	Species has a strong association with water (wetlands, water courses banks of lakes and marshes, artificial wetlands).	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR / CR & MI	Intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Numenius minutus*	Little Curlew	MI / MI	Pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs. The species prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry, flooded or heavily vegetated. Feed in short, dry grassland and sedgeland, including dry floodplains and black soil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used.	Unlikely	Unlikely	N	High	N	
Laridae	*Onychoprion anaethetus*	Bridled Tern	MI / MI	Occupy tropical and subtropical seas, breeding on islands, including vegetated coral cays, rocky continental islands and rock stacks. Bridled Terns are only rarely found in inshore continental waters and along mainland coastlines, though the species is reported to breed on the mainland of far southern Western Australia (Higgins & Davies 1996; Johnstone & Storr 1998).	Unlikely	Unlikely	N	High	N	
Anatidae	*Oxyura australis*	Blue-billed Duck	P4 / -	Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	Unlikely	Unlikely	N	High	N	
Accipitridae	Pandion cristatus	Osprey, Eastern Osprey	MI / MI	Littoral and coastal habitats and terrestrial wetlands and offshore islands. Requires extensive areas of open fresh, brackish or saline water for foraging.	Unlikely	Unlikely	N	High	N	
Accipitridae	*Pandion haliaetus*	Osprey	MI / MI	Littoral and coastal habitats and terrestrial wetlands and offshore islands. Requires extensive areas of open fresh, brackish or saline water for foraging.	Unlikely	Unlikely	N	High	N	

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Elapidae	*Parasuta spectabilis* subsp. *bushi*	Spectacled hooded snake (Esperance), Mallee Black-headed Snake (Esperance area)	P1	Variety of temperate to semiarid vegetation associations growing on light to heavy, often stony soils, including coastal shell grit beaches, dry sclerophyll forest of mallee and/or other Eucalyptus woodlands, heathlands, shrublands including chenopod, often with Triodia- Brown dominated understorey, and rocky ranges, slopes and foothills. Currently known from the Scaddan area.	Possible	Unlikely	N	High	N	
Psittacidae	*Pezoporus flaviventris*	Western Ground Parrot	CR / CR	Preferred habitat includes low coastal and near coastal heathlands, unburnt for at least five years.	Unlikely	Unlikely	N	High	N	
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	MI / MI	Fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons.	Unlikely	Unlikely	N	High	N	
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	MI / MI	Coastal habitats, occasionally fresh, brackish or saline wetlands or claypans especially with muddy margins and often with submerged vegetation or short emergent grass. Other terrestrial habitats include short grass in paddocks, or ploughed or recently burnt areas.	Unlikely	Unlikely	N	High	N	
Charadriidae	*Pluvialis squatarola*	Grey Plover	MI / MI	Sheltered embayments, estuaries and lagoons with mudflats and sandflats; terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes (Marchant & Higgins 1993).	Unlikely	Unlikely	N	High	N	
Hydryphantidae	*Pseudohydryphantes doegi*	Doeg's Watermite	P2 / -	Pseudohydryphantes is a genus of water mites that are found in lentic (still fresh water) and lotic (moving fresh water).	Unlikely	Unlikely	N	High	N	
Laridae	*Sternula nereis nereis*	Australian Fairy Tern	VU / VU	Coastal areas and embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline.	Unlikely	Unlikely	N	High	N	
Diomedeidae	*Thalasseus bergii*	Crested Tern	MI / MI	Tropical and subtropical coastlines, foraging in the shallow waters of lagoons, coral reefs, estuaries, bays, harbours and inlets, along sandy, rocky, coral or muddy shores, on rocky outcrops in open sea, in mangrove swamps and also far out to sea on open water. It shows a preference for nesting on offshore islands, low-lying coral reefs, sandy or rocky coastal islets, coastal spits, lagoon mudflats, and artificial islets in saltpans and sewage works within 3 km of the coast.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	MI & P4 / MI	Typical habitat is often found to be sheltered coasts with reefs and rock platforms or with intertidal mudflats.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Tringa glareola*	Wood Sandpiper	MI / MI	Inland shallow freshwater wetlands, often with other waders. They prefer ponds and pools with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber.	Unlikely	Unlikely	N	High	N	
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	MI / MI	Prefers permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. In Western Australia they prefer freshwater to marine environments.	Unlikely	Unlikely	N	High	N	
Bivalvia	*Westralunio carteri*	Carter's Freshwater Mussel	VU / -	Patchily distributed in sandy/muddy sediments of freshwater lakes, rivers and streams with greatest densities associated with woody debris and overhanging riparian vegetation near stream banks and edges of lakes/dams.	Unlikely	Unlikely	N	High	N	Waterlogged areas not suitable for this species.
Archaeidae	Zephyrarchaea marki	Cape Le Grand Assassin Spider	VU/-	Elevated leaf litter in *Banksia speciosa* thickets. Currently known from Cape Le Grand.	Possible	Unlikely	Yes	Low	N	

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Scolopacidae	*Calidris alba*	Sanderling	MI / MI	Almost entirely coastal mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed.	Unlikely	Unlikely	N	High	N	
Procellariidae	*Ardenna carneipes*	Flesh-footed Shearwater	VU / MI	Mainly occurs in the subtropics over continental shelves and slopes and occasionally inshore waters. Breeds on islands in burrows on sloping ground in coastal forest, scrubland, shrubland or grassland.	Highly Unlikely	Highly Unlikely	N	Low	N	
Procellariidae	*Ardenna grisea*	Sooty Shearwater	MI / MI	Marine species. Occurs in pelagic (open ocean) sub-tropical, sub-Antarctic and Antarctic waters.	Highly Unlikely	Highly Unlikely	N	Low	N	
Procellariidae	Ardenna tenuirostris	Short-tailed Shearwater	MI / MI	Found in coastal waters.	Highly Unlikely	Highly Unlikely	N	Low	N	
Diomedeidae	*Diomedea antipodensis*	Antipodean Albatross	EN / VU & MI	Marine, pelagic and aerial species. Nests in open patchy vegetation, such as among tussock grassland or shrubs on ridges, slopes and plateaus.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Diomedea dabbenena*	Tristan Albatross	CR/ EN & MI	Marine, pelagic seabird that sleeps and rests on ocean waters when not breeding.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Diomedea epomophora*	Southern Royal Albatross	VU / VU & MI	Marine, pelagic seabird that sleeps and rests on ocean waters when not breeding.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Diomedea exulans*	Wandering Albatross	VU / VU & MI	Marine, pelagic seabird that sleeps and rests on ocean waters when not breeding.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Diomedea sanfordi*	Northern Royal Albatross	EN / EN & MI	Marine, pelagic and aerial. Habitat includes subantarctic, subtropical, and occasionally Antarctic waters.	Highly Unlikely	Highly Unlikely	N	High	N	
Procellariidae	*Halobaena caerulea*	Blue Petrel	- / VU	Pelagic, occasionally over shallow waters.	Highly Unlikely	Highly Unlikely	N	High	N	
Procellariidae	*Macronectes giganteus*	Southern Giant-Petrel	MI / VU & MI	Marine; Antarctic to subtropical waters.	Highly Unlikely	Highly Unlikely	N	High	N	
Procellariidae	*Macronectes halli*	Northern Giant Petrel	MI / EN & MI	Marine, oceanic; mainly in subantarctic waters.	Highly Unlikely	Highly Unlikely	N	High	N	
Procellariidae	*Pachyptila turtur subantarctica*	Fairy Prion (southern)	- / VU	Sub-Antarctic seas and islands while breeding. Subtropical seas non breeding time; rarely inshore expect when sheltering from storms.	Highly Unlikely	Highly Unlikely	N	High	N	
Procellariidae	*Pterodroma mollis*	Soft-plumaged Petrel	- / VU	Marine, oceanic species.	Highly Unlikely	Highly Unlikely	N	High	N	
Stercorariidae	*Stercorarius antarcticus lonnbergi*	Brown Skua	P4 -	Marine, oceanic species	Highly Unlikely	Highly Unlikely	N	High	N	
Laridae	*Sterna hirundo*	Common Tern	MI / MI	Marine, pelagic and coastal species, observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Thalassarche carteri*	Indian Yellow-nosed Albatross	EN / VU & MI	Marine bird, located in subtropical and warmer subantarctic waters (Marchant & Higgins 1990).	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Thalassarche cauta cauta*	Shy Albatross	VU / VU & MI	Marine species. Breeds on rock islands.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Thalassarche cauta steadi*	White-capped Albatross	VU / VU & MI	Shelf-waters around breeding islands and over adjacent rises. During the non-breeding season, birds have been observed over continental shelves around continents. The species occurs both inshore and offshore and enters harbours and bays. The species is scarce in pelagic waters. Birds gather to scavenge at commercial fishing grounds.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Thalassarche chlororhynchos*	Atlantic Yellow-nosed Albatross	VU / MI	Marine species. Builds nests built on tussock grass, on rocks and under trees.	Highly Unlikely	Highly Unlikely	N	High	N	

Table 14 continued.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of Occurrence (Pre Survey)	Likelihood of Occurrence (Post Survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Diomedeidae	*Thalassarche impavida*	Campbell Albatross	VU / VU & MI	Marine sea bird inhabiting sub-Antarctic and subtropical waters from pelagic to shelf-break water habitats.	Highly Unlikely	Highly Unlikely	N	High	N	
Diomedeidae	*Thalassarche melanophris*	Black-browed Albatross	EN / VU & MI	Marine species that inhabits Antarctic, subantarctic and temperate waters and occasionally enters the tropics.	Highly Unlikely	Highly Unlikely	N	High	N	

Appendix C

Conservation Status Definitions and Condition Scale

Table 15: Conservation code definitions for flora and fauna as listed as Threatened or specially protected.
Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, Threatened, extinct or in need of special protection, and have been gazetted as such.

Threat Category	Definition
Threatened - Critically endangered species (CR)	Facing an extremely high risk of extinction in the wild in the immediate future.
Threatened - Endangered species (EN)	Facing a very high risk of extinction in the wild in the near future.
Threatened - Vulnerable species (VU)	Facing a high risk of extinction in the wild in the medium-term future.
Threatened - Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Threatened – Extinct in the wild (EW)	Species is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form.
Specially protected species - Migratory species (MI)	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
Specially protected species – Conservation Dependent (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened.
Specially protected species – Other specially protected species (OS)	Fauna otherwise in need of special protection to ensure their conservation

Table 16: Conservation code definitions for flora and fauna as listed as Priority.
Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3.

Threat Category	Definition
Priority 1: Poorly-known species	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation.
Priority 2: Poorly-known species	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation.
Priority 3: Poorly-known species	Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.
Priority 4: Rare, Near Threatened and other species in need of monitoring	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently Threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of Threatened species during the past five years for reasons other than taxonomy.

Table 17: Conservation code definitions for ecological communities listed as Threatened (TEC).

Threat Category	Definition
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Table 18: Conservation code definitions for ecological communities listed as Priority (PEC).

Possible Threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3.

Threat Category	Definition
Priority One (P1)	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha), and appear to be under immediate threat.
Priority Two (P2)	Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation.
Priority Three (P3)	(i)Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii)communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii)communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.
Priority Four (P4)	Ecological communities that are adequately known, rare but not Threatened or meet criteria for Near Threatened, or that have been recently removed from the Threatened list. These communities require regular monitoring.
Priority Five (P5)	Conservation Dependent ecological communities that are not Threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming Threatened within five years.

Table 19: Condition Rating Scale (adapted from Keighery 1994) outlined in EPA (2016a).

Vegetation 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.

Appendix D

Species Lists and Relevé Data

Table 20: Flora Species List recorded within survey area.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Aizoaceae	*Carpobrotus*	*virescens*	Inland pigface			X						X	
Aizoaceae	*Disphyma*	*crassifolium* subsp *clavellatum*	Round leaved pigface								X		
Anarthriaceae	*Anarthria*	*laevis*								X		X	
Anarthriaceae	*Anarthria*	*scabra*				X						X	
Anarthriaceae	*Lyginia*	*imberbis*				X							
Araliaceae	*Trachymene*	*pilosa*	Native parsnip			X				X	X		
Asparagaceae	*Asparagus*	*asparagoides*	Bridal creeper	X - DP / WoNS								X	
Asparagaceae	*Laxmannia*	*minor*				X				X			
Asparagaceae	*Lomandra*	*mucronata*											X
Asparagaceae	*Thysanotus*	*patersonii*	Twining fringe lilly						X			X	
Asteraceae	*Arctotheca*	*calendula*	Cape weed	X		X			X		X		
Asteraceae	*Argentipallium*	*tephrodes*	Salt lake everlasting								X		
Asteraceae	*Blennospora*	*drummondii*								X	X		
Asteraceae	*Cotula*	*bipinnata*	Ferny cotula	X							X		
Asteraceae	*Cotula*	*coronopifolia*	Water buttons	X							X		
Asteraceae	*Erigeron*	sp.	Fleabane	X			X						
Asteraceae	*Euchiton*	*sphaericus*				X							
Asteraceae	*Gnephosis*	*drummondii*				X					X		
Asteraceae	*Hypochaeris*	*glabra*	Smooth cats ear	X		X			X	X	X	X	
Asteraceae	*Hypochaeris*	*radicata*	Flat weed	X		X						X	
Asteraceae	*Podotheca*	*angustifolia*	Sticky longheads			X							
Asteraceae	*Pogonolepis*	*muelleriana*								X	X		
Asteraceae	*Pterochaeta*	*paniculata*	Wooly waitzia			X							
Asteraceae	*Quinetia*	*urvillei*				X							
Asteraceae	*Senecio*	*quadridentatus*							X				
Asteraceae	*Sonchus*	*oleraceus*	Sow thistle	X				X					
Asteraceae	*Ursinia*	*anthemoides*	Ursinia	X		X			X	X	X	X	
Campanulaceae	*Wahlenbergia*	*capensis*	Cape bluebell	X		X					X		

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Caryophyllaceae	*Stellaria*	*media*	Chickweed	X			X						
Casuarinaceae	*Allocasuarina*	*humilis*	Dwarf sheoak			X				X		X	
Casuarinaceae	*Allocasuarina*	*thyoides*	Horned sheoak			X						X	
Centrolepidaceae	*Centrolepis*	*aristata*	Pointed centrolepis			X							
Centrolepidaceae	*Centrolepis*	*humillima*	Dwarf centrolepis								X		
Centrolepidaceae	*Centrolepis*	*polygyna*	Wiry centrolepis			X							
Chenopodiaceae	*Tecticornia*	*halocnemoides*								X	X		
Chenopodiaceae	*Tecticornia*	*pergranulata*								X	X		
Crassulaceae	*Crassula*	*closiana*				X				X	X		
Crassulaceae	*Crassula*	*colorata*	Dense stonecrop			X				X	X		
Cyperaceae	*Caustis*	*dioica*	Puzzle grass			X				X		X	X
Cyperaceae	*Cyathochaeta*	*equitans*	Tibetan flags			X							
Cyperaceae	*Ficinia*	*nodosa*	Knotted club rush			X	X		X		X	X	
Cyperaceae	*Gahnia*	*drummondii*											
Cyperaceae	*Gahnia*	*trifida*	Coast saw-sedge					X	X	X		X	X
Cyperaceae	*Lepidosperma*	*carphoides*	Black rapier sedge								X		
Cyperaceae	*Lepidosperma*	*squamatum*				X		X	X	X	X	X	X
Cyperaceae	*Machaerina*	*juncea*	Bare twigrush			X		X					
Cyperaceae	*Mesolemaena*	*tetragona*	Semaphore sedge			X							
Cyperaceae	*Schoenus*	*pleiostemoneus*											X
Cyperaceae	*Schoenus*	*Subflavus* subsp. *subflavus.*										X	
Cyperaceae	*Tricostularia*	*aphylla*	Medusa sedge			X							
Dilleniaceae	*Hibbertia*	*acerosa*	Needle Guinea flower			X							X
Dilleniaceae	*Hibbertia*	*gracilipes*	Australian buttercup			X						X	X
Dilleniaceae	*Hibbertia*	*oligantha*				X							
Dilleniaceae	*Hibbertia*	*racemosa*	Cut leaf hibbertia			X						X	

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Droseraceae	*Drosera*	*drummondii*							X				
Droseraceae	*Drosera*	*glanduligera*	Pimpernel sundew			X				X		X	
Droseraceae	*Drosera*	*intricata*				X							
Droseraceae	*Drosera*	*neesii*	Jewel rainbow			X						X	
Droseraceae	*Drosera*	sp. Branched Styles (S.C. Coffey 193)									X		
Ericaceae	*Andersonia*	*parvifolia*				X				X		X	
Ericaceae	*Dielsiodoxa*	*oligarrhenoides*				X				X			X
Ericaceae	*Leucopogon*	*?bossiaea*			P2					X	X		
Ericaceae	*Leucopogon*	*assimilis*				X			X	X		X	
Ericaceae	*Leucopogon*	sp. Coujinup (M.A. Burgman 1085)				X							X
Ericaceae	*Lysinema*	*ciliatum*	Curry flower									X	X
Euphorbiaceae	*Stachystemon*	*virgatus*											X
Fabaceae	*Acacia*	*biflora*				X			X	X			
Fabaceae	*Acacia*	*cupularis*	Coastal umbrella bush							X			
Fabaceae	*Acacia*	*cyclops*	Coastal wattle			X	X	X		X	X	X	X
Fabaceae	*Acacia*	*gonophylla*						X					
Fabaceae	*Acacia*	*latipes*										X	
Fabaceae	*Acacia*	*myrtifolia*				X							
Fabaceae	*Acacia*	*patagiata*				X							
Fabaceae	*Acacia*	*pycnantha*	Golden wattle	X								X	
Fabaceae	*Acacia*	*saligna*	Orange wattle				X		X				X
Fabaceae	*Aotus*	sp. Esperance (P.G. Wilson 7904)				X							
Fabaceae	*Chorizema*	*aciculare*				X				X		X	X
Fabaceae	*Daviesia*	*apiculata*				X				X		X	
Fabaceae	*Daviesia*	*major*										X	
Fabaceae	*Daviesia*	*teretifolia*				X							
Fabaceae	*Eutaxia*	*inuncta*				X							X

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Fabaceae	*Gastrolobium*	*discolor*	Box poison										X
Fabaceae	*Gastrolobium*	*spinosum*	Prickly poison										X
Fabaceae	*Gompholobium*	*marginatum*										X	
Fabaceae	*Gompholobium*	*polymorphum*											X
Fabaceae	*Gompholobium*	*tomentosum*	Hairy yellow pea			X							X
Fabaceae	*Jacksonia*	*racemosa*				X						X	X
Fabaceae	*Ornithopus*	*compressus*	Yellow serradella	X					X				
Frankeniaceae	*Frankenia*	*sessilis* var *sessilis*									X		
Goodeniaceae	*Dampiera*	*fasciculata*	Bundled-leaf dampiera			X						X	X
Goodeniaceae	*Dampiera*	*lavandulacea*										X	
Goodeniaceae	*Dampiera*	*parvifolia*	Many bracted dampiera			X							
Goodeniaceae	*Dampiera*	*sacculata*	Pouched dampiera									X	
Goodeniaceae	*Goodenia*	*krauseana*								X			
Goodeniaceae	*Goodenia*	*pterigosperma*				X							
Goodeniaceae	*Goodenia*	*trinervis*				X							
Goodeniaceae	*Lechenaultia*	*formosa*	Red devil			X							
Goodeniaceae	*Scaevola*	*thesioides* subsp *filiformis*										X	
Haemodoraceae	*Conostylis*	*seorsiflora* subsp *longissima*			P2								
Haemodoraceae	*Conostylis*	*seorsiflora* subsp *seorsiflora*				X			X				
Haemodoraceae	*Haemodorum*	sp.	Blood root			X							
Haloragaceae	*Glischrocaryon*	*roei*	Pop flower									X	
Hemerocallidaceae	*Chamaescilla*	*corymbosa*	Blue squill			X		X		X		X	
Hemerocallidaceae	*Dianella*	*brevicaulis*	Blueberry lilly			X			X	X		X	
Hemerocallidaceae	*Stypandra*	*glauca*	Blind grass										X
Iridaceae	*Moraea*	*setifolia*		X							X		

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Iridaceae	*Patersonia*	*lanata*	Wooly patersonia			X							X
Iridaceae	*Patersonia*	*limbata*										X	
Iridaceae	*Patersonia*	*maxwellii*				X						X	X
Iridaceae	*Patersonia*	*occidentalis*	Purple flag						X				
Iridaceae	*Romulea*	*rosea*	Guildford grass	X		X			X		X	X	
Juncaceae	*Juncus*	*acutus*	Spiny rush	X		X							
Juncaceae	*Juncus*	sp.					X						
Juncaginaceae	*Triglochin*	*mucronata*				X					X		
Lauraceae	*Cassytha*	*glabella*	Tangled dodder laurel				X		X	X		X	
Loganiaceae	*Phyllangium*	*divergens*									X		
Loranthaceae	*Nuytsia*	*floribunda*	Munji; Christmas tree			X							
Malvaceae	*Lawrencia*	*squamata*								X	X		
Malvaceae	*Thomasia*	*petalocalyx*	Paper flower										X
Myrtaceae	*Austrobaeckea*	*uncinella*			P3	X						X	
Myrtaceae	*Calothamnus*	*gracilis*	One-sided bottlebrush			X							
Myrtaceae	*Calothamnus*	*quadrifidus*	One-sided bottlebrush									X	
Myrtaceae	*Conothamnus*	*aureus*				X							
Myrtaceae	*Cyathostemon*	*ambiguus*				X						X	
Myrtaceae	*Darwinia*	sp. Gibson (R.D. Royce 3569)			P1							X	
Myrtaceae	*Eucalyptus*	*occidentalis*	Flat topped yate				X		X				
Myrtaceae	*Eucalyptus*	*rigens*	Salt lake mallee									X	
Myrtaceae	*Eucalyptus*	*uncinata*	Hook leaved mallee									X	X
Myrtaceae	*Kunzea*	*salina*			P3						X		
Myrtaceae	*Leptospermum*	*laevigatum*	Victorian tea tree	X								X	
Myrtaceae	*Leptospermum*	*oligandrum*				X			X				
Myrtaceae	*Leptospermum*	*spinescens*	Spiny tea tree			X							
Myrtaceae	*Melaleuca*	*brevifolia*						X		X	X	X	

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Myrtaceae	*Melaleuca*	*cuticularis*	Salt water paper bark					X	X			X	
Myrtaceae	*Melaleuca*	*pentagona* var *latifolia*				X				X			
Myrtaceae	*Melaleuca*	*pulchella*	Crab claw flower									X	
Myrtaceae	*Melaleuca*	*scabra*				X						X	
Myrtaceae	*Melaleuca*	*striata*							X				
Myrtaceae	*Melaleuca*	*suberosa*	Corky honeymyrtle							X			
Myrtaceae	*Micromyrtus*	*elobata* subsp *elobata*				X				X		X	X
Myrtaceae	*Phymatocarpus*	*maxwelli*				X				X			X
Myrtaceae	*Taxandria*	*callistachys*										X	
Myrtaceae	*Taxandria*	*spathulata*				X						X	
Myrtaceae	*Tetrapora*	*preissiana*				X	X	X	X	X	X	X	
Myrtaceae	*Verticordia*	*minutifolia*				X				X			
Myrtaceae	*Verticordia*	*plumosa* var *grandiflora*	Plumed featherflower			X				X			
Orchidaceae	*Caladenia*	*attingens* subsp *gracillima*	Small mantis orchid										X
Orchidaceae	*Caladenia*	*cairnsiana*	Zebra orchid							X			
Orchidaceae	*Caladenia*	*flava*	Cowslip orchid			X						X	
Orchidaceae	*Caladenia*	sp.											X
Orchidaceae	*Disa*	*bracteata*	South African orchid	X		X							
Orchidaceae	*Diuris*	*laxiflora*	Bee orchid			X			X	X	X		
Orchidaceae	*Elythranthera*	*brunonis*	Purple enamel orchid			X							
Orchidaceae	*Lyperanthus*	*serratus*	Rattle beak orchid			X							
Orchidaceae	*Microtis*	*eremicola*				X							
Orchidaceae	*Microtis*	*media*	Mignonette orchid			X						X	
Orchidaceae	*Microtis*	sp.								X			
Orchidaceae	*Pterostylis*	*sanguinea*						X					
Orchidaceae	*Pyrorchis*	*nigricans*	Red beaks			X							
Orchidaceae	*Thelymitra*	*antennifera*	Lemon scented orchid			X				X		X	

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Orchidaceae	*Thelymitra*	sp.							X				
Orobanchaceae	*Orobanche*	*minor*	Lesser broomrape	X		X		X		X		X	
Phyllanthaceae	*Poranthera*	*microphylla*	Small poranthera			X			X				
Pittosporaceae	*Billardiera*	*coriacea*										X	
Pittosporaceae	*Billardiera*	*fusiformis*	Australian bluebell			X			X		X	X	
Poaceae	*Amphipogon*	*strictus*	Greybeard grass			X							
Poaceae	*Austrostipa*	*elegantissima*				X							
Poaceae	*Austrostipa*	*juncifolia*									X		
Poaceae	*Avena*	*fatua*	Wild oats	X		X		X	X			X	
Poaceae	*Briza*	*maxima*	Blowfly grass	X		X	X	X		X	X	X	
Poaceae	*Briza*	*minor*	Shivery grass	X		X			X				
Poaceae	*Bromus*	*diandrus*	Brome grass	X						X	X	X	
Poaceae	*Cymbopogon*	*obtectus*	Silky heads									X	
Poaceae	*Ehrharta*	*longifolia*	Annual veldt grass	X			X	X	X				
Poaceae	*Eragrostis*	*curvula*	African lovegrass	X		X	X	X	X				
Poaceae	*Lolium*	*perenne*	Perennial ryegrass	X			X				X		
Poaceae	*Neurachne*	*alopecuroidea*	Mulga foxtail			X						X	X
Poaceae	*Parapholis*	*incurva*	Coast barb grass	X							X		
Poaceae	*Phalaris*	*minor*	Lesser canary grass	X		X	X						
Poaceae	*Rytidosperma*	*setaceum*	Wallaby grass			X					X		
Poaceae	*Stenotaphrum*	*secundatum*	Buffalo grass	X							X		
Polygalaceae	*Comesperma*	*ciliatum*	Twining lovers										X
Polygonaceae	*Persicaria*	*prostrata*	Creeping knotweed	X			X						
Primulaceae	*Lysimachia*	*arvense*	Pimpernel	X		X				X			
Proteaceae	*Adenanthos*	*cuneatus*	Jug flower			X			X				
Proteaceae	*Banksia*	*armata*	Prickly dryandra										X
Proteaceae	*Banksia*	*obtusa*	Shining honeypot									X	

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Proteaceae	*Banksia*	*repens*	Creeping banksia									X	
Proteaceae	*Grevillea*	*oligantha*										X	X
Proteaceae	*Hakea*	*adnata*								X	X		
Proteaceae	*Hakea*	*cinerea*	Ashy hakea							X			
Proteaceae	*Hakea*	*corymbosa*	Cauliflower hakea			X						X	
Proteaceae	*Hakea*	*lissocarpha*	Honey bush									X	
Proteaceae	*Hakea*	*nitida*	Frog hakea										X
Proteaceae	*Hakea*	*prostrata*	Harsh hakea										X
Proteaceae	*Hakea*	*trifurcata*	Two-leaf hakea										X
Proteaceae	*Hakea*	*denticulata*	Stinking roger									X	X
Proteaceae	*Isopogon*	*polycephalus*	Clustered cone flower			X						X	X
Proteaceae	*Lambertia*	*inermis* var *drummondii*	Chittick; native honeysuckle			X							
Proteaceae	*Lambertia*	*inermis* var *inermis*	Chittick; native honeysuckle			X	X		X	X			X
Proteaceae	*Persoonia*	*scabra*			P3							X	
Proteaceae	*Petrophile*	*squamata* subsp Northern (KJ. Monks 40)										X	X
Proteaceae	*Petrophile*	*teretifolia*	Pixie mops							X			
Proteaceae	*Synaphea*	*oligantha*				X						X	
Proteaceae	*Synaphea*	*petiolaris* subsp. *petiolaris*											X
Restionaceae	*Chordifex*	*sphacelatus*				X						X	
Restionaceae	*Desmocladus*	*lateriflorus*				X						X	
Restionaceae	*Hypolaena*	*humilis*				X		X	X	X	X	X	
Restionaceae	*Lepidobolus*	*chaetocephalus*	Bristle headed chaff rush			X							
Restionaceae	*Lepyrodia*	*macra*	Large scale rush			X				X			
Rhamnaceae	*Cryptandra*	*nutans*											X
Rhamnaceae	*Cryptandra*	*pungens*				X						X	X
Rhamnaceae	*Stenanthemum*	*notiale*										X	

Table 20 continued.

Family	Genera	Species	Vernacular	Invasive	Cons Sig	1	2	3	4	5	6	7	8
Rubiaceae	*Opercularia*	*vaginata*	Dogweed			X						X	X
Sapindaceae	*Dodonaea*	*caespitosa*				X							
Stylidiaceae	*Stylidium*	*perpusillum*	Tiny triggerplant			X							
Stylidiaceae	*Stylidium*	*rupestre*	Rock triggerplant			X							
Xanthorrhoeaceae	*Xanthorrhoea*	*platyphylla*	Grass tree			X						X	

Relevé	R1	**Veg Code**	1: MyPrS	**Date Surveyed**	30/09/2022
Location	2.0866 km north of Degrussa Road railway crossing, on western railway corridor. 350.287 KM.				
GPS (Lat, Long)	-33.5981063031, 121.7975557458				
Landform and Slope	Sandplain, Flat				
Soils	Sand, White				
Hydrology	Well Drained				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U *Nuytsia floribunda*\tree\3\bc; M+ ^^*Lambertia inermis, Acacia cyclops, Adenanthos cuneatus*\shrub\2\c; G ^*Hypolaena humilis, Caustis dioica, Chamaescilla corymbosa*\^sedge, herb\1\c Vegetation Description (Muirs, 1977): *Nuytsia floribunda* Open Low Woodland B, over *Lambertia inermis, Phymatocarpus maxwellii* and *Acacia cyclops* Scrub, over *Adenanthos cuneatus, Allocasuarina humilis, Tetrapora preissiana* Heath A and B, over *Hibbertia racemosa, Micromyrtus elobata* subsp *elobata* and *Leucopogon assimilis* Very Open Dwarf Scrub C and D, over *Cyathochaeta equitans* and *Caustis dioica* Open Tall Sedges, over *Hypolaena humilis* Low Sedges, over *Chamaescilla corymbosa, *Lysimachia arvensis* and *Trachymene pilosa* Very Open Herbs, over **Eragrostis curvula* and **Avena fatua* Tall Grass and **Briza maxima* Low Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m	*Nuytsia floribunda*		E <5%
Shrub >2m	*Lambertia inermis, Phymatocarpus maxwelli*	*Acacia cyclops, Acacia saligna*	M 30-70%
Shrub 1-2m	*Adenanthos cuneatus*		M 30-70%
Shrub 0.5-1m			
Shrub <0.5m			
Sedge	*Hypolaena humilis*		M 30-70%
Herb	*Chamaescilla corymbosa*	*Drosera neesii, Stylidium rupestre*	E <5%
Grass	**Eragrostis curvula, *Avena fatua, *Briza maxima*		M 30-70%

Relevé	R2	**Veg Code**	3: McSW	**Date Surveyed**	30/09/2022
Location	1.427 km north of Degrussa Road railway crossing. Located on western railway corridor. 350.925KM				
GPS (Lat, Long)	-33.6036169886, 121.7990190758				
Landform and Slope	Drainage Depression, Gentle Slopes				
Soils	Sand, White				
Hydrology	Poor Drained				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U+ ^*Melaleuca cuticularis*, +/- *Melaleuca brevifolia*, *Acacia cyclops*\shrub\2\i; M ^^*Tetrapora preissiana, Cyathostemon ambiguus*\shrubs\2\bc; G ^^*Gahnia trifida, Hypolaena humilis*, +/-*Eragrostis curvula*\^sedge, grass\1\d Vegetation Description (Muirs, 1977): *Melaleuca cuticularis, Melaleuca brevifolia* and *Acacia cyclops* Scrub, over *Tetrapora preissiana, Cyathostemon ambiguus* and *Acacia gonophylla* Very Open Low Scrub A and B, over *Gahnia trifida* Open Tall Sedge, over *Hypolaena humilis* and *Lepidosperma squamata* Open Low Sedges, over **Eragrostis curvula* and **Avena fatua* Tall Grass, over **Briza maxima* Very Open Low Grass, over *Tecticornia pergranulata* Very Open Herbs.				
Condition	Very Good				
Comments	-				

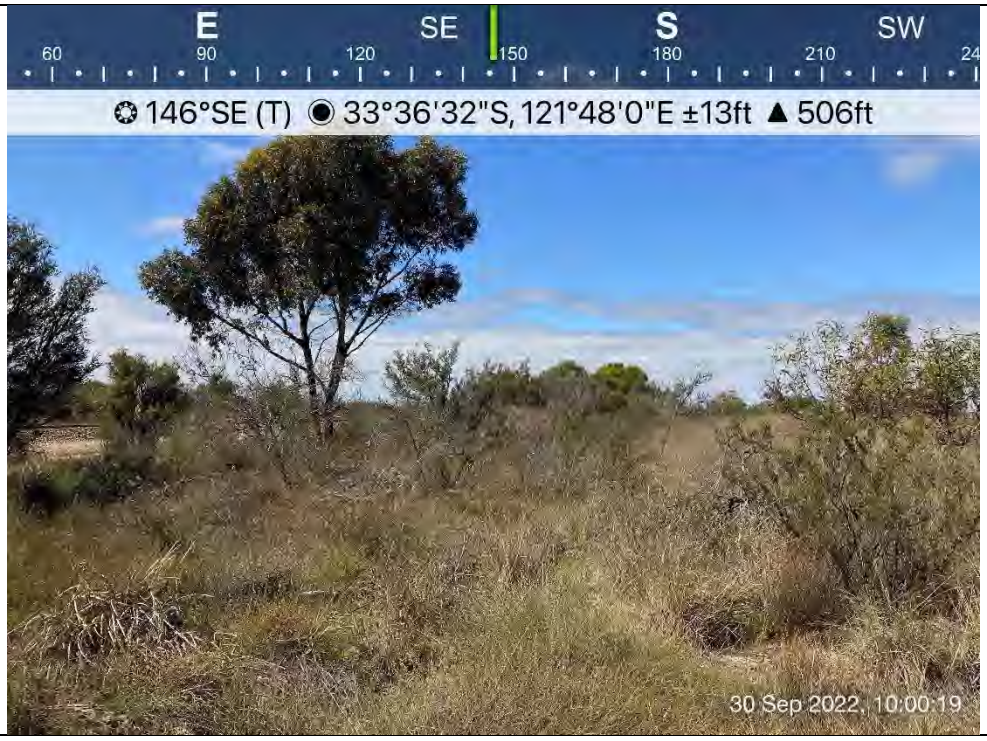
Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Shrub >2m	*Melaleuca cuticularis*	*Melaleuca brevifolia*	M 30-70%
Shrub 1-2m			
Shrub 0.5-1m		*Tetrapora preissiana, Acacia gonophylla*	E <5%
Shrub <0.5m			
Sedge	*Gahnia trifida*	*Lepidosperma squamata, Hypolaena humilis*	V 2-10%
Herb			
Grass	**Eragrostis curvula*	**Avena fatua*	M 30-70%

Relevé	R3	**Veg Code**	1: MyPrS	**Date Surveyed**	30/09/2022
Location	1.35km north of Degrussa Road railway crossing. Located on western railway corridor. 351KM.				
GPS (Lat, Long)	-33.6045993479, 121.7991418181				
Landform and Slope	Sandplain, Flat Slopes				
Soils	Sand, White				
Hydrology	Good Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U *Nuytsia floribunda*\tree\3\bc; M+ ^^*Lambertia inermis, Acacia cyclops, Adenanthos cuneatus*\shrub\2\c; G ^*Hypolaena humilis, Caustis dioica, Chamaescilla corymbosa*\^sedge, herb\1\c Vegetation Description (Muirs, 1977): *Nuytsia floribunda* Open Low Woodland B, over *Lambertia inermis, Phymatocarpus maxwellii* and *Acacia cyclops* Scrub, over *Adenanthos cuneatus, Allocasuarina humilis, Tetrapora preissiana* Heath A and B, over *Hibbertia racemosa, Micromyrtus elobata* subsp *elobata* and *Leucopogon assimilis* Very Open Dwarf Scrub C and D, over *Cyathochaeta equitans* and *Caustis dioica* Open Tall Sedges, over *Hypolaena humilis* Low Sedges, over *Chamaescilla corymbosa, *Lysimachia arvensis* and *Trachymene pilosa* Very Open Herbs, over **Eragrostis curvula* and **Avena fatua* Tall Grass and **Briza maxima* Low Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m	*Nuytsia floribunda*		E <5%
Shrub >2m	*Lambertia inermis*	*Acacia cyclops*	S 10-30%
Shrub 1-2m	*Adenanthos cuneatus, Allocasuarina humilis, Tetrapora preissiana*		M 30-70%
Shrub 0.5-1m	*Hibbertia racemosa*		E <5%
Shrub <0.5m			
Sedge	*Hypolaena humilis, Caustis dioica*	*Cyathochaeta equitans*	S 10-30%
Herb	**Lysimachia arvensis*		E <5%
Grass	**Eragrostis curvula, *Avena fatua, *Ehrharta longifolia*		M 30-70%

Relevé	R4	**Veg Code**	4: EoWHhS	**Date Surveyed**	30/09/2022
Location	830 m north of Degrussa Road railway crossing. Located on western railway corridor. 351.553KM.				
GPS (Lat, Long)	-33.6091810285, 121.8001079737				
Landform and Slope	Lower slopes, Flat.				
Soils	Light grey sand				
Hydrology	Good Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U +/-*Eucalyptus occidentalis*\tree\4\bi; M ^^*Melaleuca cuticularis, Lambertia inermis, Tetrapora preissiana*\shrub\3\r; G+ ^*Hypolaena humilis +/-Dianella brevicaulis, Ursinia anthemoides*\^Sedge, herb\1\d Vegetation Description (Muirs, 1977): *Eucalyptus occidentalis* Open Low Woodland B, over *Melaleuca cuticularis, Lambertia inermis* and *Acacia saligna* Open Scrub, over *Tetrapora preissiana, Leucopogon assimilis* and *Acacia cupularis* Open Low Scrub A and B, over *Dianella Brevicaulis* Very Open Tall Sedge, over *Hypolaena humilis* and *Ficinia nodosa* Dense Low Sedge, over **Ursinia anthemoides, *Hypochaeris glabra* and **Romula rosea* Open Herbs, over **Eragrostis curvula, *Ehrharta longifolia* and **Avena fatua* Tall Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m	*Eucalyptus occidentalis*		
Trees <10m			
Shrub >2m	*Melaleuca cuticularis*	*Lambertia inermis, Acacia saligna*	
Shrub 1-2m	*Tetrapora preissiana*		
Shrub 0.5-1m	*Leucopogon assimilis, Acacia cupularis*		
Shrub <0.5m			
Sedge	*Hypolaena humilis*	*Dianella brevicaulis, Ficinia nodosa*	
Herb	**Ursinia anthemoides, *Hypochaeris glabra, *Romula rosea*		
Grass	**Eragrostis curvula, *Ehrharta longifolia*	**Avena fatua*	



Relevé	R5	**Veg Code**	1: MyPrS	**Date Surveyed**	30/09/2022
Location	715 m north of Degrussa Road railway crossing. Located on eastern railway corridor. 351.645KM.				
GPS (Lat, Long)	-33.6099406122, 121.80062949				
Landform and Slope	Lower Slopes, Flat				
Soils	Light Grey Sand				
Hydrology	Well Drained				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U *Nuytsia floribunda*\tree\3\bc; M+ ^^*Lambertia inermis, Acacia cyclops, Adenanthos cuneatus*\shrub\2\c; G ^*Hypolaena humilis, Caustis dioica, Chamaescilla corymbosa*\^sedge, herb\1\c Vegetation Description (Muirs, 1977): *Nuytsia floribunda* Open Low Woodland B, over *Lambertia inermis, Phymatocarpus maxwellii* and *Acacia cyclops* Scrub, over *Adenanthos cuneatus, Allocasuarina humilis, Tetrapora preissiana* Heath A and B, over *Hibbertia racemosa, Micromyrtus elobata* subsp *elobata and Leucopogon assimilis* Very Open Dwarf Scrub C and D, over *Cyathochaeta equitans* and *Caustis dioica* Open Tall Sedges, over *Hypolaena humilis* Low Sedges, over *Chamaescilla corymbosa, *Lysimachia arvensis* and *Trachymene pilosa* Very Open Herbs, over **Eragrostis curvula* and **Avena fatua* Tall Grass and **Briza maxima* Low Grass.				
Condition	Excellent				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m	*Nuytsia floribunda*		E <5$
Shrub >2m	*Lambertia inermis*	*Acacia cyclops*	V 2-10%
Shrub 1-2m	*Adenanthos cuneatus*	*Allocasuarina humilis, Acacia saligna*	S 10-30%
Shrub 0.5-1m	*Phymatocarpus maxwelli, Tetrapora preissiana*	*Leptospermum oligandrum*	V 2-10%
Shrub <0.5m	*Micromyrtus elobata* subsp *elobata, Leucopogon assimilis*		E <5%
Sedge	*Hypolaena humilis, Caustis dioica*	*Cyathochaeta equitans, Desmocladus lateriflorus, Dianella brevicaulis*	M 30-70%
Herb	*Opercularia vaginata*	**Arctotheca calendula, *Hypochaeris glabra, Trachymene pilosa, Crassula closiana, *Lysimachia arvensis, Chamaescilla corymbosa*	V 2-10%
Grass	**Eragrostis curvula, Austrostipa elegantissima*	**Bromus diandrus*	S 10-30%

Relevé	R6	**Veg Code**	5: HaSHhS	**Date Surveyed**	30/09/2022
Location	680 m south of Degrussa Road railway crossing. Located on western railway corridor. 353.077KM				
GPS (Lat, Long)	-33.6226503736, 121.8006250949				
Landform and Slope	Slope Lower, Flat				
Soils	Light Grey Sand				
Hydrology	Poorly Drained				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U ^*Hakea adnata*, +/-*Acacia cyclops*\shrub\3\i; M *Tetrapora preissiana, Phymatocarpus maxwellii, Leucopogon assimilis*\shrub\2\c; G+ ^*Hypolaena humilis*, +/-*Gahnia trifida, *Ursinia anthemoides*\^sedge, herb\1\d Vegetation Description (Muirs, 1977): *Hakea adnata* and *Acacia cyclops* Scrub, over *Tetrapora preissiana, Phymatocarpus maxwellii, Leucopogon assimilis* Heath A and B, over *Gahnia trifida* and *Dianella brevicaulis* Open Tall Sedge, over *Hypolaena humilis* and *Lepidosperma squamatum* Dense Low Sedge, over **Ursinia anthemoides, Trachymene pilosa* and *Diuris laxiflora* Very Open Herbs, over **Eragrostis curvula* and **Bromus diandrus* Very Open Tall Grass, over **Briza maxima* Very Open Low Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Shrub >2m	*Hakea adnata*	*Acacia cyclops*	S 10-30%
Shrub 1-2m			
Shrub 0.5-1m	*Tetrapora preissiana*	*Phymatocarpus maxwelli, Leucopogon assimilis, Verticordia plumosa var grandiflora*	M 30-70%
Shrub <0.5m			
Sedge	*Hypolaena humilis*	*Lepidosperma squamatum, Dianella brevicaulis, Gahnia trifida*	D >70%
Herb	**Ursinia anthemoides*	*Caladenia cairnsiana, Diuris laxiflora, Trachymene pilosa *Lysimachia arvensis*	V 2-10%
Grass		**Eragrostis curvula, *Bromus diandrus, *Briza maxima*	E <5%

Relevé	R7	**Veg Code**	6: SSSL	**Date Surveyed**	30/09/2022
Location	785 m south of Degrussa Road railway crossing. Located on western railway corridor. 353.165KM				
GPS (Lat, Long)	-33.6234173793, 121.8036268454				
Landform and Slope	Drainage Depression, Flat				
Soils	Light Grey Clay-sand				
Hydrology	Poorly Drained				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): M ^^*Melaleuca brevifolia, Kunzea salina, Leucopogon ?bossiaea*\shrub\2\i; G ^^*Tecticornia pergranulata, Tecticornia halocnemoides, Austrostipa juncifolia*\herb, grass\1\i Vegetation Description (Muirs, 1977): *Melaleuca brevifolia* and *Acacia patagiata* Low Scrub A and B, over *Kunzea salina* and *Leucopogon ?bossiaea* Open Dwarf Scrub C and D, over *Hypolaena humilis* Very Open Low Sedge, over *Tecticornia pergranulata, Tecticornia halocnemoides* and *Frankenia sessilis* var *sessilis* Open Herbs, over *Austrostipa juncifolia* Open Tall Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Shrub >2m			
Shrub 1-2m			
Shrub 0.5-1m	*Melaleuca brevifolia*	*Acacia patagiata*	S 10-30%
Shrub <0.5m	*Kunzea salina, Leucopogon ?bossiaea*		V 2-10%
Sedge	*Hypolaena humilis*		E <5%V 2-10%
Herb	*Tecticornia pergranulata, Tecticornia halocnemoides*	*Disphyma crassifolia, Frankenia sessilis* var *sessilis*	V 2-10%
Grass	*Austrostipa juncifolia*		

Relevé	R8	**Veg Code**	7: MMSAsS	**Date Surveyed**	30/09/2022
Location	1.04 km south of Degrussa Road railway crossing. Located on western railway corridor. 353.421KM				
GPS (Lat, Long)	-33.6256146029, 121.8044739672				
Landform and Slope	Slope Middle, Flat				
Soils	Light Grey Sand				
Hydrology	Good Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U ^^*Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa*\mallee\2\i ; M+ *Acacia cyclops, Cyathostemon ambiguus, Melaleuca scabra*\shrub\2\i; G ^*Anarthria scabra*, *+/-Lepidosperma squamata, Ursinia anthemoides*\sedge, grass\1\c Vegetation Description (Muirs, 1977): *Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa* and *Eucalyptus tetraptera* Very Open Shrub Mallee, over *Acacia cyclops* and *Allocasuarina humilis* Very Open Scrub, over *Cyathostemon ambiguus, Hakea denticulata, Melaleuca scabra* Open Low Scrub A and B, over *Hibbertia gracilipes, Persoonia scabra* and *Daviesia apiculata* Open Dwarf Scrub C and D, over *Anarthria scabra, Lepidosperma squamatum* and *Caustis dioica* Low Sedge, over **Ursinia anthemoides, Opercularia vaginata, Chamaescilla corymbosa* Very Open Herbs, over **Briza maxima, *Eragrostis curvula, Neurachne alopecuroidea* Open Tall and Low Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Mallee <8m	*Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa, Eucalyptus tetraptera*		E <5%
Shrub >2m	*Acacia cyclops*		E<5%
Shrub 1-2m	*Melaleuca scabra*		E<5%
Shrub 0.5-1m	*Cyathostemon ambiguus, Melaleuca pulchella, Tetrapora preissiana*		V 2-10%
Shrub <0.5m			D >70%
Sedge	*Anarthria scabra*	*Hypolaena humilis, Lepidosperma squamatum*	E <5%
Herb	*Chamaescilla corymbosa*	**Ursinia anthemoides*	E <5%
Grass	**Briza maxima*		

Relevé	R9	**Veg Code**	7: MMSAsS	**Date Surveyed**	30/09/2022
Location	1.09 km south of Degrussa Road railway crossing. Located on western railway corridor. 353.471KM				
GPS (Lat, Long)	-33.6260715676, 121.8046414383				
Landform and Slope	Slope Middle, Flat				
Soils	Light Grey Sand				
Hydrology	Good Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U ^^*Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa*\mallee\2\i ; M+ *Acacia cyclops, Cyathostemon ambiguus, Melaleuca scabra*\shrub\2\i; G ^*Anarthria scabra*, *+/-Lepidosperma squamata, Ursinia anthemoides*\sedge, grass\1\c Vegetation Description (Muirs, 1977): *Eucalyptus rigens, Eucalyptus uncinata, Eucalyptus pleurocarpa* and *Eucalyptus tetraptera* Very Open Shrub Mallee, over *Acacia cyclops* and *Allocasuarina humilis* Very Open Scrub, over *Cyathostemon ambiguus, Hakea denticulata, Melaleuca scabra* Open Low Scrub A and B, over *Hibbertia gracilipes, Persoonia scabra* and *Daviesia apiculata* Open Dwarf Scrub C and D, over *Anarthria scabra, Lepidosperma squamatum* and *Caustis dioica* Low Sedge, over **Ursinia anthemoides, Opercularia vaginata, Chamaescilla corymbosa* Very Open Herbs, over **Briza maxima, *Eragrostis curvula, Neurachne alopecuroidea* Open Tall and Low Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Mallee <8m	*Eucalyptus uncinata, Eucalyptus tetraptera*		
Shrub >2m	*Acacia cyclops*	*Allocasuarina humilis*	
Shrub 1-2m	*Hakea denticulata, Hakea lissocarpha*		
Shrub 0.5-1m	*Cyathostemon ambiguus*		
Shrub <0.5m	*Hibbertia gracilipes, Persoonia scabra, Daviesia apiculata*		
Sedge	*Caustis dioica, Dianella brevicaulis, Lepidosperma squamatum, Anarthria scabra*	*Desmocladus lateriflorus*	
Herb	**Ursinia anthemoides, Opercularia vaginata*		
Grass	**Eragrostis curvula, *Briza maxima, Neurachne alopecuroidea*		

No photo collected

Relevé	R10	**Veg Code**	1: MyPrS	**Date Surveyed**	30/09/2022
Location	1.55 km south of Degrussa Road railway crossing. Located on western railway corridor. 353.931KM				
GPS (Lat, Long)	-33.6299981172, 121.8046414383				
Landform and Slope	Slope Middle, Flat				
Soils	Light Grey Sand				
Hydrology	Good Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U *Nuytsia floribunda*\tree\3\bc; M+ ^^*Lambertia inermis, Acacia cyclops, Adenanthos cuneatus*\shrub\2\c; G ^*Hypolaena humilis, Caustis dioica, Chamaescilla corymbosa*\^sedge, herb\1\c Vegetation Description (Muirs, 1977): *Nuytsia floribunda* Open Low Woodland B, over *Lambertia inermis, Phymatocarpus maxwellii* and *Acacia cyclops* Scrub, over *Adenanthos cuneatus, Allocasuarina humilis, Tetrapora preissiana* Heath A and B, over *Hibbertia racemosa, Micromyrtus elobata* subsp *elobata* and *Leucopogon assimilis* Very Open Dwarf Scrub C and D, over *Cyathochaeta equitans* and *Caustis dioica* Open Tall Sedges, over *Hypolaena humilis* Low Sedges, over *Chamaescilla corymbosa, *Lysimachia arvensis* and *Trachymene pilosa* Very Open Herbs, over **Eragrostis curvula* and **Avena fatua* Tall Grass and **Briza maxima* Low Grass.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Mallee <8m	*Eucalyptus uncinata*		V 2-10%
Shrub >2m	*Acacia cyclops*	**Acacia pycnantha*	E <5%
Shrub 1-2m	*Hakea cinerea, Cyathostemon ambiguus, Phymatocarpus maxwellii, Isopogon polycephalus*		S 10-30%
Shrub 0.5-1m	*Leucopogon assimilis, Tetrapora preissiana*	*Calothamnus gracilis*	S 10-30%
Shrub <0.5m	*Hibbertia gracilipes, Chorizema aciculare*		E <5%
Sedge	*Caustis dioica, Lepidosperma squamatum, Desmocladus lateriflorus*		M 30-70%
Herb	*Drosera neesii, Chamaescilla corymbosa, Hypolaena humilis*	*Thelymitra antennifera, Elythranthera brunonis*	V 2-10%
Grass	*Neurachne alopecuroidea*		E <5%

No photo collected

Relevé	R11	**Veg Code**	3: McSW	**Date Surveyed**	30/09/2022
Location	1.63 km south of Degrussa Road railway crossing. Located on western railway corridor. 354.04KM				
GPS (Lat, Long)	-33.6307855479, 121.8063977139				
Landform and Slope	Slope Lower, Flat				
Soils	Light Grey Sand				
Hydrology	Poor Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U+ ^*Melaleuca cuticularis*, +/- *Melaleuca brevifolia*, *Acacia cyclops*\shrub\2\i; M ^^*Tetrapora preissiana, Cyathostemon ambiguus*\shrubs\2\bc; G ^^*Gahnia trifida, Hypolaena humilis*, +/-*Eragrostis curvula*\^sedge, grass\1\d Vegetation Description (Muirs, 1977): *Melaleuca cuticularis, Melaleuca brevifolia* and *Acacia cyclops* Scrub, over *Tetrapora preissiana, Cyathostemon ambiguus* and *Acacia gonophylla* Very Open Low Scrub A and B, over *Gahnia trifida* Open Tall Sedge, over *Hypolaena humilis* and *Lepidosperma squamata* Open Low Sedges, over **Eragrostis curvula* and **Avena fatua* Tall Grass, over **Briza maxima* Very Open Low Grass, over *Tecticornia pergranulata* Very Open Herbs.				
Condition	Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Mallee <8m			
Shrub >2m	*Melaleuca cuticularis*	*Acacia cyclops*	S 10-30%
Shrub 1-2m	*Cyathostemon ambiguus*		E <5%
Shrub 0.5-1m			
Shrub <0.5m	*Lawrencia squamata*		E <5%
Sedge	*Gahnia trifida*	*Hypolaena humilis*	S 10-30%
Herb	*Tecticornia pergranulata*	**Lysimachia arvensis*	S 10-30%
Grass	**Briza maxima*		V 2-10%

Relevé	R12	**Veg Code**	8: MS	**Date Surveyed**	30/09/2022
Location	1.75 km south of Degrussa Road railway crossing. Located on western railway corridor. 354.149KM				
GPS (Lat, Long)	-33.6318636104, 121.8068573547				
Landform and Slope	Slope Lower, Flat				
Soils	Light brown sand over gravel				
Hydrology	Poor Drainage				
Vegetation description	Vegetation Description (NVIS; DoEE, 2017): U *Eucalyptus uncinata*\mallee\3\i; M+ *Hakea trifurcata, Lambertia inermis, Hakea nitida*\shrub\2\c; G ^^*Patersonia occidentalis, Gahnia trifida, Neurachne alopecuroidea*\sedge, grass\1\i Vegetation Description (Muirs, 1977): *Eucalyptus uncinata* Open Shrub Mallee, over *Hakea trifurcata, Lambertia inermis* and *Hakea nitida* Thicket, over *Acacia saligna, Beaufortia schaueri* and *Leucopogon* sp. Coujinup (M.A. Burgman 1085) Low Scrub A and B, over *Synaphea petiolaris* subsp *petiolaris, Gompholobium polymorphum* and *Cryptandra nutans* Open Dwarf Scrub C and D, over *Gahnia trifida* Open Tall Sedge, over *Patersonia occidentalis, Lepidosperma squamatum* and *Patersonia lanata* Open Low Sedge, over *Neurachne alopecuroides, *Bromus diandrus* and **Briza maxima* Open Tall and Low Grass, over *Opercularia vaginata* Very Open Herbs.				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m			
Trees <10m			
Mallee <8m	*Eucalyptus uncinata*		E <5%
Shrub >2m	*Hakea trifurcata, Lambertia inermis, Hakea nitida*	*Acacia cyclops*	M 30-70%
Shrub 1-2m	*Acacia saligna, Phymatocarpus maxwellii, Isopogon polycephalus*	*Gastrolobium spinosum*	V 2-10%
Shrub 0.5-1m	*Beaufortia schaueri, Leucopogon* sp. Coujinup, *Grevillea oligantha, Cyathostemon ambiguus*	*Lysinema ciliatum, Thomasia petalocalyx, Micromyrtus elobata* subsp *elobata*	S 10-30%
Shrub <0.5m	*Synaphea petiolaris* subsp *petiolaris, Gompholobium polymorphum, Cryptandra nutans, Stachystemon virgatus, Chorizema aciculare*		V 2-10%V 2-10%
Sedge	*Patersonia occidentalis, Gahnia trifida*	*Lepidosperma squamatum, Patersonia lanata*	E <5%
Herb		*Opercularia vaginata*	V 2-10%
Grass	*Neurachne alopecuroidea*	**Bromus diandrus, *Briza maxima*	

Table 21: Fauna species recorded within survey area.

Family	Species	Vernacular	Cons Code
Birds			
Monarchidae	*Grallina cyanoleuca*	Mudlark	
Psittaculidae	*Barnardius zonarius*	Australian ringneck	
Acanthizidae	*Gerygone fusca*	Western gerygone	
Anatidae	*Anas superciliosa*	Pacific black duck	
Ardeidae	*Egretta novaehollandiae*	White-faced heron	
Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike	
Charadriidae	*Vanellus miles*	Masked lapwing	
Columbidae	*Phaps chalcoptera*	Common bronzewing	
Columbidae	*Phaps elegans*	Brush bronzewing	
Cuculidae	*Chrysococcyx basalis*	Horse field's bronze cuckoo	
Locustellidae	*Cincloramphus mathewsi*	Rufous songlark	
Meliphagidae	*Anthochaera lunulata*	Western wattlebird	
Meliphagidae	*Lichmera indistincta*	Brown honeyeater	
Meliphagidae	*Manorina flavigula*	Yellow-throated miner	
Meliphagidae	*Phylidonyris novaehollandiae*	New Holland honeyeater	
Recurvirostridae	*Himantopus himantopus*	Black-winged stilt	
Rhipiduridae	*Rhipidura leucophrys*	Willy wagtail	
Invertebrates			
Araneidae	*Austracantha minax*	Christmas spider	
Araneidae	*Trichonephila edulis*	Australian golden orb weaver	
Mammals			
Canidae	*Vulpes vulpes*	Fox	
Leporidae	*Oryctolagus cuniculus*	Rabbit	
Macropodidae	*Macropus fuliginosus*	Western grey kangaroo	
Peramelidae	*Isoodon fusciventer*	Quenda	P4
Reptiles			
Agamidae	*Pogona minor*	Dwarf bearded dragon	
Scincidae	*Tiliqua rugosa*	Bobtail skink	

Appendix E

Threatened and Priority Reporting Forms

Appendix F

DCCEEW PMST reports

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Darwinia sp. Gibson **TPFL Pop. No:**

OBSERVATION DATE: 30/09/2022 **CONSERVATION STATUS:** P1 **New population** ☒

OBSERVER/S: Katie White, Bianca Theyer, Kahree Garnaut **PHONE** 0439 993 451

ROLE: Botanist / Environmental Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au / enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

2.2 km north of Gibson townsite and 15 km north of Esperance townsite. Located on railway line, on western side approximately 1.3 km south of Degrussa Road intersection

Reserve No:

DBCA DISTRICT: South Coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒
Lat / Northing: 945893.3
Long / Easting: 626738.2
ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐
No. satellites: ____ Map used: _____
Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 353. 663 to _____	Specify other: _____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☒ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	4			
Dead				

Area of pop (m²): _____
Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ____ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☒
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 50%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Expansion of active railway footprint		M	S
•			
•			

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☒
Closed depression ☒
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☒
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: Clay-sand

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☒
Black ☐
Specify other:

DRAINAGE:
Well drained ☐
Seasonally inundated ☒
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Gibson salt lake drainage system
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☒ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Scattered tall shrubland with closed low shrubland. Scattered grasses, sedges. High density of forbs
2.
3.
4.

ASSOCIATED SPECIES: Melaleuca brevifolia, Kunzea salina, Austrostipa juncifolia, Hypolaena humilis

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Note. Only partial survey undertaken and full number of plants in population not quantified. Unknown what affect of impact.

Specimen not retained by WA Herbarium.

FLORA AUTHORISATION / LICENCE No: FB62000327-2 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW195 WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: Accesion 9826

ATTACHED: Map ☐ Mudmap ☐ Photo ☒ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 7/12/2022

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

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Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Kunzea salina **TPFL Pop. No:** Reported to DBCA in 2021

OBSERVATION DATE: 30/09/2022 **CONSERVATION STATUS:** P3 **New population** ☐

OBSERVER/S: Katie White, Bianca Theyer, Kahree Garnaut **PHONE** 0439 993 451

ROLE: Botanist / Environmental Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au / enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

2.2 km north of Gibson townsite and 15 km north of Esperance townsite. Located on railway line, on western side approximately 720 m to 1.4 km south of Degrussa Road intersection.

(previously reported further south along railway line – likely to be part of same population. Was located here from 720 m south of Railway crossing on Degrussa Road, on eastern railway reserve).

Reserve No:

DBCA DISTRICT: South Coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒

Lat / Northing: 945784

Long / Easting: 6269032

ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐

No. satellites: ____ Map used: _____

Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 353.102 to 353.760	Specify other: _____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☒ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	92 plants			
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ___ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 0%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Expansion of active railway footprint	_____	M	S

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☒
Closed depression ☒
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☒
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: Clay-sand

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☒
Black ☐
Specify other:

DRAINAGE:
Well drained ☐
Seasonally inundated ☒
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Gibson salt lake drainage system
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☒ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Scattered tall shrubland with closed low shrubland. Scattered grasses, sedges. High density of forbs
2.
3.
4.

ASSOCIATED SPECIES: Melaleuca brevifolia, Kunzea salina, Austrostipa juncifolia, Hypolaena humilis

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Note. Only partial survey undertaken and full number of plants in population not quantified. Unknown what affect of impact.

Specimen previously submitted to WA Herbarium in 2021 (KW181, Accession 9281, specimen not retained. 36 plants counted in 2021. Survey area extended in 2022 and surveyed in different area (ie. all plants are additional to the count in 2021).

FLORA AUTHORISATION / LICENCE No: FB62000327-2 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: _____

ATTACHED: Map ☐ Mudmap ☐ Photo ☒ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 12/12/2022

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

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TAXON: Leucopogon bossiaea **TPFL Pop. No:** Reported to DBCA in 2021

OBSERVATION DATE: 30/09/2022 **CONSERVATION STATUS:** P2 **New population** ☐

OBSERVER/S: Katie White, Bianca Theyer, Kahree Garnaut **PHONE** 0439 993 451

ROLE: Botanist / Environmental Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au / enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

2.2 km north of Gibson townsite and 15 km north of Esperance townsite. Located on railway line, on western side approximately 710 m to 1.3 km south of Degrussa Road intersection.

(previously reported further south along railway line – likely to be part of same population. Was located here from 690 m south of Railway crossing on Degrussa Road, on eastern railway reserve).

Reserve No:

DBCA DISTRICT: South Coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒
Lat / Northing: 945784
Long / Easting: 6269032
ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐
No. satellites: ____ Map used: _____
Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 353.102 to 353.760	Specify other: _____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☒ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	83 plants			
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ___ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 0%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Expansion of active railway footprint	_____	M	S

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☒
Closed depression ☒
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☒
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: Clay-sand

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☒
Black ☐
Specify other:

DRAINAGE:
Well drained ☐
Seasonally inundated ☒
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Gibson salt lake drainage system
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☒ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Scattered tall shrubland with closed low shrubland. Scattered grasses, sedges. High density of forbs
2.
3.
4.

ASSOCIATED SPECIES: Melaleuca brevifolia, Kunzea salina, Austrostipa juncifolia, Hypolaena humilis

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Note. Only partial survey undertaken and full number of plants in population not quantified. Unknown what affect of impact.

Specimen previously submitted to WA Herbarium in 2021 (KW178, Accession 9281, specimen not retained. 31 plants counted in 2021. Survey area extended in 2022 and surveyed in different area (ie. all plants are additional to the count in 2021).

FLORA AUTHORISATION / LICENCE No: FB62000327-2 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: _____

ATTACHED: Map ☐ Mudmap ☐ Photo ☒ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 12/12/2022

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Persoonia scabra **TPFL Pop. No:**

OBSERVATION DATE: 30/09/2022 **CONSERVATION STATUS:** P3 **New population** ☒

OBSERVER/S: Katie White, Bianca Theyer, Kahree Garnaut **PHONE** 0439 993 451

ROLE: Botanist / Environmental Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au / enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

2.2 km north of Gibson townsite and 15 km north of Esperance townsite. Located on railway line, on western side approximately 1.08 km south of the Degrussa road intersection.

Reserve No:

DBCA DISTRICT: South Coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒
Lat / Northing: 945835
Long / Easting: 6268930.7
ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐
No. satellites: ____ Map used: _____
Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 353.472 to _____	Specify other: _____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____
(Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	2			
Dead				

Area of pop (m²): _____
Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ____ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 0%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Expansion of active railway footprint		M	S
•			
•			

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☒
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☒
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: _____

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☒
Grey ☒
Black ☐
Specify other: _____

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Sandplain / slopes to Gibson salt lake
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☒ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Mixed Mallee woodland with low sedgeland.
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

Anarthria scabra, Tetrapora sp, Melaleuca scabra, Lepidosperma squamatum, Acacia cyclops, Melaleuca pulchella

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Note. Herbarium identification noted that specimen was sterile and difficult to distinguish from P2 Persoonia spathulata

Note. Only partial survey undertaken and full number of plants in population not quantified. Unknown what affect of impact.

Specimen not retained by WA Herbarium.

FLORA AUTHORISATION / LICENCE No: FB62000327-2 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW194 WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: Accesion 9826

ATTACHED: Map ☐ Mudmap ☐ Photo ☒ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 7/12/2022

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

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GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

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Threatened and Priority Flora Report Form

Version 1.4 March 2021

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TAXON: Austrobaeckea uncinella **TPFL Pop. No:**

OBSERVATION DATE: 30/09/2022 **CONSERVATION STATUS:** P3 **New population** ☒

OBSERVER/S: Katie White, Bianca Theyer, Kahree Garnaut **PHONE** 0439 993 451

ROLE: Botanist / Environmental Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au / enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

Exact location unknown, collected within survey area - located 2.2 km north of Gibson townsite and Esperance townsite. On railway line. Survey area covered 2.1 km to north to 1.8 km south of Degrussa road railway crossing on north and south side of railway line.

Nt. Coordinates provided are estimate

Reserve No:

DBCA DISTRICT: South Coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒

Lat / Northing: 945835

Long / Easting: 6268930.7

ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 350.284 to 354.231	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☐ Count method:
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive				
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 0%

CONDITION OF PLANTS: Healthy ☐ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Expansion of active railway footprint		M	S

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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Record entered by: **Sheet No.:** **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☒
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☒
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other:

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☒
Grey ☒
Black ☐
Specify other:

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Sandplain / slopes to Gibson salt lake
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☒ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Mixed Mallee woodland with low sedgeland.
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

Anarthria scabra, Tetrapora sp, Melaleuca scabra, Lepidosperma squamatum, Acacia cyclops, Melaleuca pulchella

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Unknown if Herbarium retained spcecimen.

No count to quanity population, exact location and associated vegetation present. Estimates provided based off data collected during survey.

FLORA AUTHORISATION / LICENCE No: FB62000327-2 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW237 WA Herb. ☒ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: Accesion 9330

ATTACHED: Map ☐ Mudmap ☐ Photo ☒ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 27/1/2023

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

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TAXON: Conostylis seorsiflora ssp longissima **TPFL Pop. No:**

OBSERVATION DATE: 30/09/2022 **CONSERVATION STATUS:** P2 **New population** ☒

OBSERVER/S: Katie White, Bianca Theyer, Kahree Garnaut **PHONE** 0439 993 451

ROLE: Botanist / Environmental Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au / enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

Exact location unknown, collected within survey area - located 2.2 km north of Gibson townsite and Esperance townsite. On railway line. Survey area covered 2.1 km to north to 1.8 km south of Degrussa road railway crossing on north and south side of railway line.

Nt. Coordinates provided are estimate

Reserve No:

DBCA DISTRICT: South Coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒
Lat / Northing: 945835
Long / Easting: 6268930.7
ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐
No. satellites: Map used:
Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 350.284 to 354.231	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☐ Count method:
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive				
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 0%

CONDITION OF PLANTS: Healthy ☐ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Expansion of active railway footprint		M	S

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☐
Drainage line ☒
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☒
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☒
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other:

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☒
Grey ☒
Black ☐
Specify other:

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Sandplain / slopes to Gibson salt lake
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☒ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Mixed Mallee woodland with low sedgeland.
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

Anarthria scabra, Tetrapora sp, Melaleuca scabra, Lepidosperma squamatum, Acacia cyclops, Melaleuca pulchella

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☒ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Unknown if Herbarium retained spcecimen.

No count to quanity population, exact location and associated vegetation present. Estimates provided based off data collected during survey.

FLORA AUTHORISATION / LICENCE No: FB62000327-2 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW236 WA Herb. ☒ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: Accesion 9330

ATTACHED: Map ☐ Mudmap ☐ Photo ☒ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 27/1/2023

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

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. Please see the caveat for interpretation of information provided here.

Report created: 17-Aug-2022

Summary

Matters of National Environment 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 (Ramsar	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	45
Listed Migratory Species:	52

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

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 Lands:	12
Commonwealth Heritage Places:	None
Listed Marine Species:	84
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	19
Regional Forest Agreements:	None
Nationally Important Wetlands:	4
EPBC Act Referrals:	6
Key Ecological Features (Marine):	None
Biologically Important Areas:	13
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Lake gore	Within 10km of Ramsar site	In buffer area only
Lake warden system	Within Ramsar site	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Zanda latirostris listed as Calyptorhynchus latirostris](#) Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
FISH			
[Thunnus maccoyii](#) Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
MAMMAL			
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In feature area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area	In buffer area only
PLANT			
[Anigozanthos bicolor subsp. minor](#) Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat known to occur within area	In feature area
[Eremophila glabra subsp. Scaddan (C. Turley s.n. 10/11/2005)](#) [89454]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
[Eucalyptus merrickiae](#) Goblet Mallee [13119]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Kennedia glabrata](#) Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lambertia echinata subsp. echinata Prickly Honeysuckle [56729]	Endangered	Species or species habitat may occur within area	In feature area
Ricinocarpos trichophorus Barrens Wedding Bush [19931]	Endangered	Species or species habitat likely to occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
SHARK			
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Galeorhinus galeus School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat may occur within area	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Onychoprion anaethetus			
Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Balaenoptera edeni			
Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Caperea marginata			
Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only
Carcharhinus longimanus			
Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area	In buffer area only
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area	In buffer area only
Charadrius bicinctus Double-banded Plover [895]		Species or species habitat known to occur within area	In buffer area only
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [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.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [51964]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51407]	WA	In buffer area only
Commonwealth Land - [52092]	WA	In buffer area only
Commonwealth Land - [52190]	WA	In buffer area only
Commonwealth Land - [50339]	WA	In buffer area only
Commonwealth Land - [51065]	WA	In buffer area only
Commonwealth Land - [51066]	WA	In buffer area only
Commonwealth Land - [50311]	WA	In buffer area only
Commonwealth Land - [51798]	WA	In buffer area only
Commonwealth Land - [50338]	WA	In buffer area only
Commonwealth Land - [51064]	WA	In buffer area only
Commonwealth Land - [51408]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Breeding known to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat may occur within area	In buffer area only
Ardenna tenuirostris as Puffinus tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area overfly marine area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Breeding known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius bicinctus			
Double-banded Plover [895]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Charadrius ruficapillus			
Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area overfly marine area	In buffer area only
Chroicocephalus novaehollandiae as Larus novaehollandiae			
Silver Gull [82326]		Breeding known to occur within area	In buffer area only
Diomedea antipodensis			
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea dabbenena			
Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora			
Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans			
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Diomedea sanfordi			
Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area	In buffer area only
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area	In buffer area only
Larus pacificus Pacific Gull [811]		Breeding known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Pachyptila turtur Fairy Prion [1066]		Species or species habitat may occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area	In buffer area only
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Pterodroma macroptera Great-winged Petrel [1035]		Breeding likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Stercorarius skua as Catharacta skua Great Skua [823]		Species or species habitat may occur within area	In buffer area only
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Tringa brevipes as Heteroscelus brevipes](#) Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area overfly marine area	In feature area
Fish			
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area	In buffer area only
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area	In buffer area only
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
[Histiogamphelus cristatus](#) Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
[Leptoichthys fistularius](#) Brushtail Pipefish [66248]		Species or species habitat may occur within area	In buffer area only
[Lissocampus caudalis](#) Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In buffer area only
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area	In buffer area only
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In buffer area only
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In buffer area only
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Vanacampus poecilolaemus](#) Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Mammal			
[Arctocephalus forsteri](#) Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat likely to occur within area	In buffer area only
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Reptile			
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In buffer area only
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In buffer area only

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
[Balaenoptera acutorostrata](#) Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
[Caperea marginata](#) Pygmy Right Whale [39]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat likely to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Dalyup	Nature Reserve	WA	In buffer area only
Esperance 827 and Part 373 & 826	NRS Addition - Gazettal in Progress	WA	In buffer area only
Helms Arboretum	5(1)(h) Reserve	WA	In buffer area only
Kendall Road	Nature Reserve	WA	In buffer area only
Lake Mortijinup	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Lake Warden	Nature Reserve	WA	In buffer area only
Mount Ridley	Nature Reserve	WA	In buffer area only
Mullet Lake	Nature Reserve	WA	In buffer area only
Recherche Archipelago	Nature Reserve	WA	In buffer area only
Shark Lake	Nature Reserve	WA	In buffer area only
Speddingup East	Nature Reserve	WA	In buffer area only
Truslove North	Nature Reserve	WA	In buffer area only
Truslove Townsite	Nature Reserve	WA	In buffer area only
Unnamed WA04182	Nature Reserve	WA	In buffer area only
Unnamed WA24511	Nature Reserve	WA	In buffer area only
Unnamed WA24953	Nature Reserve	WA	In buffer area only
Unnamed WA31313	Nature Reserve	WA	In buffer area only
Unnamed WA32259	Nature Reserve	WA	In buffer area only
Woody Lake	Nature Reserve	WA	In buffer area only

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Lake Gore System	WA	In buffer area only
Lake Warden System	WA	In buffer area only
Mortijinup Lake System	WA	In buffer area only
Pink Lake	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Grain Receivals Depot	2001/170	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Port of Esperance Maintenance Dredging, WA	2013/6822	Not Controlled Action	Completed	In buffer area only
Shire of Esperance /Transport - land/Gibson Road, 26km north of Esperance/WA/Gibson Road Upgrade	2014/7199	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna carneipes Flesh-footed Shearwater [82404]	Foraging (in high numbers)	Known to occur	In buffer area only
Eudyptula minor Little Penguin [1085]	Foraging (provisioning young)	Known to occur	In buffer area only
Hydroprogne caspia Caspian Tern [808]	Foraging (provisioning young)	Known to occur	In buffer area only
Larus pacificus Pacific Gull [811]	Foraging (in high numbers)	Known to occur	In buffer area only
Onychoprion anaethetus Bridled Tern [82845]	Foraging (in high numbers)	Known to occur	In buffer area only
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur	In buffer area only
Puffinus assimilis tunneyi Little Shearwater [59363]	Foraging (in high numbers)	Known to occur	In buffer area only
Sternula nereis Fairy Tern [82949]	Foraging (in high numbers)	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Seals			
Neophoca cinerea Australian Sea Lion [22]	Foraging (male and female)	Known to occur	In buffer area only
Sharks			
Carcharodon carcharias White Shark [64470]	Foraging	Known to occur	In buffer area only
Whales			
Eubalaena australis Southern Right Whale [40]	Calving buffer	Known to occur	In buffer area only
Eubalaena australis Southern Right Whale [40]	Seasonal calving habitat	Known to occur	In buffer area only
Megaptera novaeangliae Humpback Whale [38]	Migration (north)	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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
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-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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