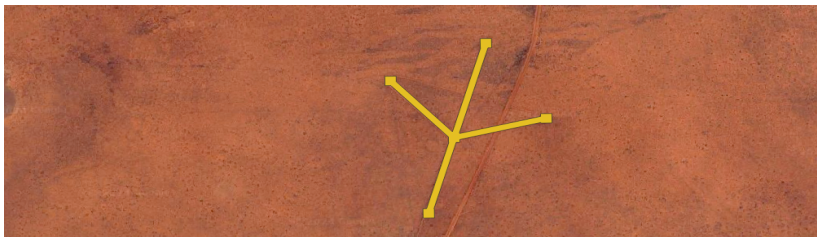
Biota Environmental Sciences

Yarrie Bore Line Road - Biological Survey



Prepared for BHP WAIO

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Biota Environmental Sciences

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Yarrie Bore Line – Biological Survey

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1.0 Executive Summary

BHP Western Australia Iron Ore required a biological survey for a small area totalling approximately 10 hectares, comprising four 60 x 60 metres pads connected by 40 metre wide corridors (hereafter referred to as the Survey Area). The Survey Area is located approximately 33 kilometres north-northwest of the Yarrie mine, in the Great Sandy Desert bioregion. The results of the survey will be used to inform the environmental impact assessment for the drilling of new water bores in the Survey Area.

Biota Environmental Sciences was commissioned to conduct a desktop study, followed by a single-season reconnaissance and targeted flora and vegetation survey and a single-season basic and targeted vertebrate fauna survey in the Survey Area. The aim of the study was to identify key biological values within the Survey Area, particularly communities or species listed under the Commonwealth *Environment Protection and Biodiversity Act 1999* (the EPBC Act), State *Biodiversity Conservation Act 2016* (the BC Act) or under Western Australian (WA) Department of Biodiversity, Conservation and Attractions (DBCA) policy.

The survey was conducted on the 23 of July 2024 by botanist Chloe Flaherty and zoologist Joshua Keen. Two flora relevés were sampled and targeted flora and fauna searches were conducted on foot throughout the Survey Area. Targeted flora and fauna search effort included 5.13 kilometres of traverses, equating to 153 person-minutes of targeted searches throughout the Survey Area.

The Survey Area comprised a broad Pindan sand plain. Remnant native vegetation accounted for 8.3 hectares (83%) of the Survey Area. The remaining 1.7 hectares (17% of the Survey Area) comprised cleared areas consisting of tracks and existing bore infrastructure. The intact vegetation comprised one broad floristic formation consisting of one vegetation association: Open hummock grassland of *Triodia schinzii* with high open shrubland of *Acacia eriopoda, A. ancistrocarpa, A. monticola* and scattered low trees of *Owenia reticulata, Corymbia zygophylla, Erythrophleum arenarium* on orange Pindan sand plains. Vegetation condition was ranked as Very Good, with only minor disturbances: camel and cattle tracks and scats, as well as some areas of previous human disturbance, including two locations of discarded broken pipes. The vegetation association recorded did not comprise a Threatened Ecological Community or Priority Ecological Community.

A total of 33 native vascular flora species from 25 genera and 13 families were recorded during the survey. No introduced flora species (weeds) were recorded. On-ground conditions leading up to the survey were dry, with very few annual flora species recorded. No Threatened or Priority flora species were recorded during the survey; however, due to the dry survey conditions, one Priority annual species, *Rothia indica* subsp. *australis* (Priority 3), was assessed as having some potential to occur (may occur – 'moderate' likelihood of occurrence) following the survey. One species, *Gardenia pyriformis* subsp. *keartlandii,* represents a range extension, with the closest vouchered records at the WA Herbarium located approximately 73 kilometres northeast of the Survey Area.

There were two fauna habitats in the Survey Area: Sand Plain and Cleared areas. Two fauna species of significance were recorded:

- Bilby, Dalgyte (*Macrotis lagotis*) – listed as Vulnerable under the BC Act and EPBC Act, and
- Brush-tailed Mulgara, Ampurta (*Dasycercus blythi*) – DBCA Priority 4.

Both species were identified through secondary signs: a single inactive Bilby burrow system, and diggings and tracks attributed to the Brush-tailed Mulgara.

In addition, three significant fauna species were assessed as likely to occur in the Survey Area: the Pacific Swift (*Apus pacificus*) – BC Act and EPBC Act Migratory, Grey Falcon (*Falco hypoleucos*) – BC Act and EPBC Act Vulnerable, and Peregrine Falcon (*Falco peregrinus*) – BC Act Other

Specially Protected. A further four significant fauna species, all migratory birds, were assessed as having a 'moderate' likelihood to occur in the Survey Area (may occur).

2.0 Introduction

2.1 Project Background

Mining commenced at the Yarrie mine in late 1993, with iron ore extracted from open cut pits and transported by rail to Port Hedland. Production at Yarrie was suspended in 2014 and the mine is currently in a suspended operations status.

BHP Western Australia Iron Ore (BHP WAIO) required a biological survey for a small area totalling approximately 10 hectares (ha), comprising four 60 x 60 metres (m) pads connected by 40 m wide corridors (hereafter referred to as the Survey Area). The Survey Area is located approximately 33 kilometres (km) north-northwest of the Yarrie mine, within the Great Sandy Desert bioregion. The results of the survey will be used to inform the environmental impact assessment for the drilling of new water bores in the Survey Area.

2.2 Objectives of the Study

BHP WAIO commissioned Biota Environmental Sciences (Biota) to complete a desktop study, followed by a single-season reconnaissance and targeted flora and vegetation survey and a single-season basic and targeted vertebrate fauna of the Survey Area consistent with relevant Environmental Protection Authority (EPA) guidance and policy. The overall objective of the study was to identify key biological values within the Survey Area. The results of this study will be used to inform the environmental impact assessment process and will support a Native Vegetation Clearing Permit (NVCP) application.

The key elements of the scope comprise:

1. Complete a desktop study of a broader 40 km locality (hereafter referred to as the 'Study Area') to identify flora and fauna values that may be associated with the Survey Area.
2. Conduct a reconnaissance and targeted flora and vegetation survey, consistent with EPA guidance (EPA 2016a) to:
    - Describe, photograph and map the dominant vegetation types of the Survey Area;
    - Assess and map the condition of the vegetation within the Survey Area;
    - Identify any vegetation units of significance, including potential Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs);
    - Compile a non-exhaustive list of vascular flora species;
    - Record and map populations of significant flora species within the Survey Area; and
    - Record populations of weeds, with a particular focus on weed species listed as Declared Pests under the Western Australian (WA) *Biosecurity and Agriculture Management Act 2007* (the BAM Act), or those listed as Weeds of National Significance (WoNS).
3. Undertake a basic and targeted vertebrate fauna survey consistent with EPA guidance (EPA 2020) to gather information on general fauna assemblages and assess fauna habitats within the Survey Area, particularly with regard to their potential to support significant species.
4. Collate, present and discuss all data from the survey in a technical flora, vegetation and fauna report, and supply all data in an appropriate format (i.e. as per BHP 2023a).

2.3 Relevant Commonwealth and State Policy

This report has been prepared with consideration of relevant Commonwealth and State policy documents including:

- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a);
- *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b);
- *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2020);
- *Matters of National Environmental Significance - Significant impact guidelines* (Department of the Environment 2013);
- *Environmental Factor Guideline: Terrestrial Fauna* (EPA 2016c);
- *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010a);
- *Survey Guidelines for Australia's Threatened Mammals* (DSEWPaC 2011a);
- *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPaC 2011b);
- *Survey Guidelines for Australia's Threatened Bats* (DEWHA 2010b); and
- *Guidelines for determining the likely presence and habitat usage of Night Parrot (Pezoporus occidentalis) in Western Australia* (DBCA 2024).

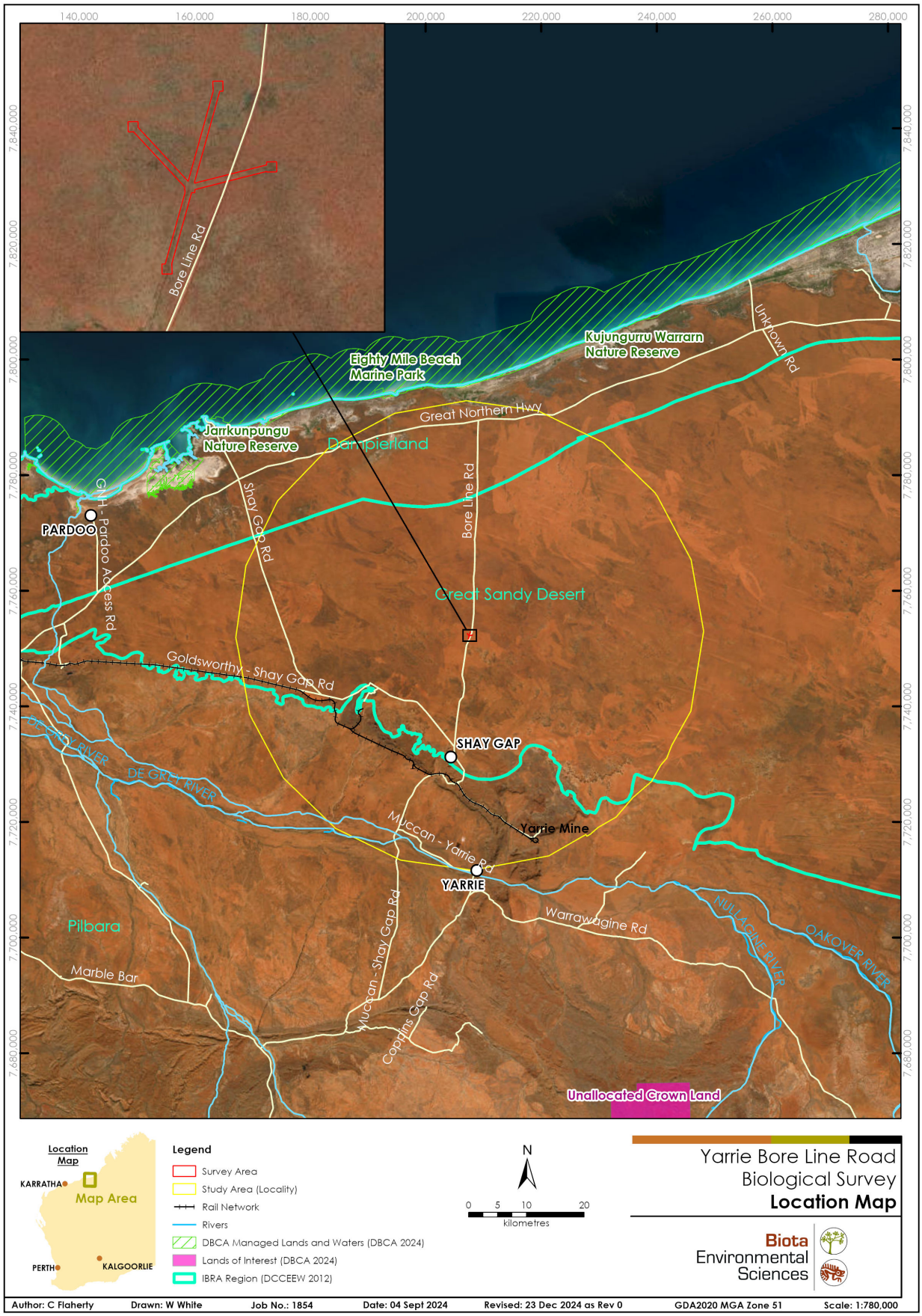

Figure 2.1: Location and extent of the Survey Area and Study Area.

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3.0 Methodology

3.1 Desktop Study

The aim of the initial desktop study was to compile and review information relevant to the Survey Area, and to identify known features of significance (see Appendix 1 for definitions of significant species and communities). This enabled a preliminary assessment of potential key environmental factors relating to the vegetation, flora and fauna that may need to be considered.

The desktop study considered the results of database searches (Section 3.1.1), as well as regional information and previous biological surveys completed in the locality (Section 3.1.2).

3.1.1 Database Searches

The following databases were searched to assist in the determination of vegetation, flora and fauna of significance relevant to the Survey Area:

1. The NatureMap database: this joint project of the DBCA and the WA Museum was the most comprehensive source of information regarding WA's flora and fauna before it was taken offline in December 2021. It comprised information from the DBCA Fauna Survey Returns database, the WA Threatened Flora and Fauna Databases, the WA Herbarium and WA Museum Specimen databases, and the BirdLife Australia Atlas. While NatureMap is no longer publicly available, data from a 40 km buffer of the Survey Area was provided upon request through DBCA; this did not include location information for individual records.
2. The Commonwealth EPBC Act Protected Matters Search Tool (PMST) was used to identify flora and fauna species and other matters of national environmental significance (MNES) that may occur in the locality. A search was completed for a buffer of 40 km radius around the Survey Area.
3. Atlas of Living Australia (ALA)[1] is a joint project between academic collecting institutions, private individual collectors, and community groups, hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). It contains occurrence records, environmental data and images, and provides the conservation status of species throughout Australia. The ALA search was completed for a 40 km radius around the Survey Area.
4. Specific searches of the DBCA Threatened and Priority Flora Database and Threatened and Priority Fauna Database were commissioned to identify the significant flora and fauna species known from within 40 km of the Survey Area.
5. The DBCA database of TECs, PECs and Environmentally Sensitive Areas (ESAs) was searched to identify significant communities known to occur within 40 km.
6. The Index of Biodiversity Surveys for Assessments (IBSA): this database consolidates data from land-based biodiversity surveys conducted to support EIA and compliance required under the *Environmental Protection Act 1986,* and provides a publicly available online platform for data sharing (where agreed by the proponent). IBSA was searched for previous surveys within a 40 km radius of the Survey Area.
7. eBird (https://ebird.org/) is a citizen science database of bird records from around the globe, managed by Cornell University and moderated by local experts.
8. Biota's internal database of past surveys was also searched for relevant records.

Database search results are summarised in Appendix 2. Given the location of the Survey Area over 40 km from the coast, obligate marine species records (e.g. cetaceans, pelagic seabirds) have not been considered in this study.

[1] http://www.ala.org.au

3.1.2 Literature and Spatial Data Review

Published and unpublished reports relevant to the Survey Area were reviewed. Several regional-scale reports and data sets were examined, as well as bioregional data, land systems, soils and geology (see Sections 4.1 to 4.3).

Results and methodologies of the following 12 biological surveys in the locality were also reviewed as part of the desktop study:

- Australian Renewable Energy Hub Detailed Flora and Vegetation Survey – Phases 1 to 4 (Biota 2024a);
- Australian Renewable Energy Hub Detailed Fauna Assessment (Biota 2024b);
- Yarrie 2021 Significant Species Monitoring (Biologic 2023);
- Yarrie 2022 Significant Species Monitoring (Biologic 2022a);
- Cattle Gorge and Callawa West 2020 Significant Species and Rehabilitation Monitoring (Biologic 2022b);
- Callawa West Vertebrate Fauna Survey (Biologic 2014a);
- Cattle Gorge Targeted Vertebrate Fauna Survey (Biologic 2014b);
- Callawa West Flora, Vegetation and Fauna Assessment (Onshore Environmental 2013a);
- Cundaline Northern Ridge Flora, Vegetation and Fauna Assessment (Onshore Environmental 2013b);
- Yarrie Level 2 Flora and Vegetation and Level 1 Fauna Survey (Astron 2013);
- Callawa Level 2 Vertebrate Fauna Assessment (Eco Logical 2012); and
- Nimingarra, Shay Gap and Sunrise Hill Vertebrate Fauna Interim Summary Report (ENV Australia 2011).

3.2 Assessment of Likelihood of Occurrence

Significant species identified in the desktop study were assessed for their likelihood of occurrence in the Survey Area, both prior to and following the survey. This assessment was based on the proximity of previous records to the Survey Area, knowledge of the habitat preferences of each taxon, an assessment of the habitats present within the Survey Area, and any records obtained during the field survey.

The guidelines used to assess likelihood of occurrence are outlined in Table 3.1, with the assessments for flora and fauna provided in Appendix 3 and Appendix 4 respectively. For the purposes of this report, the term “proximity” is defined as being within 20 km of the Survey Area, while the "locality" comprises the area up to 40 km from the Survey Area (desktop Study Area).

Table 3.1: Guidelines used to assess the likelihood of occurrence of significant flora and fauna.

Likelihood	Guideline
Recorded	1. The species was recorded during the field survey or has been previously recorded in the Survey Area.
Likely to occur or "High"	1. There are existing records of the species within 20 km of the Survey Area; and • the species is strongly linked to a specific habitat, which is present in the Survey Area; or • the species has more general habitat preferences, and suitable habitat is present.
May occur or "Moderate"	1. There are existing records of the species within 40 km of the Survey Area, however • the species is strongly linked to a specific habitat, of which only a small amount is present in the Survey Area; or • the species has more general habitat preferences, but only some suitable habitat is present in the Survey Area. 2. There is suitable habitat in the Survey Area, but the species is recorded infrequently in the locality.
Unlikely to occur or "Low"	1. The species is linked to a specific habitat, which is absent in the Survey Area; or 2. Suitable habitat is present, however there are no existing records of the species from within 40 km of the Survey Area despite reasonable previous search effort in suitable habitat; or 3. There is some suitable habitat in the Survey Area, however the species is very infrequently recorded in the locality or the only records are historical (>40 years ago).
Would not occur	1. The species is strongly linked to a specific habitat, which is absent from the Survey Area; and/or 2. The species' range is very restricted and would not include the Survey Area.

3.3 Field Survey

3.3.1 Survey Timing and Conditions

The survey was conducted on the 23 of July 2024 by Principal Botanist Chloe Flaherty and Senior Zoologist Joshua Keen (both of Biota). A summary of the field team members and their experience is provided in Table 3.2. The flora survey was completed under a DBCA 'Flora Taking (Biological Assessment) Licence' (FB62000167-2). A Regulation 27 'Fauna taking (biological assessment) licence' was not required, as the survey did not constitute disturbance of fauna under the BC Act.

Table 3.2: Survey team, qualifications, and experience.

Name	Position at Biota	Survey Role	Qualification	Years of Experience
Joshua Keen	Senior Zoologist	Fauna (project manager, S26 supervisor and fauna field leader)	BSc. (Zool), Hons.	9
Chloe Flaherty	Principal Botanist	Flora (project manager and flora field leader)	BSc. (NRM), Hons.	14

Weather data were obtained from the Bureau of Meteorology (Bureau of Meteorology 2024) weather stations at Yarrie (no. 4046; located approximately 40 km south of the Survey Area), Marble Bar (no. 4106; approximately 105 km southwest of the Survey Area) and Pardoo Station (no. 4028; approximately 68 km northwest of the Survey Area) for the year preceding the survey. Long-term data were obtained for comparison with the data preceding the survey (Figure 3.1).

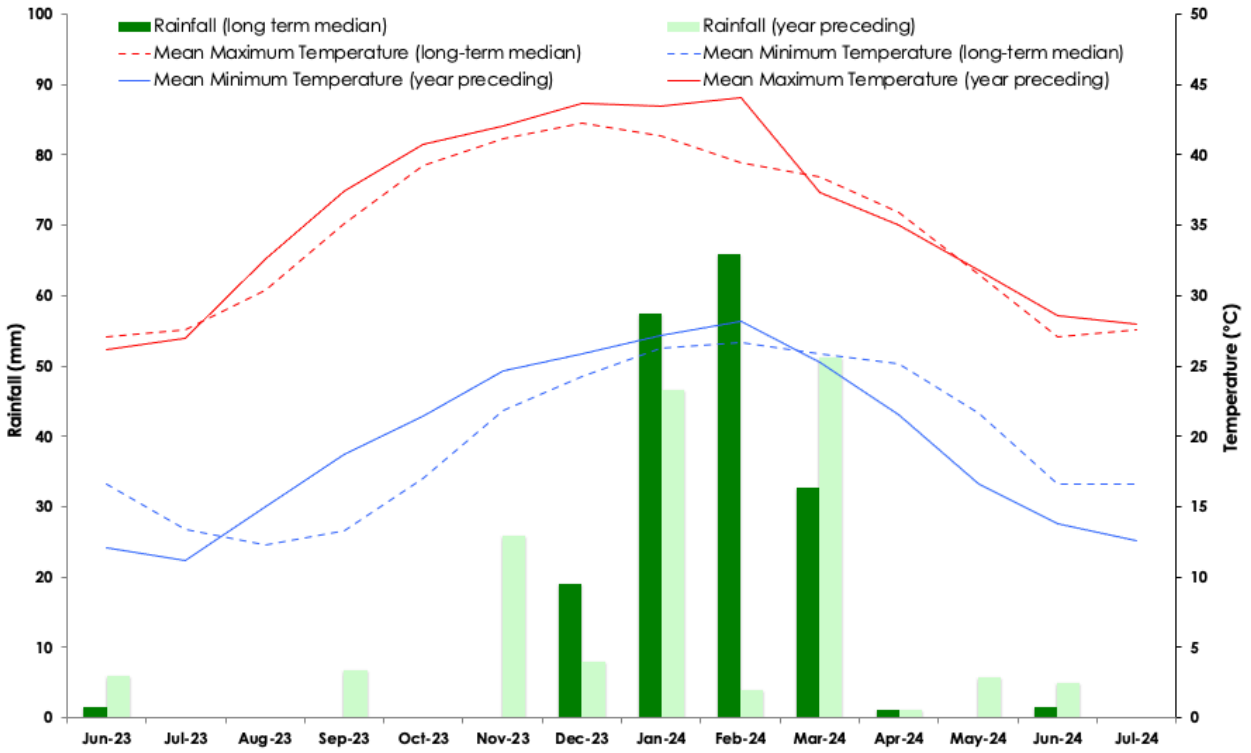

Figure 3.1: Climate and weather graph depicting long-term medians and 2023/2024 data.

All data from the Bureau of Meteorology. Rainfall data from Yarrie weather station (#4046) for 1898-2024 (except Apr-May 2024 and Jul-24 for which Marble Bar weather station (#4106) was used; and Jul-Oct 2023 and June 2024 for which Pardoo Station (#4028) was used). Temperature data from Marble Bar (#4106) for 2001-2024.

Maximum and minimum temperatures were generally consistent with long-term trends; however, mean maximum temperatures between August 2023 and February 2024 were slightly higher than the long-term median for the same period.

Rainfall in the six months preceding the survey (113.7 mm) was lower than the long-term median for the same months (158.7 mm). In the months leading up to the survey, February 2024 was notably dry (4.0 mm), despite usually being the wettest month of the wet season (long-term median 65.9 mm). The three months leading up to the survey received higher than the long-term median rainfall for the same period at Yarrie, though the total was still minimal (12.0 mm compared to the long-term median of 2.7 mm) (Figure 3.1). Consistent with the monthly median, no rainfall was received in July 2024. As a result of the low rainfall, on-ground conditions during the survey were dry, and very few annual flora species were recorded.

3.3.2 Flora and Vegetation Survey

A reconnaissance and targeted flora and vegetation survey was conducted as per the relevant EPA Guidance (EPA 2016a).

3.3.2.1 Floristic Data Collection: Assessment of Relevés

One broad habitat and vegetation type was evident based on the aerial imagery. Indicative flora sites were selected prior to the field survey to sample the representative vegetation.

Two relevés were sampled, which are unbounded floristic sampling sites with a similar search area to a standard quadrat (50 x 50 m in the Great Sandy Desert bioregion).

The following parameters were recorded for the relevés:

1. Location coordinates (±1.5 m) were recorded using a hand-held Global Positioning System (GPS) unit. A central point was recorded as a minimum for a relevé;
2. Habitat: A description of the landform and habitat;

3. Soil: A broad description of the soil and any stony surface mantle;
4. Fire History: An estimate of time since last fire;
5. Disturbance Details: Vegetation condition was ranked according to the scale from BHP WAIO's Vegetation and Flora Survey Procedure (no. 0124627, Version 3.0; BHP Iron Ore undated); this considers evidence of grazing, physical disturbance, weed invasion etc.;
6. Flora Species: The estimated percentage of foliar cover of each flora species present in the vicinity of the relevé (if not a linear site, then within a ~50 m radius of the centre point); and
7. Photograph: A representative digital photograph of the vegetation was taken from the central point of a relevé.

The locations of the relevés are shown in Figure 3.2.

3.3.2.2 Vegetation Description and Mapping

The vegetation types for this study were described at the association level (level V as per the National Vegetation Information System; NVIS)[2]. Vegetation types and boundaries were subsequently verified using both the data collected in the field and digital imagery. The vegetation type mapped for this assessment was given a unique code as per BHP WAIO's Vegetation and Flora Survey Procedure (no. 0124627, Version 3.0; BHP Iron Ore undated). Vegetation condition mapping was also prepared using the categories from BHP WAIO's Vegetation and Flora Survey Procedure (no. 0124627, Version 3.0; BHP Iron Ore undated).

Vegetation maps were created and consolidated using Geographical Information System (GIS) software (QGIS and MapInfo Professional). All maps in this report were produced by Will White (Senior GIS Cartographer at Biota).

3.3.2.3 Searches for Significant Flora and Weeds

The desktop study identified a subset of significant flora (i.e. Threatened and Priority listed species) from the locality that were considered to have some potential to occur in the Survey Area (see Appendix 3). Targeted searches for these species were conducted on foot throughout the Survey Area. A total of 152 minutes was spent searching by the Botanist, covering a total distance of 5.13 km. Survey effort is shown in Figure 3.2. The number of individuals and extent of the population were also recorded for each location.

Introduced flora species (weeds) were also searched for during the foot traverses. These searches focused on weeds of management concern; i.e. Declared Plants under the BAM Act and WoNS. No attempt was made to fully document the extent of other weeds, however any weeds encountered during the survey were recorded.

3.3.2.4 Opportunistic Records

Opportunistic records of flora species were also made for the Survey Area to supplement the species recorded at relevé sites. Opportunistic records were made during the foot traverses undertaken on-route to flora sampling sites, during vegetation mapping traverses and during targeted flora traverses.

3.3.2.5 Flora Specimen Identification, Nomenclature and Data Entry

Flora species were identified either in the field, or in the office following the field survey. If a species was common and well known to the survey botanist, the identification was confirmed and recorded in the field. If the species was difficult to determine without microscopic examination, belonged to a recognised species complex, or was poorly collected or otherwise unusual, a sample specimen was collected. Specimens were pressed in the field, and then dried for further study and confirmation.

2 http://www.environment.gov.au/land/publications/nvis-taxonomic-review/introduction#del

Sample specimens were identified using flora keys, reference to appropriate publications, voucher reference collections and comparison to the collections held at the WA Herbarium. Principal Botanist Chloe Flaherty identified all specimens, which were then confirmed by Principal Botanist Michi Maier.

All data were entered into a Microsoft Access Vegetation Database structure held internally at Biota. The database structure employed by Biota was developed by Ted Griffin (private consultant) at the request of Malcolm Trudgen (M.E. Trudgen and Associates). Nomenclature and significance rankings used in this report are in accordance with the current listing of WA flora recognised by the WA Herbarium, as listed on Florabase[3] at the time of reporting

3.3.3 Fauna Field Survey

A basic and targeted vertebrate fauna survey was conducted as per the relevant EPA Guidance (EPA 2020).

3.3.3.1 Fauna Habitat Assessment

A preliminary review of the fauna habitats present in the Survey Area was conducted by examination of aerial photography and thematic layers including geology, land systems, soils and Beard's vegetation mapping. Ground-truthing of preliminary fauna habitat mapping was conducted in the field while traversing on foot through the Survey Area.

Habitat descriptions comprised soil type, landform, any notable microhabitats present, any disturbance (e.g. fire, weeds, grazing, evidence of introduced fauna), broad vegetation characteristics and representative photographs. These descriptions were recorded at the two flora relevés. The descriptions and detailed vegetation mapping were then used to define, assess, and map the fauna habitat. Habitat maps were created and consolidated using QGIS and MapInfo Professional.

3.3.3.2 Targeted Fauna Searches

Targeted fauna searches were undertaken for significant fauna species assessed during the desktop study as potentially occurring in the Survey Area; specifically, the Vulnerable Bilby (*Macrotis lagotis*) and Priority 4 Brush-tailed Mulgara (*Dasycercus blythi*).

The Survey Area was traversed on foot to search for evidence of significant fauna species (individuals, tracks, scats, diggings or remains). A total of 152 minutes was spent searching by the Zoologist, covering a total distance of 5.13 km (Figure 3.2).

[3] http://florabase.dbca.wa.gov.au

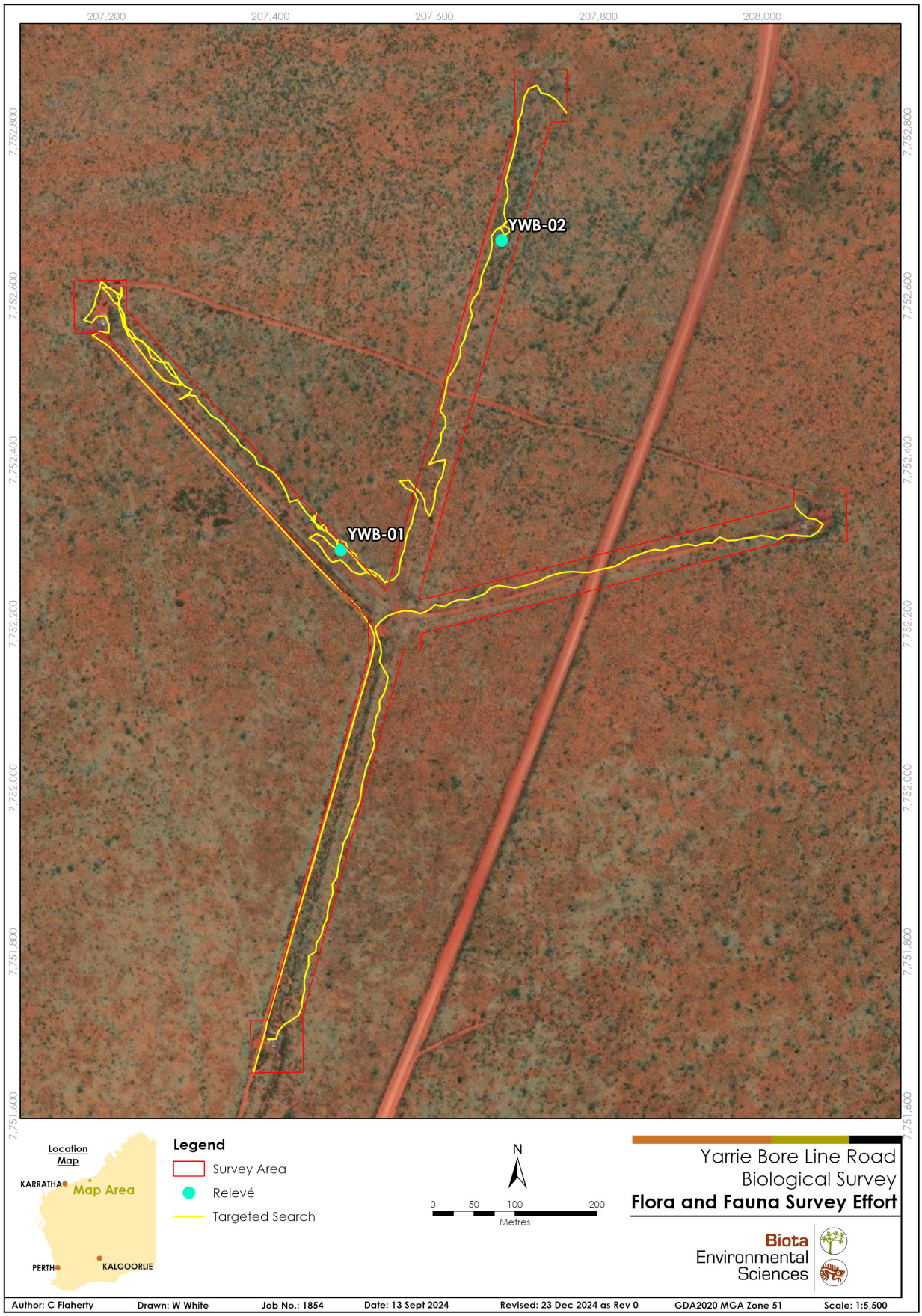

Figure 3.2: Vegetation, flora and fauna survey effort.

3.4 Limitations of the Study

The field survey provided an adequate representation of the vegetation, flora, and fauna values of the Survey Area. However, there are limitations to this study that must be considered when reviewing the results detailed in this report. As per the relevant EPA Technical Guidance Statements (EPA 2016a, 2020), potential constraints and consequent limitations of this study are summarised in Table 3.3.

Table 3.3: Assessment of potential limitations for this study.

Potential Limitation	Assessment
1. Availability of contextual information at a regional and local scale	While all publicly available databases and literature were reviewed for the current study, there has been limited biological work from the Great Sandy Desert that would be relevant to the Survey Area. Two large surveys completed for the Australian Renewable Energy Hub project, approximately 50 km to the east of the Survey Area, were available for review; these provide the most relevant contextual data, as they were completed over similar sandy Pindan plains. In addition, several biological surveys were reviewed from the Yarrie area in the adjacent Pilbara bioregion. Databases of information relating to rare species and communities were searched and potential data gaps were taken into account when assessing the likelihood of occurrence of species in the Survey Area. The current survey added new data specific to the Survey Area, however local level information is a minor limiting factor for the study.
2. Competency/ experience of the team carrying out the survey, including experience in the bioregion surveyed	Both field team members were suitably qualified to fulfill their role in the survey. Senior Zoologist Joshua Keen has nine years of zoological surveying experience, including six years of experience in the Pilbara and Great Sandy Desert bioregions. Principal Botanist Chloe Flaherty has 14 years of experience conducting botanical surveys in the Pilbara and Great Sandy Desert bioregions. Numerous plant specimens were collected, and these were confirmed by botanist Michi Maier (Biota) with over 30 years of experience including the Pilbara and Great Sandy Desert bioregions. There were no limitations due to experience of personnel.
3. Proportion of flora recorded and/or collected, any identification issues	All vascular flora encountered in the Survey Area were recorded. The dry survey conditions meant that fewer than expected species were recorded for the area, with no annual species present during the survey. Although dry, most (88%) of the flora specimens collected during the field survey were of sufficient quality to be fully determined to the lowest relevant taxonomic level. Fungi and non-vascular flora (algae, mosses and liverworts) were not systematically surveyed, which is consistent with the accepted level of effort for a survey of this type and scale. The proportion of flora recorded was considered a minor limitation of this study.
4. Appropriate area fully surveyed (effort and extent)	The scope of the study was to complete a reconnaissance and targeted flora survey, and a basic and targeted fauna survey (terms as described in EPA 2016a, 2020). All sections of the Survey Area were traversed on foot. The Survey Area is considered to have been adequately surveyed.
5. Access restrictions within the Survey Area	All parts of the Survey Area were accessible and there were no access restrictions. Access was not a limitation.
6. Survey timing, rainfall, season of survey	The survey was completed in July 2024, which is outside the recommended timing for a primary 'wet season' survey in the Northern Botanical Province (EPA 2016a). The dry conditions in the months preceding the survey likely impacted the presence and detectability of some annual or cryptic perennial species. Survey timing is considered a minor limitation for the study.

Potential Limitation	Assessment
7. Disturbance that may have affected the results of survey such as fire, flood or clearing	Approximately 1.7 ha (17%) of the Survey Area was already cleared and mapped as Completely Degraded. However, there was sufficient intact vegetation and habitat through the remainder of the Survey Area to define the association adequately. Disturbance is not considered to be a limitation.

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4.0 Desktop Study

4.1 IBRA Bioregion and Subregion

The Interim Biogeographic Regionalisation for Australia (IBRA) recognises 89 bioregions and 419 biological subregions for Australia (DCCEEW 2024). The Survey Area lies within the McLarty (GSD1) subregion of the Great Sandy Desert bioregion (see Figure 2.1). The McLarty subregion is 13,173,266 ha in size and is described as:

> "Mainly tree steppe grading to shrub steppe in south; comprising open hummock grassland of *Triodia pungens* and *T. schinzii* with scattered trees of *Owenia reticulata* and Bloodwoods, and shrubs of *Acacia* spp., *Grevillea wickhamii* and *G. refracta*, on Quaternary red longitudinal sand dune fields overlying Jurassic and Cretaceous sandstones of the Canning and Amadeus Basins. *Casuarina decaisneana* (Desert Oak) occurs in the far east of the region. Gently undulating lateritised uplands support shrub steppe such as *Acacia pachycarpa* shrublands over *Triodia pungens* hummock grass. Calcrete and evaporite surfaces are associated with occluded palaeo-drainage systems that traverse the desert; these include extensive salt lake chains with samphire low shrublands, and *Melaleuca glomerata - M. lasiandra* shrublands. It includes the Mandora Palaeoriver System. Red-brown dunefields with finer texture than further south. Includes gravelly surfaces of Anketell Ridge along its northern margin" (Graham 2003).

4.2 Land Systems

Land systems are composed of repeating patterns of topography, soils and vegetation, which are described as a series of land units (Christian and Stewart 1953). A total of 105 land systems were identified and mapped in the Pilbara bioregion by the then Department of Agriculture. Land systems mapping covering the Survey Area was prepared by van Vreeswyk et al. (2004).

The Survey Area lies within the Nita (RGENIT) land system (Figure 4.1), which is described as "sandplains supporting shrubby Spinifex grasslands with occasional trees".

4.3 Geology and Soils

Surface geology mapping has been compiled for the locality area at a scale of 1:1,000,000 based on geological maps published by Geoscience Australia (2008) and the Geological Survey of Western Australia (2011). The Survey Area is underlain by one surface geology unit, the Czs (sand plain 38499) unit (Figure 4.2). This is described as "Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay, local calcrete, laterite, silcrete, silt, clay alluvium, colluvium, aeolian sand".

Soil landscapes comprising a number of soil units were mapped by Northcote et al. (1960) to provide consistent descriptions of Australia's soils. The Survey Area intersects one soil unit, AB21 (Figure 4.3), which is described as "Pindan country – gently undulating sand plain with a few small rocky sandstone residuals; no external drainage: chief soils are red earthy sands (Uc5.21)".

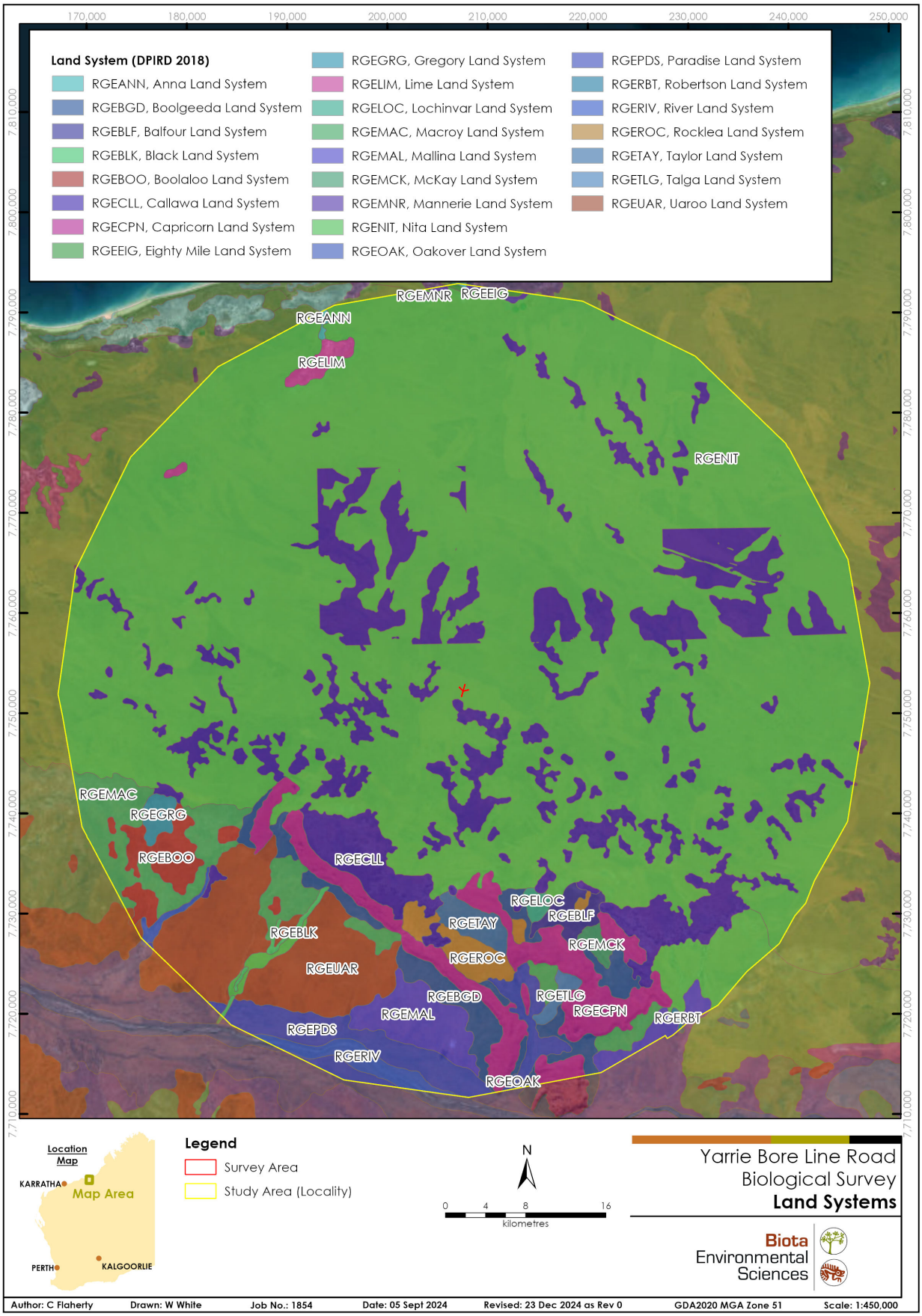

Figure 4.1: **Land systems of the Survey Area and surrounds.**
Digital dataset used from DPIRD (2018a).

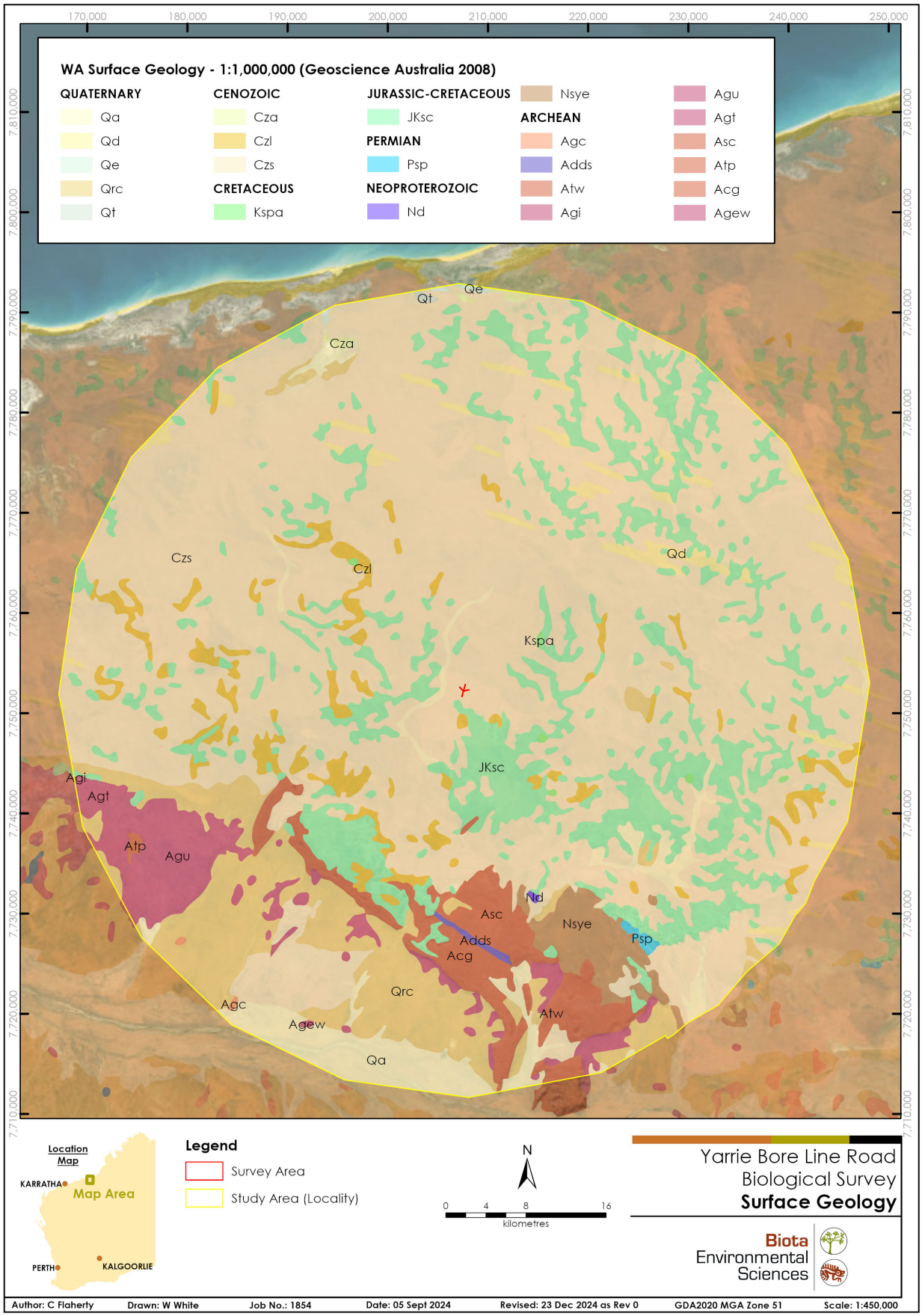

Figure 4.2: Surface geology of the Survey Area and surrounds.

Digital dataset used from Geoscience Australia (2008).

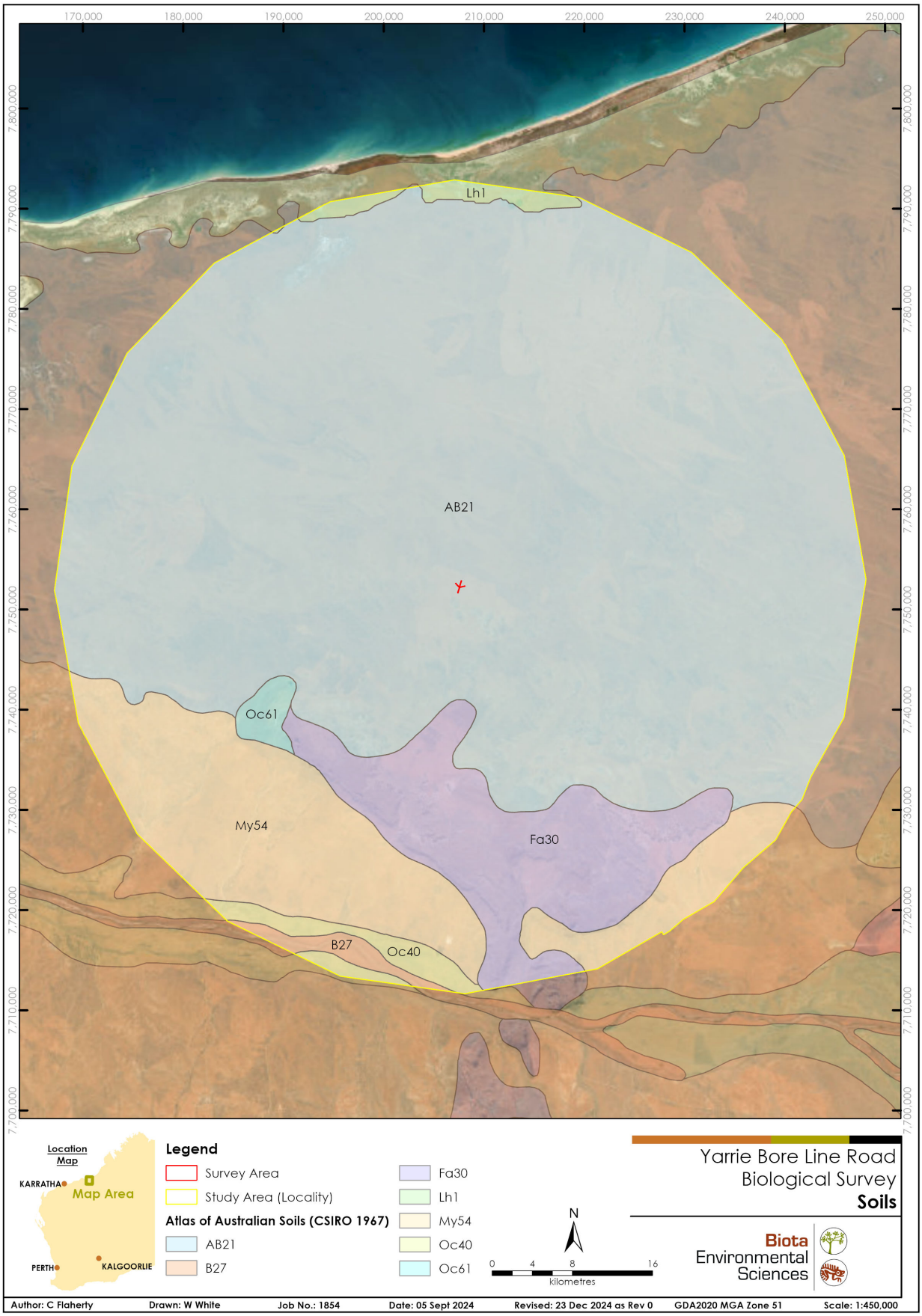

Figure 4.3: Soils of the Survey Area and surrounds.

Digital dataset from CSIRO (1967).

4.4 Beard's Vegetation

Broad-scale vegetation mapping for the locality has been prepared at the 1: 1,000,000 scale based on the work of J.S Beard (Beard 1968). The Survey Area occurs in the Eremaean botanical province and intersects one mapping unit defined by Beard for the Mandora West physiographic region (Figure 4.4):

- Mandora West 117: Hummock grassland, *Triodia* spp.

From 2007 to 2018, the DBCA and Department of Water and Environmental Regulation (DWER) published regular updates regarding the current and pre-European extents of each of Beard's vegetation units in WA. Based on the most recent data from 2018, the extent of the Mandora West 117 unit in the Great Sandy Desert bioregion was at 99.9% of its pre-European extent (467,121.73 ha) at that time. The extent within the Survey Area represents <0.01% of the overall extent within the Great Sandy Desert.

4.5 Surface Hydrology

The Great Sandy Desert bioregion experiences little to no surface water runoff to water courses, and surface water features tend to be ephemeral and sparse (Semeniuk and Semeniuk 2000). There are no major surface water courses within the bioregion; however, the large wetland system of Walyarta (Mandora Marsh) is located 120 km northeast of the Survey Area.

At a local scale, the Survey Area does not contain any obvious creeklines or other local surface drainage. The closest major creekline is the De Grey River, located approximately 35 km south of the Survey Area.

4.6 Conservation Reserves and Protected Areas in the Locality

There are no gazetted conservation reserves or protected areas within 40 km of the Survey Area.

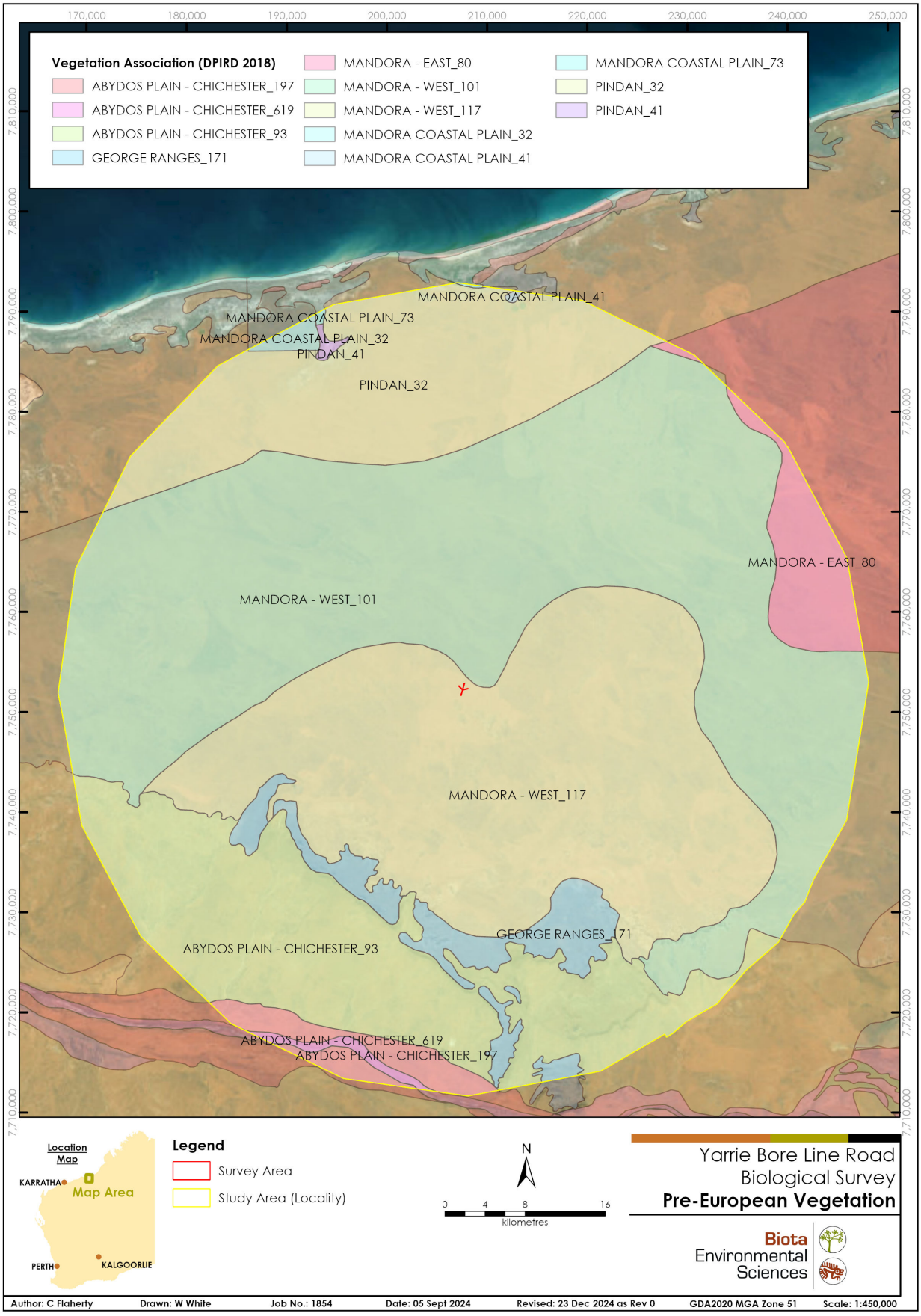

Figure 4.4: **Beard's vegetation mapping units of the Survey Area and surrounds.**
Digital dataset used from DPIRD (2018b).

4.7 Previous Biological Surveys

A summary of 10 previous studies and surveys completed in the locality and reviewed for this study is presented in Table 4.1. Most of these surveys were completed in the Pilbara bioregion, around the Yarrie mine. While slightly outside of the 40 km locality (approximately 52 km east of the Survey Area), flora and fauna surveys from the Australian Renewable Energy Hub project were also considered in this literature review as they represented more relevant surveys from similar landforms in the Great Sandy Desert bioregion (Biota 2024a, 2024b).

Table 4.1: Biological surveys conducted in the locality of the Survey Area.

Report/Survey	Survey Size and Location	Type of Survey/Study[4]	Survey Timing	Survey Limitations	No. Native Species Recorded	Threatened and Priority Species/Communities
Flora and Vegetation Surveys						
Australian Renewable Energy Hub Detailed Flora and Vegetation Survey – Phases 1 to 4 (Biota 2024a)	• 660,533 ha. Located ~52 km east.	Detailed and Targeted flora and vegetation survey	Phase 1: August–September 2017 Phase 2: March 2018 Phase 3: March 2021 Phase 4: March–April 2023	No major limitations.	Flora species: 457 species from 160 genera and 50 families.	No TECs or PECs Nine significant flora taxa recorded: • *Tephrosia rosea* var. Port Hedland (A.S. George 1114) (Priority 1) • *Goodenia hartiana* (Priority 2) • *Bonamia oblongifolia* (Priority 3) • *Croton aridus* (Priority 3) • *Indigofera ammobia* (Priority 3) • *Phyllanthus* sp. aff. *hebecarpus* (Priority 3) • *Polymeria* sp. Broome (K.F. Kenneally 9759) (Priority 3) • *Terminalia kumpaja* (Priority 3) • *Tribulopis marliesiae* (Priority 3)
Biological Surveys						
Callawa West Flora, Vegetation and Fauna Assessment (Onshore Environmental 2013a)	• ~660 ha. • Located ~35 km south.	Level 1 fauna; Level 2 flora and vegetation	October and November 2012	Not optimal collecting conditions for flora.	Fauna species: • 39 birds; • 2 mammals; • 3 reptiles. Flora species: 146 species from 80 genera and 33 families.	No significant vertebrate fauna species recorded. No TECs or PECs No Threatened or Priority flora species recorded. Two flora species of interest: *Stemodia* sp. Shay Gap (B. Cook 7) and *Sida macropoda,* but both no longer considered taxonomically significant.
Cundaline Northern Ridge Flora, Vegetation and Fauna Assessment (Onshore Environmental 2013b)	• ~600 ha. • Located ~20 km south.	Level 1 fauna; Level 2 flora and vegetation	July 2013	None listed.	Fauna species: • 38 birds; • 2 mammals; • 3 reptiles. Flora species: 157 flora species from 85 genera and 38 families.	No significant vertebrate fauna species recorded. No TECs or PECs No Threatened or Priority flora species recorded. Two flora species of interest: *Stemodia* sp. Shay Gap (B. Cook 7) and *Sida macropoda,* but both no longer considered taxonomically significant.

[4] Corresponding survey definitions as per EPA (2016a, 2020), Level 1 approximately equivalent to Basic/Reconnaissance; Level 2 approximately equivalent to Detailed.

Report/Survey	Survey Size and Location	Type of Survey/Study[4]	Survey Timing	Survey Limitations	No. Native Species Recorded	Threatened and Priority Species/Communities
Yarrie Level 2 Flora and Vegetation and Level 1 Fauna Survey (Astron 2013)	• ~ 2100 ha. • Located approximately 30 km south-southeast.	Level 1 fauna; Level 2 flora and vegetation	October / November 2013	None listed.	Fauna species: • 1 amphibian; • 40 birds; • 5 mammals; • 11 reptiles. Flora species: 168 flora species from 85 genera and 36 families.	Two significant vertebrate fauna species recorded: • Northern Quoll (EN); • Western Pebble-mound Mouse (P4). No TECs or PECs No Threatened or Priority flora species recorded.
Fauna Surveys						
Australian Renewable Energy Hub Detailed Fauna Assessment (Biota 2024b)	• 660,533 ha. • Located approximately 52 km east.	Detailed and Targeted terrestrial fauna survey	Phase 1: August-September 2017 Phase 2: March 2018 Phase 3: March 2021	No major study limitations.	Fauna species: • 2 amphibian; • 83 birds; • 35 mammals; • 74 reptiles.	Seven significant vertebrate fauna species recorded: • Northern Quoll (EN); • Black-footed Rock-wallaby (EN); • Bilby (VU); • Dampierland Plain Slider (P2); • Spectacled Hare-wallaby (P3); • Brush-tailed Mulgara (P4); • Western Pebble-mound Mouse (P4); • Migratory bird species.
Callawa West Vertebrate Fauna Survey (Biologic 2014a)	• ~660 ha. • Located ~35 km south.	Single-phase Level 2 fauna	September 2013	None listed.	Fauna species: • 36 birds; • 16 mammals; • 11 reptiles.	Five significant vertebrate fauna species recorded: • Northern Quoll (EN); • Ghost Bat (VU); • Bilby (VU); • Western Pebble-mound Mouse (P4); • Pilbara Leaf-nosed Bat (VU).
Callawa Level 2 Vertebrate Fauna Assessment (Eco Logical 2012)	• ~1,200 ha. • Located approximately 33 km south-southeast.	Single-phase Level 2 to supplement previous Level 2 fauna survey	June 2005 and May 2012	Some inaccessible areas.	Fauna species: • 1 amphibian; • 69 birds; • 19 mammals; • 36 reptiles.	Two significant vertebrate fauna species recorded: • Northern Quoll (EN); • Western Pebble-mound Mouse (inactive mounds only) (P4).
Cattle Gorge Targeted Vertebrate Fauna Survey (Biologic 2014b)	• ~536 ha. • Located ~27 km south.	Targeted fauna	July 2013	No nocturnal survey.	Fauna species: • 33 birds; • 11 mammals; • 7 reptiles.	Three significant vertebrate fauna species recorded: • Pilbara Olive Python (VU); • Northern Quoll (EN); • Pilbara Leaf-nosed Bat (VU).

Report/Survey	Survey Size and Location	Type of Survey/Study[4]	Survey Timing	Survey Limitations	No. Native Species Recorded	Threatened and Priority Species/Communities
Nimingarra, Shay Gap and Sunrise Hill Vertebrate Fauna Interim Summary Report (ENV Australia 2011)	• Survey Area size not listed. • Located ~16 km southwest.	First phase of a Level 2 fauna survey	Survey dates not listed, ~June 2011	None listed in Interim Report (full report unavailable).	Fauna species: • 7 amphibians; • 16 mammals; • 42 birds; • 42 reptiles.	Three significant vertebrate fauna species recorded: • Ghost Bat (VU); • Northern Quoll (EN); • Pilbara Leaf-nosed Bat (VU).
Yarrie 2022 Significant Species Monitoring (Biologic 2022a) **and** Cattle Gorge and Callawa West 2020 Significant Species and Rehabilitation Monitoring (Biologic 2022b) **and** Yarrie 2021 Significant Species Monitoring (Biologic 2023)	• ~16,700 ha. • Located south of the Survey Area.	Multi-phase Targeted and Detailed fauna	May 2020; May 2021; June 2021; February 2022; March 2022; May 2022	Some issues with collar retrieval and data analysis (not affecting species list).	Fauna species: • 50 birds; • 19 mammals; • 27 reptiles.	Five significant vertebrate fauna species recorded: • Ghost Bat (VU); • Northern Quoll (EN); • Bilby (VU); • Pilbara Leaf-nosed Bat (VU); • Pilbara Olive Python (VU).

NB. Taxa have been reviewed and updated for current nomenclature and significance status; species included as significant in past reports that are no longer listed have been excluded.

4.8 Factors of Environmental Significance

4.8.1 Significant Vegetation in the Locality

Two State-listed PECs occur in the locality. The Priority 3 Gregory Land System is located approximately 30 km west-southwest of the Survey Area and the Priority 3 Lime Land System PEC is located approximately 33 km north-northwest of the Survey Area (Figure 4.5).

Based on their description and locations, neither PEC would occur in the Survey Area.

4.8.2 Significant Flora in the Locality

The EPBC Act PMST did not identify any Threatened flora species listed as MNES as having been recorded or potentially occurring in the locality.

No significant flora species have been recorded previously from the Survey Area, however a total of 12 significant flora species (four Priority 1 species, one Priority 2 species, six Priority 3 species, and one Priority 4 species) have been recorded from the locality. Recognising that limited survey work has been completed in the locality, another six Priority species recorded from the Great Sandy Desert to the northeast have been included in desktop study. This full list of Priority flora identified by the desktop study is provided in Appendix 3, and Figure 4.5 shows the spatial location of the Priority flora records returned by the DBCA database search for the locality.

Of these 18 Priority species, only one species was assigned a ranking of 'likely to occur' (or a 'high' likelihood of occurrence) prior to the field survey, while five species were assigned a ranking of 'may occur' (or a 'moderate' likelihood of occurrence) (see Table 4.2).

Table 4.2: Significant flora species from the locality that have potential to occur in the Survey Area.

Likely to Occur – 'high' likelihood		May Occur – 'moderate' likelihood	
Species	**Status**	**Species**	**Status**
Croton aridus	Priority 3	*Tephrosia rosea* var. Port Hedland (A.S. George 1114)	Priority 1
		Goodenia hartiana	Priority 2
		Acacia monticola x *tumida* var. *kulparn*	Priority 3
		Indigofera ammobia	Priority 3
		Rothia indica subsp. *australis*	Priority 3

4.8.3 Significant Vertebrate Fauna in the Locality

A total of 63 vertebrate fauna species listed as significant under State or Federal legislation were identified from the locality during the desktop study. Note that this includes all species returned from the EPBC Act PMST, including those based solely on habitat occurring in the area (i.e. without any actual records). This total comprised nine mammals, 50 bird species and four reptile species.

For those species which have previously been recorded within 40 km of the Survey Area, locations are presented in Figure 4.6. This figure includes DBCA, ALA and eBird records of significant species. Note that some database records (primarily ALA) are generalised up to 10 km. Species only identified from the EPBC Act search are not included as there are no associated spatial records.

Notably, five Bilby (*Macrotis lagotis*) records in proximity to the Survey Area were returned from the DBCA database search (all between 100-200 m from the southern end of the Survey Area; see inset on Figure 4.6). All five records were made in the year 2000 and were of secondary signs of the species (four records were of scats and one record was of tracks).

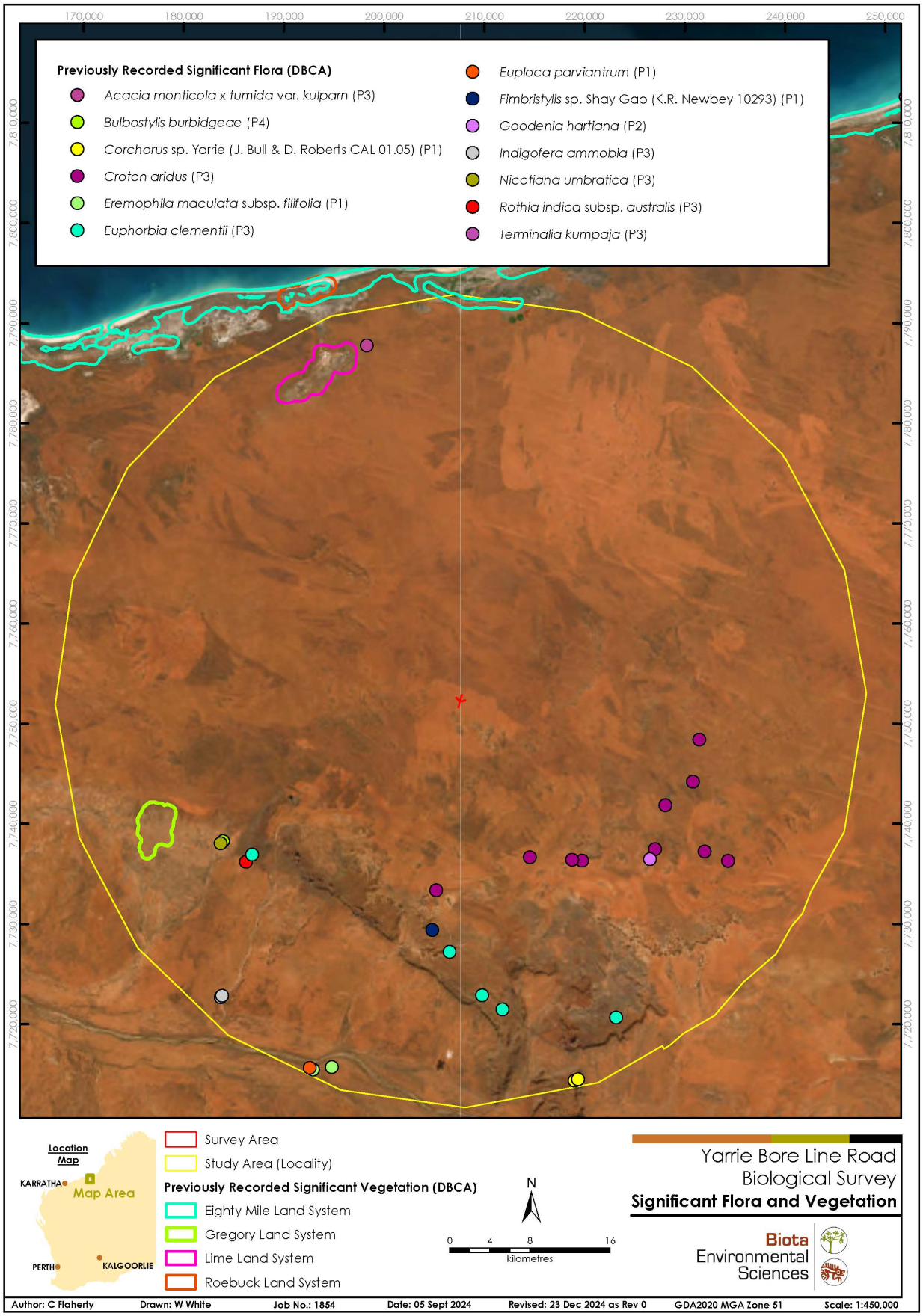

Figure 4.5: DBCA database records of significant flora and communities in the locality.

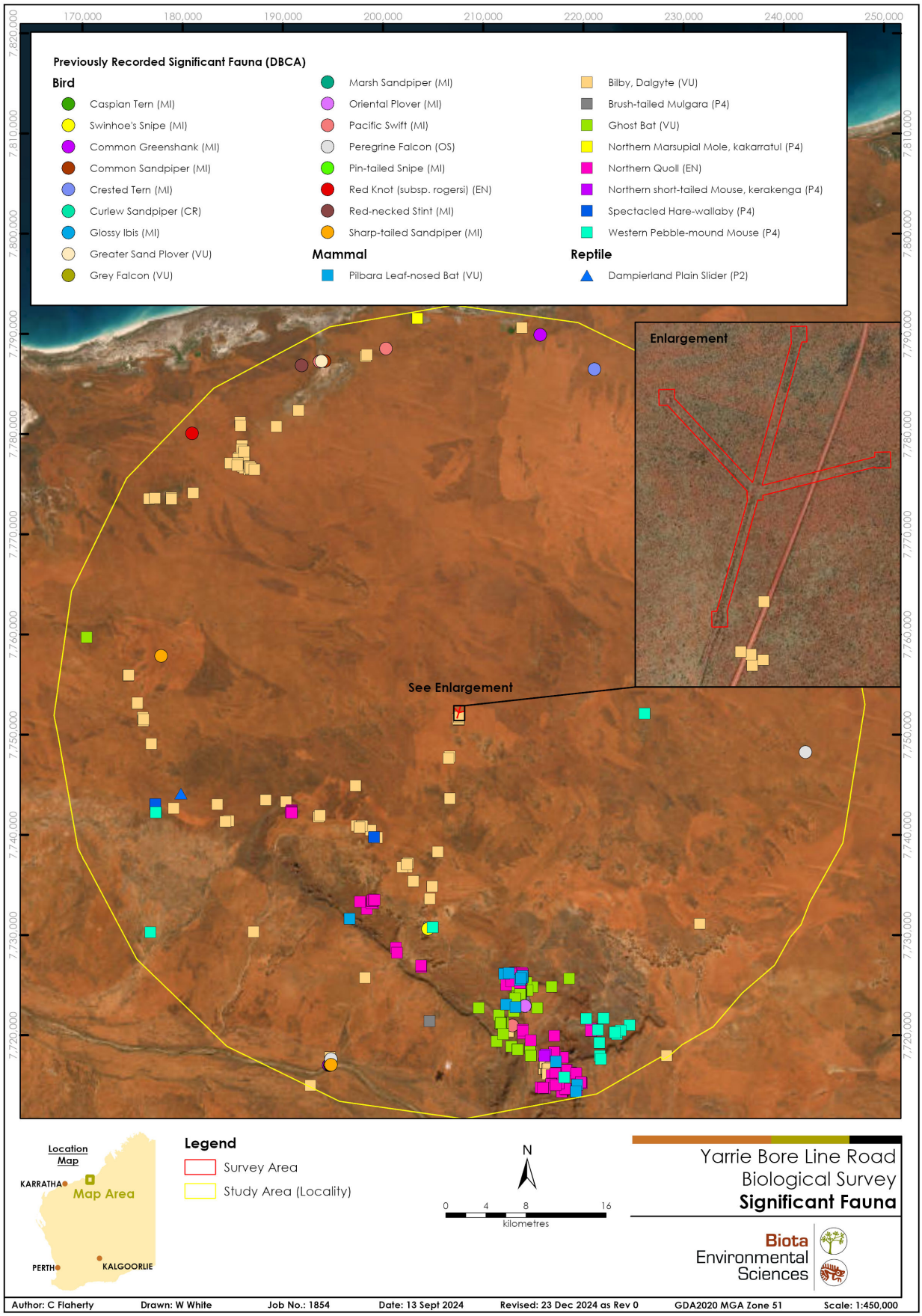

Figure 4.6: Previous significant vertebrate fauna records in the locality of the Survey Area.

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5.0 Flora and Vegetation Results

5.1 Vegetation

The Survey Area lies within one broad landform type, a broad sand plain. Remnant native vegetation accounted for 8.3 ha (83%) of the Survey Area. The cleared areas consisted of tracks and existing bore infrastructure and totalled 1.7 ha (17% of the Survey Area).

One broad floristic formation (based on the dominant growth form and genus for the dominant stratum) was mapped for the Survey Area, which corresponded to one intact vegetation association (described to Level V according to the NVIS; see Section 3.3.2.2). The association is described briefly below and displayed on Figure 5.1.

Code	**SA Tsc AerAancAm OwrCozErare**
Broad Floristic Formation	*Triodia* open hummock grassland
Vegetation association description (NVIS Level V)	Open hummock grassland of *Triodia schinzii* with high open shrubland of *Acacia eriopoda, A. ancistrocarpa, A. monticola* and scattered low trees of *Owenia reticulata, Corymbia zygophylla, Erythrophleum arenarium* on orange Pindan sand plains.
Distribution and habitat	This unit (Plate 5.1) was mapped for the entire Survey Area and occurred more broadly in the surrounding areas on the undulating sandy plains in the locality.
Other associated species	Trees/Tall Shrubs: *Gardenia pyriformis* subsp. *keartlandii, Grevillea eriostachya* and *G. wickhamii.* Shrubs: *Acacia tumida* var. *kulparn* and *Sida arenicola.* Low Shrubs: *Acacia stellaticeps, Bonamia erecta, Jacksonia aculeata, Halgania solanacea, Leptosema anomalum* and *Tephrosia* sp. D Kimberley Flora (R.D. Royce 1848). Grasses: *Aristida holathera* var. *holathera, A. inaequiglumis, Eragrostis eriopoda* and *Eriachne obtusa*. Herbs: *Bonamia alatisemina, Evolvulus alsinoides, Rhynchosia minima, Trigastrotheca molluginea* and *Zornia chaetophora*.
Vegetation condition	Very Good: some camel and cattle tracks and scats noted; some areas with signs of human disturbance (discarded broken pipes, some evidence of previous clearing).
Sampling sites	YWB-01, YWB-02.
Notes	The dominant *Acacia* species present in the high open shrubland was variable across the Survey Area, and some areas also supported an open shrubland to scattered shrubs of *Acacia tumida* var. *kulparn,* and a low open shrubland to scattered low shrubs of *Acacia stellaticeps*.


Plate 5.1: Vegetation association SA Tsc AerAancAm OwrCozErare in the Survey Area.

5.1.1 Vegetation of Significance

No TECs or PECs were recorded in the Survey Area, and none are expected to occur based on their known distribution and species composition.

The vegetation association mapped within the Survey Area did not support populations of significant flora nor is it considered to be of elevated local or regional significance.

5.1.2 Vegetation Condition

The condition of the vegetation in the Survey Area is summarised in Table 5.1 and mapped in Figure 5.2 (see Table 4 in BHP's Vegetation and Flora Survey Procedure (BHP Iron Ore undated) for condition scale).

The condition of all intact vegetation in the Survey Area was ranked as Very Good. No weeds were recorded in the Survey Area, however minor disturbance from cattle and camels was noted in some areas (scats and tracks but no obvious areas of grazing). There was also some sign of previous human disturbance including three locations which had discarded broken pipes.

Table 5.1: Extent of vegetation condition categories in the Survey Area.

Condition	Extent in Survey Area		Notes
	Area (ha)	Proportion (%)	
Very Good	8.3	83	Minor disturbance from cattle/camels or previous human disturbance within otherwise intact vegetation.
Completely Degraded	1.7	17	Cleared areas associated with tracks and existing infrastructure.
Total	**10.0**	**100**	

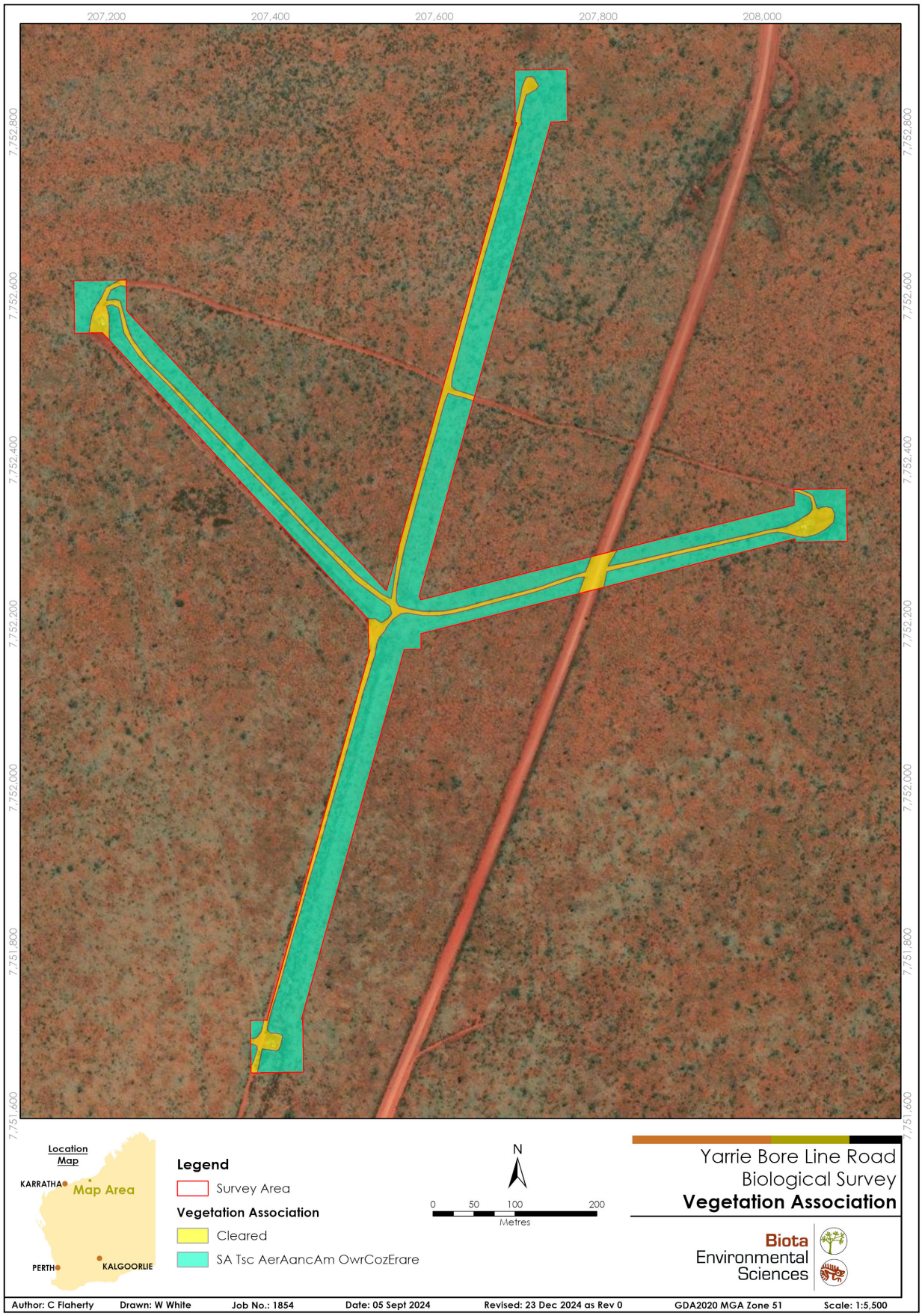

Figure 5.1: Vegetation association mapping for the Survey Area.

Figure 5.2: Vegetation condition mapping for the Survey Area.

5.2 Flora

5.2.1 Overview

A total of 33 native vascular flora species from 25 genera and 13 families were recorded during the survey. No introduced flora species were recorded (Section 5.2.4).

A summary of the flora sites raw data is provided in Appendix 5 and a full vascular flora species list is provided in Appendix 6.

The dominant native families and genera recorded from the Survey Area are shown in Table 5.2.

Table 5.2: Dominant native families and genera recorded from the Survey Area.

Family	No. Native Species	Genus	No. Native Species
Fabaceae (peas)	11	*Acacia*	5
Poaceae (grasses)	6	*Aristida*	2
Convolvulaceae (Morning Glory)	3	*Bonamia*	2
		Grevillea	2
		Sida	2

5.2.2 Significant Flora Recorded from the Survey Area

No Threatened or Priority flora species were recorded during the survey.

5.2.3 Significant Flora Potentially Occurring in the Survey Area

Based on the level of on-ground survey effort and the vegetation unit mapped for the Survey Area, all but one of the significant flora identified from the desktop study were ranked as 'unlikely to occur' or 'low' likelihood of occurrence following the survey (see Appendix 3). The remaining Priority 3 species, *Rothia indica* subsp. *australis*, is described briefly below:

- ***Rothia indica* subsp. *australis* (Priority 3)**
  This member of the pea family is a prostrate annual herb which is densely covered in spreading hairs. It is known from 22 vouchered records, mostly in the eastern Pilbara, with records also in the Great Sandy Desert bioregion (near the border of the Northern Territory) and the Dampierland bioregion (Manguel Creek Station) (WA Herbarium 2024). Typical suitable habitat for this species comprises sand hills and plains, and vegetation type SA Tsc AerAancAm OwrCozErare represents potentially suitable habitat. While there is only one previous record from the locality (26 km southwest of the Survey Area), this small annual pea would only be recorded under good conditions. Due to the dry conditions during the survey, this species would have been unlikely to have been present and/or identifiable. It is considered that the species may occur in the Survey Area following wet season rainfall, hence the likelihood of occurrence for this species has been retained as 'may occur' or 'moderate'.

5.2.4 Range Extensions

One species recorded, *Gardenia pyriformis* subsp. *keartlandii,* represents a range extension for the species. *Gardenia pyriformis* subsp. *keartlandii* occurs throughout the Kimberley, with the closest vouchered records at the WA Herbarium located approximately 73 km northeast and 100 km east of the Survey Area (WA Herbarium 2024). Two individuals were recorded in the Survey Area and the specimen collected has been submitted as a voucher to the WA Herbarium.

5.2.5 Introduced Flora

No introduced flora species were recorded from the Survey Area.

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6.0 Fauna Results

6.1 Fauna Habitats

Two fauna habitats were identified within the Survey Area:

- Sand Plain (Shrubland on sandy plains); and
- Cleared areas.

The fauna habitats are mapped in Figure 6.1, and Table 6.1 presents detailed information for each, including physical characteristics, dominant vegetation, extent and proportion of the Survey Area, and a representative site picture taken during the survey.

The predominant fauna habitat in the Survey Area was mapped as Sand Plain, accounting for 83% of the Survey Area. The primary disturbances identified within the Survey Area were land clearing, previous human disturbance, and habitat degradation by cattle and camels.

Based on reviews of aerial imagery and land systems, vegetation, and surface geology mapping (see Section 4.0), the Sand Plain fauna habitat is not confined to the Survey Area and is common and widespread in the McLarty (GSD1) subregion (Graham 2003).

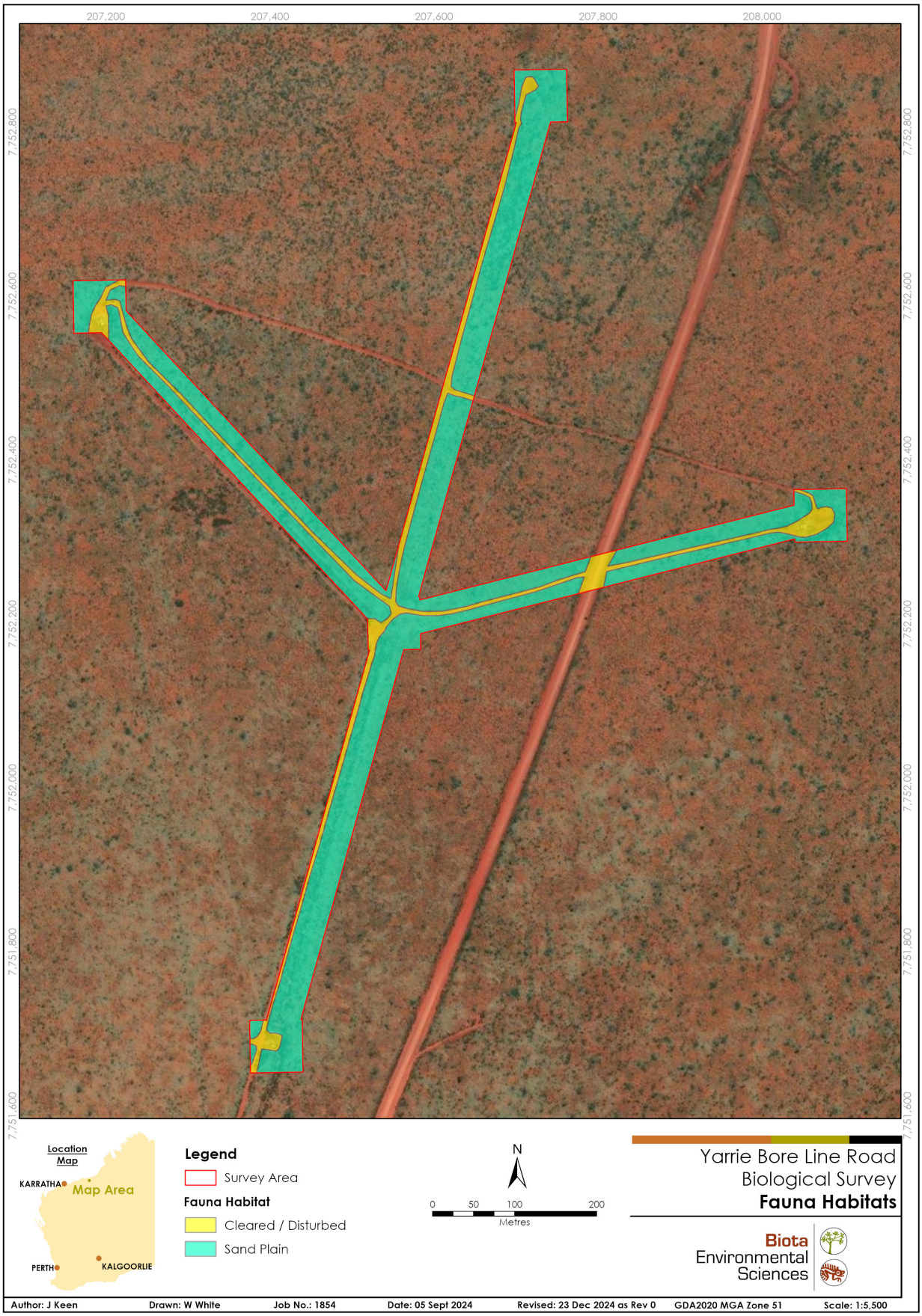

Figure 6.1: Fauna habitats in the Survey Area.

Table 6.1: Fauna habitats within the Survey Area.

Description and Condition	Fauna Values	Representative Photo
Fauna Habitat: Sand Plain ('Shrubland on sandy plains') **Extent within Survey Area:** 8.3 ha (83%) **Condition/Disturbance:** Vegetation condition ranked as Very Good. Some areas showing minor signs of disturbance from cattle, camels and humans. **Description:** Open hummock grassland of *Triodia schinzii* with high open shrubland of *Acacia eriopoda, A. ancistrocarpa, A. monticola* and scattered low trees of *Owenia reticulata, Corymbia zygophylla, Erythrophleum arenarium* on orange Pindan sand plains.	This habitat type is considered critical denning and foraging habitat for the Bilby and supporting foraging habitat for the Grey Falcon. The Pacific Swift and Peregrine Falcon may also use this habitat type for aerial foraging, and it is potentially suitable for the Short-tailed Mouse and Brush-tailed Mulgara. Shrubs and ground cover provides a range of habitat for avifauna and reptile species.	
Fauna Habitat: Cleared **Extent within Survey Area:** 1.7 ha (17%) **Condition/Disturbance:** Degraded/Cleared **Description:** Cleared pads with headworks and tracks, devoid of native vegetation.	No fauna species would utilise these areas as core habitat.	

6.2 Vertebrate Fauna

Ten vertebrate fauna species were recorded in the Survey Area during the field survey, comprising five mammals, four birds and one reptile (Table 6.2). Three species of introduced mammal were recorded, comprising the Dog/Dingo (*Canis familiaris*), Dromedary Camel (*Camelus dromedarius*) and European Cattle (*Bos primigenius taurus*).

Two species of significance were recorded, both mammals (see Table 6.2 and Section **Error! Reference source not found.**).

Table 6.2: Vertebrate fauna species recorded from the Survey Area.

Species	Common Name	Conservation Status	
		State	C'wealth
Mammals			
Dasycercus blythi	Brush-tailed Mulgara, Ampurta	P4	
Macrotis lagotis	Bilby, Dalgyte	VU	VU
**Canis familiaris*	Dog/Dingo		
**Camelus dromedarius*	Dromedary, Camel		
**Bos primigenius taurus*	European Cattle		
Birds			
Coracina novaehollandiae	Black-faced Cuckooshrike		
Artamus cinereus	Black-faced Woodswallow		
Gavicalis virescens	Singing Honeyeater		
Geophaps plumifera	Spinifex Pigeon		
Reptiles			
Diporiphora pindan	Pindan Dragon		

* Introduced species

6.3 Significant Vertebrate Fauna Recorded

Two fauna species of significance were recorded via observation of secondary sign (i.e. burrows, tracks and/or diggings) within the Survey Area during the current survey (Figure 6.2):

- Bilby, or Dalgyte (*Macrotis lagotis*) – listed as Vulnerable under the BC Act and EPBC Act; and
- Brush-tailed Mulgara (*Dasycercus blythi*) – DBCA Priority 4.

These species are discussed in detail below in Sections 6.3.1 and 6.3.2.

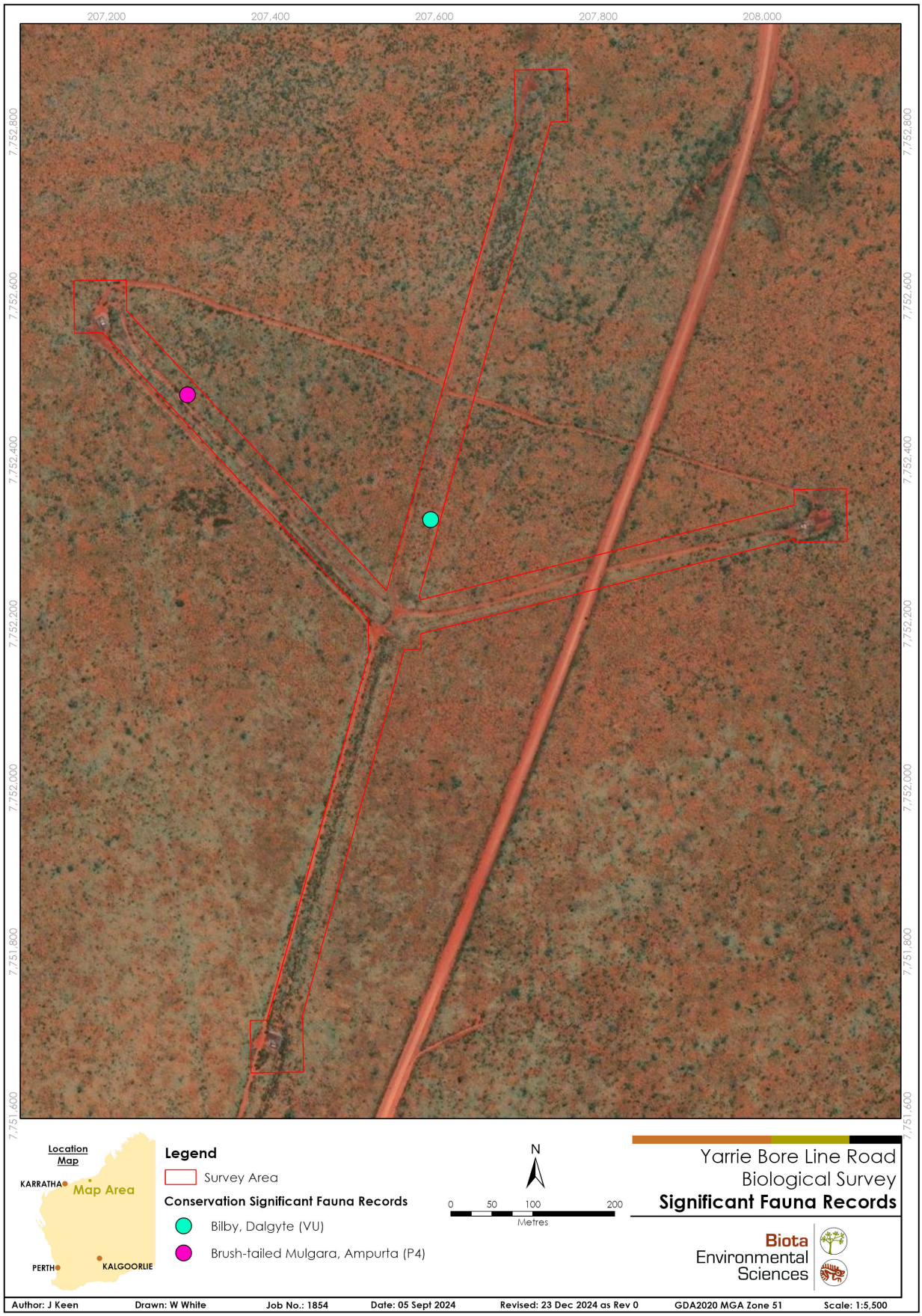

Figure 6.2: Significant vertebrate fauna recorded in the Survey Area during the current survey.

6.3.1 Bilby, dalgyte (*Macrotis lagotis*)

The Bilby is listed as Vulnerable under the BC Act and EPBC Act. It is a medium-sized marsupial adapted for digging, and creates extensive burrow systems for shelter which may also be utilised by a number of other fauna species including snakes, lizards and other marsupials (Moritz et al. 1997). Since European colonisation, the Bilby's distribution has contracted by 80%; it is now restricted to the drier and less fertile areas of the Tanami and Great Sandy Deserts in WA, with an isolated population in southwest Queensland (DCCEEW 2023). Bilbies are typically found in scattered, low-density colonies, each occupying areas ranging from 5 to 20 ha (Moritz et al. 1997). A single bilby may use up to 18 burrows, sometimes up to 1 km apart, and may use up to three different burrows in a given night (Dziminski et al. 2020). While detailed information on their population dynamics and movement within these colonies remains limited (Moritz et al. 1997), bilbies are known to move between suitable habitats in response to environmental factors such as rainfall and fire, which affect the availability of food and shelter (Southgate 2006).

Several records were identified from the locality by the desktop study; the closest were recorded in 2000, approximately 100 m from the Survey Area boundary (Figure 4.6). During the survey, one defunct burrow system was recorded in the Survey Area (Figure 6.2). This featured two entrances and was excavated into a sand spoil pile (Plate 6.1 and Plate 6.2). Active burrows typically exhibit loose soil at the entrances, accompanied by numerous tracks leading to them; the absence of tracks or fresh diggings in the vicinity of this burrow system indicates that it was inactive. There was evidence that this burrow system may have been used by a large varanid, such as *Varanus gouldii,* due to the presence of triangular shaped burrows adjacent to the spoil pile and tracks. Monitors and a range of other species may utilise burrow systems excavated by the Bilby (Southgate et al. 2019).

The 8.3 ha of Sand Plain ('Shrubland on sandy plains') habitat, characterized by sandy soils on flat topography is considered critical denning and foraging habitat for the Bilby (Department of the Environment 2013, BHP 2023b). Based on the presence of critical habitat, nearby previous records, and observations of previous activity in the Survey Area during the survey, the species is considered to have previously occurred within the Survey Area and may still occupy the Survey Area sporadically in response to environmental conditions (i.e. rain and fire).

Plate 6.1: Bilby burrow complex within spoil pile.

Plate 6.2: Bilby burrow entrance (defunct).

6.3.2 Brush-tailed Mulgara (*Dasycercus blythi*)

The Brush-tailed Mulgara is listed as a Priority 4 species by DBCA. The species occurs from southwestern Queensland across the Simpson, Tanami and Great Sandy Deserts of southern and central Northern Territory, through central Western Australia. It was split from the Crest-tailed Mulgara in 2005 and re-assessed in 2023 (Newman-Martin et al. 2023). Its historical distribution is uncertain as fossil remains of the two species are difficult to differentiate; fossil remains have been found throughout the arid zone. The preferred habitat of the Brush-tailed Mulgara is spinifex

(*Triodia* spp.) grasslands on sandplains and sandy swales, where they dig deep burrows and are usually solitary (van Dyck and Strahan 2008). They consume a wide range of prey, including insects, arthropods and small vertebrates. Compared to other dasyurids, they are relatively long-lived; both sexes can reproduce for multiple years. Populations typically experience 'boom-and-bust' cycles dependent on rainfall and the subsequent increase in prey abundance (van Dyck and Strahan 2008).

Multiple records were identified from the locality by the desktop study, with the closest recorded approximately 22 km south of the Survey Area boundary in 1997. During the survey, diggings and tracks were recorded at one location in the Survey Area (Figure 6.2; Plate 6.3 and Plate 6.4). Denning and foraging habitat for the Brush-tailed Mulgara is present within the Survey Area in the Sand Plain ('Shrubland on sandy plains') habitat. Based on the presence of suitable habitat, nearby previous records, and observations of previous activity in the Survey Area during the survey, the species is considered to occur within the Survey Area.

Plate 6.3: Mulgara diggings from foraging.

Plate 6.4: Mulgara tracks.

6.4 Significant Vertebrate Fauna Potentially Occurring

An assessment of the likelihood of occurrence of significant fauna species within the Survey Area identified three species considered likely to occur (i.e. that have a 'high' likelihood of occurrence) and four species that may occur (i.e. that have a 'moderate' likelihood of occurrence) (see Appendix 4).

Species considered likely to occur in the Survey Area comprise:

- Pacific Swift (*Apus pacificus*) – BC Act and EPBC Act Migratory;
- Grey Falcon (*Falco hypoleucos*) – BC Act and EPBC Act Vulnerable; and
- Peregrine Falcon (*Falco peregrinus*) – BC Act Other Specially Protected.

Species considered to have a moderate likelihood of occurrence in the Survey Area comprise:

- Oriental Plover (*Charadrius veredus*) – BC Act and EPBC Act Migratory;
- Little Curlew (*Numenius minutus*) – BC Act and EPBC Act Migratory;
- Oriental Pratincole (*Glareola maldivarum*) – BC Act and EPBC Act Migratory; and
- Australian [Gull-billed] Tern (*Gelochelidon* [*nilotica*] *macrotarsa*) – BC Act and EPBC Act Migratory.

An additional 55 species were considered either unlikely to occur or would not occur (see Appendix 4) and have not been discussed further.

6.4.1 Significant Fauna Likely to Occur (High Likelihood)

6.4.1.1 Pacific Swift, *Apus pacificus*

The Pacific Swift (previously Fork-tailed Swift) is listed as Migratory under both the BC Act and EPBC Act. It occurs as a non-breeding migrant across much of Australia from September to April, particularly in the northern half of the continent. In general, the species is most common closer to the coast but occurs over much of the Pilbara and Kimberley. In Australia, the species is entirely aerial in habit, foraging for flying insects and even sleeping on the wing. It is highly mobile, often occurring in association with unsettled weather and low pressure systems (Johnstone and Storr 1998).

No Pacific Swifts were recorded during the current survey; however, the survey was conducted outside the peak period of occurrence. One regional record was identified in the desktop study, approximately 7 km northwest of the Survey Area, and the Survey Area falls within the published distribution of the species (Menkhorst et al. 2017). It is considered likely to occur in the airspace over the Survey Area sporadically between September and April. Occurrence is most likely in association with the passage of low-pressure systems or other unsettled weather conditions but would not be limited to these conditions. The species could potentially use airspace over all fauna habitats within the Survey Areas.

6.4.1.2 Grey Falcon, *Falco hypoleucos*

The Grey Falcon is listed as Vulnerable under the BC Act and EPBC Act. It has a wide distribution across much of arid inland and northern Australia, occurring mainly on lightly wooded plains and along major watercourses (Johnstone et al. 2013). Breeding usually takes place in taller trees such as river red gums, or on isolated man-made structures such as communications towers (Johnstone and Storr 1998).

As categorised by BHP WAIO (BHP 2023b), critical habitat consists of "major drainage habitats with suitably sized Eucalypts (*Eucalyptus camaldulensis, E. coolabah*) as potential nesting habitat, often in the abandoned nest of a raptor or corvid in trees", and supporting habitat comprises "timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses" and "hunting [habitat] in treeless areas, particularly tussock grassland and open woodland".

The Grey Falcon was not recorded during the current survey. Three regional records were identified during the desktop study, the closest approximately 25 km west (in 1977 and 1999). However, the Survey Area falls within the published distribution of the species, the species is highly mobile and there is suitable habitat present. No critical habitat occurs in the Survey Area (Department of the Environment 2013, BHP 2023b). However, the Sand Plain ('Shrubland on sandy plains') habitat in the Survey Area is considered to be supporting habitat that would be suitable for foraging (BHP 2023b). It is considered that the Grey Falcon is likely to occur in the Survey Area sporadically while foraging.

6.4.1.3 Peregrine Falcon, *Falco peregrinus*

The Peregrine Falcon is listed as Other Specially Protected under the BC Act. It is distributed widely throughout most of Australia, but is absent from most deserts and the Nullarbor Plain (Johnstone and Storr 1998). This species inhabits a wide range of habitats including forests, woodlands, wetlands and open country (Pizzey and Knight 2007). Individuals maintain large home ranges of up to 30 km^2, and nest in recesses of cliff faces, tree hollows and along rivers (Johnstone and Storr 1998).

The Peregrine Falcon was not recorded during the current survey. Three previous records from the locality were identified during the desktop study, the closest approximately 25 km west (in 1989 and 1999). The Sand Plain ('Shrublands on sandy plains') habitat represents potentially suitable foraging habitat in the Survey Area, and this species is highly mobile. It is therefore considered that the Peregrine Falcon is likely to occasionally occur in the Survey Area while foraging.

6.4.2 Significant Fauna that May Occur (Moderate Likelihood)

6.4.2.1 Oriental Plover, *Charadrius veredus*

The Oriental Plover is listed as Migratory under the BC Act and EPBC Act. This species is a summer migrant to Australia, occurring primarily from September to April, though the earliest arrivals may return in late August, and occasional birds remain into May (Johnstone and Storr 1998; Broome Bird Observatory unpublished data). The species breeds in Mongolia, northern China and Southern Siberia, and is a non-breeding migrant to Australia (Johnstone and Storr 1998). However, unlike most shorebird species, they are not particularly tied to wetland and coastal habitats while in Australia. Their preferred foraging habitats are sparsely vegetated open areas, including short-grassed or bare plains, bare wetland margins, and recently burnt areas (Johnstone and Storr 1998). This also includes similar man-made habitats, such as sports fields and airfields. The species will also use tidal mudflats, beaches, sewage ponds and freshwater wetland areas, primarily while on migration or for roosting during the heat of the day (Johnstone and Storr 1998). They are mobile in response to conditions, and disperse across inland northern Australia during the wet season (Minton et al. 2013). They feed primarily on insects and other invertebrates captured on the ground, and appear to do much of their foraging in the early morning, evening and at night (Piersma and Hassell 2010).

The Oriental Plover was not recorded from the Survey Area during the current survey and no previous records in proximity were identified in the desktop study. The species was previously recorded in 2015 from 40 km along the coastline north of the Survey Area. However, there is suitable foraging habitat in the Survey Area in parts of the spinifex hummock grassland of the Sand Plain habitat, so the species may occur.

6.4.2.2 Little Curlew, *Numenius minutus*

The Little Curlew is listed as Migratory under the BC Act and EPBC Act. It is a common nonbreeding summer migrant to northern Australia, primarily between mid-September and April, with very few overwintering (Menkhorst et al. 2017). It favours short grassland habitats, including natural short grasslands or recently burnt grasslands, airfields and sports grounds, and less commonly other open habitats such as drying river beds and tidal flats (Johnstone and Storr 1998). The species is generally more common in coastal areas but disperses further inland following widespread rainfall during the wet season.

The Little Curlew was not recorded from the Survey Area during the current survey, which is not surprising given the timing (i.e. outside of the wet season), and no previous records from the Survey Area were identified in the desktop study. However, there are numerous records from within the locality, primarily centered around the coast of Eighty-mile Beach (40 km north of Survey Area) and most recently from 2015 (DBCA). There is suitable foraging habitat in the Survey Area in parts of the spinifex hummock grassland of the Sand Plain habitat, so the species may occur.

6.4.2.3 Oriental Pratincole, *Charadrius veredus*

The Oriental Pratincole is listed as Migratory under both the BC Act and EPBC Act. The species is a non-breeding migrant to Australia; it is typically present from October to May, with the largest numbers present from December to March (Johnstone and Storr 1998). The Oriental Pratincole uses broadly similar foraging habitats to the Oriental Plover (see Section 6.4.2.1) and is not tied to water or coastal areas. However, unlike the Oriental Plover, the species takes insect prey aerially (Johnstone and Storr 1998), and so will forage over a wider range of habitat types.

The Oriental Pratincole was not recorded from the Survey Area during the current survey, and no previous records in proximity were identified in the desktop study. The species was previously recorded in 2015 from along the coastline 40 km north of the Survey Area. The Survey Area would provide suitable foraging habitat for the Oriental Pratincole. The species would occur at similar times of year to the Oriental Plover, with the largest concentration expected between December and March. There is suitable foraging habitat in the Survey Area in parts of the spinifex hummock grassland of the Sand Plain habitat which they may use sporadically, so the species may occur.

6.4.2.4 Australian Tern, *Gelochelidon* (*nilotica*) *macrotarsa*

The Australian Tern is listed as Migratory under the BC Act and EPBC Act (as Gull-billed Tern). At the time of listing, this species was treated as conspecific with the migratory Common Gull-billed Tern. Most authorities now recognise the Australian Tern as a distinct species, based on differences in plumage, structure, ecology and genetics (Rogers et al. 2005). Australian Terns are nomadic and occur widely across Australia, including both coastal and inland areas, but generally remain within Australia. They breed colonially on inland wetlands, and forage over sheltered coasts, estuaries, inland wetlands, and over open grassland and bare ground (Johnstone and Storr 1998).

The Australian Tern was not recorded from the Survey Area during the current survey, and no previous records in proximity were identified in the desktop study. There are several records in the locality, the nearest being recorded in 2015 from 35 km north of the Survey Area along the coastline. There is suitable foraging habitat in the Survey Area in parts of the spinifex hummock grassland of the Sand Plain habitat, so the species may occur.

7.0 Discussion

A reconnaissance and targeted flora and vegetation survey, and a basic and targeted terrestrial fauna survey was conducted on the 23 July 2024. The survey timing was outside the recommended timing for a wet season survey in the Northern Botanical Province, and conditions leading up to the survey were dry, which was considered a minor limitation of the study.

7.1 Vegetation and Flora

The Survey Area consisted of a broad sand plain and a single vegetation association described as 'open hummock grassland of *Triodia schinzii* with high open shrubland of *Acacia eriopoda, A. ancistrocarpa, A. monticola* and scattered low trees of *Owenia reticulata, Corymbia zygophylla, Erythrophleum arenarium* on orange Pindan sand plains', which was mapped over 83% of the Survey Area (see Section 5.1). The remaining 17% of the Survey Area consisted of cleared areas associated with tracks and existing bore infrastructure.

This vegetation association did not comprise any listed TEC or PEC and was not considered to be otherwise significant. It was in Very Good condition and no introduced flora were recorded in the Survey Area; however, minor disturbances from cattle or camels was noted, as well as evidence of previous human disturbance.

A total of 33 native vascular flora species from 25 genera and 13 families were recorded during the survey. One species, *Gardenia pyriformis* subsp. *keartlandii,* represents a range extension of approximately 73 km for the species. No Threatened or Priority flora species were recorded during the survey. One Priority 3 species, *Rothia indica* subsp. *australis*, is ranked as 'may occur' or 'moderate' likelihood of occurrence following the survey. Due to the dry seasonal conditions, this annual species would have been unlikely to have been present during the survey; however, it may occur following wet season rainfall.

7.2 Fauna

Two fauna habitats were identified within the Survey Area, comprising:

- Sand Plain ('Shrubland on sandy plains') (83% of the Survey Area); and
- Cleared areas (17% of the Survey Area).

The Sand Plain ('Shrubland on sandy plains') fauna habitat is not confined to the Survey Area and is common and widespread in the McLarty (GSD1) subregion (Graham 2003).

Two fauna species of significance were recorded from the Survey Area: the Bilby (*Macrotis lagotis*) – listed as Vulnerable under the BC Act and EPBC Act, and the Priority 4 Brush-tailed Mulgara (*Dasycercus blythi*).

A single inactive, Bilby burrow system was recorded in the Survey Area within the Sand Plain habitat, which is considered critical denning and foraging habitat for the Bilby. Whilst Bilby was recorded in the Study Area, the species is regarded as having low site fidelity and high mobility (Southgate et al. 2007); capable of moving up to 15 km in a few weeks (Southgate and Possingham 1995). It is likely that the species may occupy the Survey Area sporadically in response to environmental conditions such as rain and fire which affect the availability of food and shelter.

Diggings and tracks of the Brush-tailed Mulgara were recorded at one location within the Survey Area. Denning and foraging habitat for Brush-tailed Mulgara is present within the Survey Area within the Sand Plain habitat. Based on the presence of suitable habitat, nearby previous

records, and observations of previous activity during the survey, the species is considered to occur within the Survey Area.

In addition, three significant fauna species were assessed as likely to occur in the Survey Area: the Pacific Swift (*Apus pacificus*) – BC Act and EPBC Act Migratory, Grey Falcon (*Falco hypoleucos*) – BC Act and EPBC Act Vulnerable, and Peregrine Falcon (*Falco peregrinus*) – BC Act Other Specially Protected. A further four significant fauna species, all migratory birds, were assessed as having a 'moderate' likelihood to occur in the Survey Area (may occur).

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Appendix 1

Framework for Significance Rankings of Communities and Species in WA

CONSERVATION CATEGORY DEFINITIONS

for Western Australian Ecological Communities

GENERAL DEFINITIONS

An **ecological community** is a naturally occurring assemblage of organisms that occurs in a particular habitat, as defined in the *Biodiversity Conservation Act 2016* (BC Act). Ecological communities may comprise various life forms including plants, animals and microorganisms.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) means an ecological community that is listed under section 27(1) of the BC Act as a critically endangered, endangered or vulnerable ecological community, or is a rediscovered ecological community to be regarded as a threatened ecological community under section 33 of the BC Act.

An **assemblage** is a defined group of biological entities.

Habitat, as defined in the BC Act, means the biophysical medium or media —

a) occupied (continuously, periodically or occasionally) by an organism or group of organisms, or
b) once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced.

An **occurrence** is a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres with, for example: a different ecological community, a sealed road, a building, a water body (for terrestrial communities), or a terrestrial body (for aquatic communities). There is no minimum size of an occurrence of a threatened or priority ecological community. By ensuring that every discrete occurrence is recognised and recorded, future changes in status can be readily monitored.

Adequately surveyed is defined as an ecological community that has been searched for thoroughly in most likely habitats, by relevant experts.

Community structure is defined as the spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage. For example, the vegetation structure (e.g., *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs) or the trophic structure in a faunal assemblage (e.g., dominance by feeders on detritus as distinct from feeders on live plants).

To **modify** an occurrence of an ecological community, as defined in section 44 of the BC Act, means to take action that results in —

(a) the modification of the occurrence of the threatened ecological community to such an extent that the occurrence is unlikely to recover —
    (i) its species composition or structure; or
    (ii) its species composition and structure; or
(b) the destruction of the occurrence of the threatened ecological community.

Destruction of an occurrence of an ecological community means modification such that reestablishment of ecological processes, species composition or community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention.

Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Refer to the document Guidance note – Modification of an occurrence of a threatened ecological community for more information on what constitutes modification and how to determine whether an action is likely to modify an occurrence of a threatened ecological community.

Threatening process means a process that threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community, as defined under the BC Act. Examples of some of the continuing threatening processes in Western Australia include: vegetation clearance; competition and land degradation by introduced fauna; dieback caused by the root-rot fungus (*Phytophthora cinnamomi*); competition and displacement of native plants by introduced flora; hydrological changes (declining groundwater levels); drying climate, fire regimes that cause declines in biodiversity; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

LISTED ECOLOGICAL COMMUNITIES

Assessment of the conservation status of ecological communities is carried out in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline Number 1 and Ministerial Guideline Number 4 that adopt the use of the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Categories and Criteria.

CO Collapsed ecological communities

An ecological community listed by order of the Minister as collapsed under section 31(1) of the BC Act. As determined by criteria set out in section 32 of the BC Act, an ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time —

(a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or
(b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover —
    (i) its species composition or structure; or
    (ii) its species composition and structure.

CR Critically endangered ecological communities

A threatened ecological community listed in the category of critically endangered under section 27(1)(a) of the BC Act, as determined by criteria set out in section 28 of the BC Act and the ministerial guidelines. A critically endangered ecological community faces an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines.

Examples of use:

- ‘Assemblages of the organic springs and mound springs of the Mandora Marsh area’ is listed as a critically endangered threatened ecological community under the *Biodiversity Conservation Act 2016.*
- ‘Assemblages of the organic springs and mound springs of the Mandora Marsh area’ is listed as critically endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: CR.

EN Endangered ecological communities

A threatened ecological community listed in the category of endangered ecological community under section 27(1)(b) of the BC Act, as determined by criteria set out in section 29 of the BC Act and the ministerial guidelines. A threatened ecological community faces a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines.

Examples of use:

- ‘Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson *et al*. (1994))’ is listed as an endangered threatened ecological community under the *Biodiversity Conservation Act 2016.*
- ‘Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))’ is listed as endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: EN.

VU Vulnerable ecological communities

A threatened ecological community listed in the category of vulnerable ecological community under section 27(1)(c) of the BC Act, as determined by criteria set out in section 30 of the BC Act and the ministerial guidelines. A vulnerable ecological community faces a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines.

Examples of use:

- '*Calothamnus graniticus* subsp. *graniticus* heaths on south west coastal granites' is listed as a vulnerable threatened ecological community under the *Biodiversity Conservation Act 2016.*
- '*Calothamnus graniticus* subsp. *graniticus* heaths on south west coastal granites' is listed as vulnerable under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table – column heading: BC Act; row text: VU.

PRIORITY ECOLOGICAL COMMUNITIES

Priority is not a listing category under the BC Act. The Priority Ecological Communities list is maintained by the department and is published on the department's website.

All fauna and flora that may be present in an ecological community are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when these species occur in an ecological community that is not listed as threatened, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Possible threatened ecological communities that do not meet survey criteria or are not adequately defined to enable listing are added to the department's Priority Ecological Communities for Western Australia list under priority 1, 2 or 3. Ecological communities that are adequately known and not threatened but rare, near threatened, or have recently been removed from the threatened list are placed in priority 4. Conservation dependent ecological communities are placed in priority 5.

P1 Priority 1: Poorly known ecological communities – very few occurrences, very restricted distribution

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g., within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Examples of use:

- 'Banded Ironstone Hills with *Dryandra arborea*' is listed as a Priority 1 ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Banded Ironstone Hills with *Dryandra arborea*' is listed as Priority 1 on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P1.

P2 Priority 2: Poorly known ecological communities – few occurrences, restricted distribution

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. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Examples of use:

- 'Aquatic invertebrate communities of peat swamps' is listed as a Priority 2 ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Aquatic invertebrate communities of peat swamps' is listed as Priority 2 on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P2.

P3 Priority 3: Poorly known ecological communities – inadequately surveyed or not well defined

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them. This category includes three sub-categories:

(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.

(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).

(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.

Examples of use:

- 'Assemblages of gypsum dunes of the central and southern wheatbelt' is listed as a Priority 3(iii) ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Assemblages of gypsum dunes of the central and southern wheatbelt' is listed as Priority 3(iii) on the DBCA Priority Ecological Communities List.
- Listing reference in a table – column heading: DBCA; row text: P3(iii).

P4 Priority 4: Adequately known ecological communities – rare, near threatened, or recently removed from the threatened list

Ecological communities that are adequately known and either rare but not threatened, near threatened, or have recently been removed from the threatened list. These communities require regular monitoring.

(i) Rare: ecological communities known from few occurrences 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 communities are usually represented on conservation lands.

(ii) Near threatened: ecological communities that are considered to have been adequately surveyed and that do not qualify as conservation dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Examples of use:

- 'Nimalaica (Nimalarragun) claypan and associated wetland assemblages' is listed as a Priority 4(ii) ecological community by the Department of Biodiversity, Conservation and Attractions.
- 'Nimalaica (Nimalarragun) claypan and associated wetland assemblages' is listed as Priority 4(ii) on the DBCA Priority Ecological Communities List.
- Listing reference in a table: column heading: DBCA, row text: P4(ii).

P5 Priority 5: Conservation dependent ecological communities

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.

CONSERVATION CODES

For Western Australian Fauna and Flora

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] 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.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species[3] under Part 2 of the *Biodiversity Conservation Act 2016.*

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is the species of fauna that are listed as critically endangered, endangered or vulnerable threatened species.

Threatened flora is the species of flora that are listed as critically endangered, endangered or vulnerable threatened species.

The assessment of the conservation status of threatened species is in accordance with the BC Act listing criteria and the requirements of Ministerial Guideline (Number 1) and Ministerial Guideline (Number 2) that adopts the use of the International Union for Conservation of Nature (IUCN) Red List of Threatened Species Categories and Criteria[4], and is based on the national distribution of the species.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.

Examples of use:

- The western ringtail possum (*Pseudocheirus occidentalis*) is listed as a critically endangered threatened species under the *Biodiversity Conservation Act 2016.*
- Western ringtail possum is listed as critically endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: CR.

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.

Examples of use:

- *Caladenia hopperiana* is listed as an endangered threatened species under the *Biodiversity Conservation Act 2016.*
- *Caladenia hopperiana* is listed as endangered under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: EN.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.

Examples of use:

- The forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) is listed as a vulnerable threatened species under the *Biodiversity Conservation Act 2016.*
- Forest red-tailed black cockatoo is listed as vulnerable under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: VU.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Examples of use:

- *Acacia kingiana* is listed as an extinct species under the *Biodiversity Conservation Act 2016.*
- *Acacia kingiana* is listed as extinct under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: EX.

EW Extinct in the wild species

Species that *"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*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no fauna or flora species listed as extinct in the wild.

SP Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered, or vulnerable) or extinct species under the BC Act cannot also be listed as specially protected species.

MI Migratory species

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; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Migratory species include birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA)[5], China (CAMBA)[6] or The Republic of Korea (ROKAMBA)[7], and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention)[8], 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.

Examples of use:

- The wedge-tailed shearwater (*Ardenna pacifica*) is listed as a specially protected migratory species under the *Biodiversity Conservation Act 2016.*
- Wedge-tailed shearwater is listed as migratory under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: MI.

CD **Species of special conservation interest (conservation dependent)**

Species of special conservation need that are dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Currently only fauna are listed as species of special conservation interest.

Examples of use:

- The wambenger, south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*) is listed as a specially protected species of special conservation interest under the *Biodiversity Conservation Act 2016.*
- Wambenger, south-western brush-tailed phascogale, is listed as conservation dependent under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: CD.

OS **Species otherwise in need of special protection (other specially protected)**

Species otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Currently only fauna are listed as species otherwise in need of special protection.

Examples of use:

- The dugong (*Dugong dugon*) is listed as a specially protected species otherwise in need of special protection under the *Biodiversity Conservation Act 2016.*
- Dugon is listed as other specially protected fauna under the *Biodiversity Conservation Act 2016.*
- Listing reference in a table: column heading: BC Act, row text: OS.

P **Priority species**

Priority is not a listing category under the BC Act.

All fauna and flora are protected in WA following the provisions in Part 10 of the BC Act. The protection applies even when a species is not listed as threatened or specially protected, and regardless of land tenure (State managed land (Crown land), private land, or Commonwealth land).

Species that may possibly be threatened species that do not meet the criteria for listing under the BC Act because of insufficient survey or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of prioritisation for survey and evaluation of conservation status so that consideration can be given to potential listing as threatened.

Species that are adequately known, meet criteria for near threatened, or are rare but not threatened, or that have been recently removed from the threatened species list or conservation dependent or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of priority status is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 **Priority 1: Poorly-known species - known from few locations, none on conservation lands**

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, for example, 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.

Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under immediate threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Borya stenophylla* is listed as a Priority 1 species by the Department of Biodiversity, Conservation and Attractions.
- *Borya stenophylla* is listed as Priority 1 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P1.

2 Priority 2: Poorly-known species - known from few locations, some on conservation lands

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, for example, national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation.

Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements for threatened listing and appear to be under threat from known threatening processes. These species are in urgent need of further survey.

Examples of use:

- *Caladenia nivalis* is listed as a Priority 2 species by the Department of Biodiversity, Conservation and Attractions.
- *Caladenia nivalis* is listed as Priority 2 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P2.

3 Priority 3: Poorly-known species - known from several locations

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.

Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. These species need further survey.

Examples of use:

- *Acacia nitidula* is listed as a Priority 3 species by the Department of Biodiversity, Conservation and Attractions.
- *Acacia nitidula* is listed as Priority 3 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P3.

4 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 a conservation dependent specially protected species.

(c) Species that have been removed from the list of threatened species or lists of conservation dependent or other specially protected species, during the past five years for reasons other than taxonomy.

(d) Other species in need of monitoring.

Examples of use:

- *Banksia aculeata* is listed as a Priority 4 species by the Department of Biodiversity, Conservation and Attractions.
- *Banksia aculeata* is listed as Priority 4 on the DBCA Priority Flora List.
- Listing reference in a table: column heading: DBCA, row text: P4.

[1] The definition of flora includes algae, fungi, and lichens.

[2] Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

[3] Schedules are not referred to when stating the listing status of threatened, extinct or specially protected species under the BC Act. See the examples provided under each listing category.

[4] Western Australia has assigned species to threat categories using the *IUCN Red List of Threatened Species Categories and Criteria* since 1996 (referencing all criteria). At the national level, threatened species listings under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) reference only some of the IUCN criteria (http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines).

[5] JAMBA - first included in the WA migratory species list in 1980.

[6] CAMBA - first included in the WA migratory species list in 2010.

[7] ROKAMBA - first included in the WA migratory species list in 2010.

[8] Bonn Convention (Birds) - first included in the WA migratory species list in 2015.

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Many of the species that are specially protected at State level are also listed as Threatened species at the Federal level, as one of the Matters of National Environmental Significance (MNES) identified under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). These may be classified as 'critically endangered', 'endangered', 'vulnerable' or 'lower risk', consistent with IUCN categories:

1. **Critically Endangered (CR):** a taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
2. **Endangered (EN):** a taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
3. **Vulnerable (VU):** a taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.
4. **Lower Risk (LR):** a taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:
    - **Conservation Dependent (CD).** Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
    - **Near Threatened (NT).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
    - **Least Concern (LC).** Taxa which do not qualify for Conservation Dependent or Near Threatened.

In addition, numerous **Migratory (MI)** species are listed as MNES under the EPBC Act (some of which are also listed as Threatened). Migratory species are those animals that migrate to Australia and its external territories, or pass through or over Australian waters during their annual migrations. The list of migratory species consists of those species listed under the following international conventions:

1. Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
2. China-Australia Migratory Bird Agreement (CAMBA);
3. Japan-Australia Migratory Bird Agreement (JAMBA); and,
4. Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Marine (MA) species are also protected under the EPBC Act, and are listed to ensure the long-term conservation of the species. Marine species include all Australian sea snakes, seals, crocodiles, dugongs, marine turtles, seahorses and seabirds that naturally occur in the Commonwealth marine area.

Under the terms of the EPBC Act, an action (e.g. a project or development) is required to be referred to the Australian Government Environment Minister for approval if it has, will have, or is likely to have, a significant impact on an MNES. The term 'action' includes projects and developments subsequent to commencement of the Act, however there are a number of exemptions (e.g. projects in Commonwealth areas). According to Department of the Environment (2013), a 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

References:

Department of the Environment (2013). Matters of National Environmental Significance - Significant Impact Guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment, Canberra, Australia.

Appendix 2

Database Search Results

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: 01-Jul-2024

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	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	24
Listed Migratory Species:	35

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	42
Whales and Other Cetaceans:	None
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	7
Key Ecological Features (Marine):	None
Biologically Important Areas:	9
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
Eighty-mile beach	Within Ramsar site	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			
Arenaria interpres			
Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris tenuirostris			
Great Knot [862]	Vulnerable	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 likely to occur within area	In buffer area only
Charadrius mongolus			
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]	Endangered	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 may occur within area	In buffer area only
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
MAMMAL			
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area	In feature area
Macrotis lagotis			
Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rhinonicteris aurantia (Pilbara form)			
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area	In feature area
REPTILE			
Liasis olivaceus barroni			
Pilbara Olive Python [66699]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Liopholis kintorei			
Great Desert Skink, Tjakura, Warrarna, Mulyamiji, Tjalapa, Nampu [83160]	Vulnerable	Species or species habitat may occur within area	In feature area
SHARK			
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	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
Sternula albifrons			
Little Tern [82849]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Migratory Marine Species			
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In buffer area only
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat known to occur within area	In feature area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Arenaria interpres](#) Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Calidris alba](#) Sanderling [875]		Species or species habitat known to occur within area	In buffer area only
[Calidris canutus](#) Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris pugnax as Philomachus pugnax Ruff [91256]		Species or species habitat known to occur within area	In buffer area only
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	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 likely to occur within area	In buffer area only
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area	In feature area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat 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
Limosa limosa Black-tailed Godwit [845]	Endangered	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 may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area	In buffer area only
Numenius phaeopus Whimbrel [849]		Species or species habitat known 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
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In buffer area only
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area	In buffer area only
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

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
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
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]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area	In buffer area only
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris pugnax as Philomachus pugnax Ruff [91256]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area overfly marine area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area	In feature area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area overfly marine area	In buffer area only
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 may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius phaeopus Whimbrel [849]		Species or species habitat known 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
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area	In buffer area only
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area overfly marine 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
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	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 stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only

Extra Information

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
De Grey River	WA	In buffer area only
Eighty Mile Beach System	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Great Northern Pipeline - 630 km buried gas pipeline	2009/5257	Controlled Action	Completed	In buffer area only
North Star Magnetite Project	2012/6689	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Development of the Cundaline and Callawa iron ore deposits	2008/4235	Not Controlled Action	Completed	In buffer area only
Goldsworthy Extension Project	2005/2280	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Telfer Gold Mine Project - Mine and Borefield Extensions and Upgrade of Storage	2002/787	Not Controlled Action	Completed	In buffer area only
Telfer Gold Mine Project - Power Supply and Infrastructure Corridor	2002/786	Not Controlled Action	Completed	In buffer area only

Biologically Important Areas			[Resource Information]
Scientific Name	Behaviour	Presence	Buffer Status
River shark			
Pristis clavata Dwarf Sawfish [68447]	Foraging	Known to occur	In buffer area only
Pristis clavata Dwarf Sawfish [68447]	Nursing	Known to occur	In buffer area only
Pristis clavata Dwarf Sawfish [68447]	Pupping	Known to occur	In buffer area only
Pristis pristis Largetooth Sawfish [60756]	Foraging	Known to occur	In buffer area only
Pristis pristis Largetooth Sawfish [60756]	Pupping	Likely to occur	In buffer area only
Pristis zijsron Green Sawfish [68442]	Nursing	Known to occur	In buffer area only
Pristis zijsron Green Sawfish [68442]	Pupping	Known to occur	In buffer area only
Seabirds			
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur	In buffer area only
Sternula albifrons sinensis Little Tern [82850]	Breeding	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
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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

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Extracts from Naturemap Summary of 40 km search – significant species only

Fauna

TAXON	COMMON NAME	CLASS	WA STATUS	EPBC STATUS
Macrotis lagotis	bilby, dalgyte, ninu	MAMMAL	VU	VU
Dasycercus blythi	brush-tailed mulgara	MAMMAL	P4	
Hydroprogne caspia	Caspian tern	BIRD	MI	MI
Tringa nebularia	common greenshank	BIRD	MI	MI
Actitis hypoleucos	common sandpiper	BIRD	MI	MI
Thalasseus bergii	crested tern	BIRD	MI	MI
Calidris ferruginea	curlew sandpiper	BIRD	CR	CR & MI
Lerista separanda	Dampierland plain slider	REPTILE	P2	
Apus pacificus	fork-tailed swift	BIRD	MI	MI
Macroderma gigas	ghost bat	MAMMAL	VU	VU
Plegadis falcinellus	glossy ibis	BIRD	MI	MI
Charadrius leschenaultii	greater sand plover, large sand plover	BIRD	VU	VU & MI
Falco hypoleucos	grey falcon	BIRD	VU	
Tringa stagnatilis	marsh sandpiper	BIRD	MI	MI
Notoryctes caurinus	northern marsupial mole, kakarratul	MAMMAL	P4	
Dasyurus hallucatus	northern quoll	MAMMAL	EN	EN
Leggadina lakedownensis	northern short-tailed mouse, Lakeland Downs mouse, kerakenga	MAMMAL	P4	
Rhinonicteris aurantia	orange leaf-nosed bat	MAMMAL	P4	
Charadrius veredus	oriental plover	BIRD	MI	MI
Falco peregrinus	peregrine falcon	BIRD	OS	
Rhinonicteris aurantia (Pilbara form)	Pilbara leaf-nosed bat	MAMMAL	VU	VU
Gallinago stenura	pin-tailed snipe	BIRD	MI	MI
Calidris canutus rogersi	red knot (subsp. rogersi)	BIRD	EN	EN & MI
Calidris ruficollis	red-necked stint	BIRD	MI	MI
Calidris acuminata	sharp-tailed sandpiper	BIRD	MI	MI
Lagorchestes conspicillatus leichardti	spectacled hare-wallaby (mainland)	MAMMAL	P4	
Gallinago megala	Swinhoe's snipe	BIRD	MI	MI
Pseudomys chapmani	western pebble-mound mouse, ngadji	MAMMAL	P4	

Flora

Taxon	Con Status
Euphorbia clementii	P3
Indigofera ammobia	P3
Acacia monticola x tumida var. kulparn	P3
Bulbostylis burbidgeae	P4
Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	P1
Croton aridus	P3
Eragrostis crateriformis	P3
Eremophila maculata subsp. filifolia	P1
Euploca parviantrum	P1
Fimbristylis sp. Shay Gap (K.R. Newbey 10293)	P1
Goodenia hartiana	P2
Nicotiana umbratica	P3
Rothia indica subsp. australis	P3

Appendix 3

Flora Likelihood Assessment

Taxon	Habit and Habitat (WA Herbarium 2024)	Source of Records						Likelihood of Occurrence within the Survey Area	
		Nature Map	ALA	EPBC PMST	DBCA WAHerb	DBCA TPFL	Biota (2024)	Initial Ranking Based in Desktop Study	Final Ranking Based on Results of Survey
Priority 1									
Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	Herb or shrub <1 m tall, with hairy stems, cylindrical fruit and yellow flowers. Grows in gullies and drainage lines on skeletal ironstone soils.	✓			✓			Unlikely to occur: two records in the locality however no rocky gullies or drainage lines occur in the survey area. (NR= 39 km SSE)	Unlikely to occur: no suitable habitat and not recorded during the field survey.
Eremophila maculata subsp. *filifolia*	Shrub to 3 m tall with long narrow leaves and a red or pale yellow corolla (Brown and Buirchell 2011). Found on spinifex plains.	✓			✓			Unlikely to occur: suitable habitat may be present, but taxon is very infrequently recorded; this entity currently only known from one plain ~1km south of the De Grey River. (NR=38 km SSW)	Unlikely to occur: not observed during the survey despite good on-ground coverage.
Euploca parviantrum	Small, spindly annual herb with white flowers that grows on spinifex plains.	✓			✓			Unlikely to occur: habitat may be suitable however species is infrequently recorded; single record in the locality from 1946. (NR=39 km SSW)	Unlikely to occur: no particularly suitable habitat (no records from pindan sands).
Fimbristylis sp. Shay Gap (K.R. Newbey 10293)	Tufted annual sedge to 15 cm tall; inflorescence of 3-many spikelets in June to July. Found on sandy soil and drainage lines.	✓			✓			Unlikely to occur: no particularly suitable habitat and infrequently recorded; only one record in the locality from 1984. (NR=22 km S)	Unlikely to occur: no particularly suitable habitat present (drainage lines).
Tephrosia rosea var. Port Hedland (A.S. George 1114)	Low to medium-height shrub with a distinctive indumentum of white crimped hairs on the leaves. Typically on near-coastal plains, but occasional records further inland.						✓	May occur: suitable habitat likely to be present; no records from the locality, however recorded to the northwest and southeast. (NR=77 km SE)	Unlikely to occur: not observed during the survey despite good on-ground coverage.
Priority 2									
Goodenia hartiana	Erect to spreading, multi-stemmed perennial herb to low shrub. Occurs on sand, sand dune swales and sandhills.	✓			✓		✓	May occur: suitably sandy habitat likely to be present, but only one record in the locality. (NR=24 km SE)	Unlikely to occur: suitable habitat present but not recorded despite thorough searches. May have been more inconspicuous than usual due to the dry conditions, but is usually still identifiable by sticky foliage with glandular hairs, so should have been detected if present.

Taxon	Habit and Habitat (WA Herbarium 2024)	Source of Records						Likelihood of Occurrence within the Survey Area	
		Nature Map	ALA	EPBC PMST	DBCA WAHerb	DBCA TPFL	Biota (2024)	Initial Ranking Based in Desktop Study	Final Ranking Based on Results of Survey
Priority 3									
Acacia monticola x *tumida* var. *kulparn*	Shrub to 4 m tall but occasionally prostrate or semi-prostrate, with grey fibrous bark. Grows on coastal cliffs and sand.	✓			✓			May occur: suitable habitat may be present, but generally recorded closer to the coast; infrequently recorded in the Pilbara with only one record in the locality. (NR=36 km NNW)	Unlikely to occur: not recorded in the survey area.
Bonamia oblongifolia	Prostrate herb with blue flowers occurring on Pindan sands.						✓	Unlikely to occur: suitably sandy habitat likely to be present, but no records in the locality; recorded from Pindan sands to the east, but not known to occur this far west. (NR=67 km SE)	Unlikely to occur: suitable habitat present but not recorded during the survey, despite thorough searches. Very infrequently recorded.
Croton aridus	Monoecious, multi-stemmed, evergreen shrub to 1.5 m tall with yellow flowers in August. Grows in deep red sand, pindan soil, sandplains or ridges and spinifex sandplains.	✓			✓		✓	Likely to occur: suitable sandy habitat likely to be present. Ten records in the locality, all from the Nita land Ssstem. (NR=16 km SSE)	Unlikely to occur: suitable habitat present but not recorded during the survey, despite thorough searches.
Euphorbia clementii	Erect herb to 60 cm tall, growing on gravelly hill sides and stony ground.	✓			✓	✓		Unlikely to occur: several records in the locality but no suitable habitat likely to be present in the survey area. (NR=24 km S)	Unlikely to occur: no suitable habitat present.
Indigofera ammobia	Many-stemmed shrub to 50 cm tall with purple flowers in September. Grows on red sand and sand dunes.	✓			✓	✓	✓	May occur; suitable sandy habitat likely to be present; recorded to west and east of the survey area, but no records in proximity. (NR=37 km SW)	Unlikely to occur: suitable habitat present but not recorded during the survey. May have been in poor condition due to dry season, however it should still have been detected if present.
Nicotiana umbratica	Erect, short-lived annual or perennial herb to 70 cm tall, growing on shallow soils and rocky outcrops.	✓			✓			Unlikely to occur; no suitable habitat present in the survey area. (NR=27 km SW)	Unlikely to occur: no suitable habitat (rocky hills or gullies).

Taxon	Habit and Habitat (WA Herbarium 2024)	Source of Records						Likelihood of Occurrence within the Survey Area	
		Nature Map	ALA	EPBC PMST	DBCA WAHerb	DBCA TPFL	Biota (2024)	Initial Ranking Based in Desktop Study	Final Ranking Based on Results of Survey
Phyllanthus hebecarpus	Perennial herb to low shrub recorded from granite outcrops; *Phyllanthus* aff. *hebecarpus* recorded from low stony rises by Biota (2024).						✓	Unlikely to occur: suitable habitat unlikely to be present; no records from the locality, however recorded to the southwest and *P.* aff. *hebecarpus* recorded to the northeast. (NR=60 km NE)	Unlikely to occur: no suitable habitat.
Polymeria sp. Broome (K.F. Kenneally 9759)	Erect herb with pink flowers occurring on Pindan sands.						✓	Unlikely to occur: suitably sandy habitat likely to be present, but no records in the locality; recorded from Pindan sands to the east but not known to occur this far south. (NR=80 km NE)	Unlikely to occur: suitable habitat present but not recorded during the survey, despite thorough searches.
Rothia indica subsp. *australis*	Prostrate annual herb to 0.3 m tall, growing in sand hills and sandy flats.	✓			✓			May occur: suitable sandy habitat likely to be present; survey area is within known distribution but only one record in the locality. (NR=26 km SW)	May occur: suitable habitat present; not recorded during the field survey, but this annual species would have been unlikely to have been present and identifiable during the survey. It may still occur in good seasonal conditions.
Terminalia kumpaja	Tall shrub to low spreading tree with a dense canopy, distinct divaricate branching, and dark purple globular fruit with a walnut-like kernel.						✓	Unlikely to occur: suitably sandy habitat likely to be present, but no records in the locality; recorded from Pindan sands to the east but not known to occur this far south. (NR=80 km NE)	Unlikely to occur: suitable habitat present but not recorded during the survey.
Tribulopis marliesiae	Spreading herb with a perennial rootstock with corky bark, yellow flowers, and compound leaves with up to four pairs of terete to very slightly compressed linear leaflets.						✓	Unlikely to occur: suitably sandy habitat likely to be present, but no records in the locality; recorded from Pindan sands to the east but not known to occur this far west. (NR=58 km ENE)	Unlikely to occur: suitable habitat present but not recorded during the survey.

Taxon	Habit and Habitat (WA Herbarium 2024)	Source of Records						Likelihood of Occurrence within the Survey Area	
		Nature Map	ALA	EPBC PMST	DBCA WAHerb	DBCA TPFL	Biota (2024)	Initial Ranking Based in Desktop Study	Final Ranking Based on Results of Survey
Priority 4									
Bulbostylis burbidgeae	Tufted, erect to spreading annual sedge to 25 cm tall. Grows in granitic soils, usually in protected areas around granite outcrops, cliff bases; occasional records from near-coastal sandplain.	✓			✓			Unlikely to occur: suitable habitat unlikely to be present and no records in proximity. (NR= 27.0 km SW)	Unlikely to occur: no particularly suitable habitat.

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Appendix 4

Fauna Likelihood Assessment

Family	Species Name	Common Name	Conservation Status		Preferred Habitat	Occurrence in Locality	Preferred Habitat in Survey Area	Likelihood of Occurrence in Survey Area
			State	Federal				
REPTILES								
Cheloniidae	*Natator depressus*	Flatback Turtle	VU	VU; MI	Tropical coastal and continental shelf waters, breeding on sandy beaches.	Returned from DBCA, one record (2016) c. 45 km north of survey area.	Low	Would not occur
Scincidae	*Lerista separanda*	Dampierland Plain Slider	P2		Dune crests and sandy areas.	Returned from DBCA and ALA, record from the locality 28 km west of survey area (2006), although 30 km accuracy listed, so may be closer or further.	Moderate	Unlikely to occur / Low
Scincidae	*Liopholis kintorei*	Great Desert Skink	VU	VU	Spinifex (*Triodia* spp.) on arid sandy, clay or loamy flats.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Pythonidae	*Liasis olivaceus barroni*	Pilbara Olive Python	VU	VU	Rocky areas within the Pilbara, showing a preference for rocky gorges containing water in streams and rock pools.	Returned from fauna surveys, nearest record c. 26 km southeast of survey area.	Low	Unlikely to occur / Low
MAMMALS								
Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara, Ampurta	P4		Spinifex grasslands on sand plains and sandy swale between low dunes from southwestern Queensland across the Simpson, Tanami, and Great Sandy Deserts of southern and central Northern Territory and central Western Australia.	Returned from DBCA search, nearest record c. 21 km southwest of survey area.	High	Recorded
Dasyuridae	*Dasyurus hallucatus*	Northern Quoll	EN	EN	Rocky areas and tall open coastal eucalypt forests, sandstone escarpment.	Numerous DBCA records; the closest are seven records (2013) from c. 19 km southwest of survey area.	Low	Unlikely to occur / Low
Thylacomyidae	*Macrotis lagotis*	Bilby, Dalgyte	VU	VU	*Acacia* shrubland, open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas.	Numerous DBCA database records, closest (2019) c. 2 km west. Also recorded on two previous surveys in the locality, most recently in 2022.	High	Recorded
Notoryctidae	*Notoryctes caurinus*	Northern Marsupial Mole	P4		Desert sand dunes; mostly lives underground.	One previous DBCA record (1910), c. 40 km north of survey area (± 50 km accuracy).	Low	Unlikely to occur / Low
Macropodidae	*Lagorchestes conspicillatus leichardti*	Spectacled Hare-wallaby (mainland)	P4		Tropical spinifex (*Triodia* spp.) or tussock grasslands with mid-dense tree and shrub cover.	Returned from DBCA and ALA; three previous records (1990), the nearest is c. 14 km southwest of survey area.	Low	Unlikely to occur / Low
Muridae	*Leggadina lakedownensis*	Short-tailed Mouse	P4		Tussock grasslands on cracking clays, variety of grassland habitats particularly seasonally inundated sandy clay soils, but known to occur in eucalypt and melaleuca woodlands, samphire, acacia shrublands and stony ranges.	Returned from DBCA and ALA; nearest record 19 km east of survey area, in 1993.	Low	Unlikely to occur / Low
Muridae	*Pseudomys chapmani*	Western Pebble-mound Mouse	P4		Stony hillsides with hummock grasslands in the central and eastern parts of the Pilbara.	Numerous DBCA database records, closest (1993) is c. 19 km east.	Low	Unlikely to occur / Low
Rhinonycteridae	*Rhinonicteris aurantia*	Pilbara Leaf-nosed Bat	VU	VU	Across northern Australia is reliant on roost sites in caves or mine adits with stable, very hot (28–32°C) and very humid (96–100%) microclimates.	Numerous DBCA database records, the nearest is c. 22 km southwest of survey area.	Low	Unlikely to occur / Low
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	VU	Occurs in a broad range of habitats, with distribution being influenced by the availability of suitable caves and mines for roost sites.	Numerous DBCA database records, closest c. 26 km southeast of survey area and as recent as 2022.	Low	Unlikely to occur / Low
BIRDS								
Apodidae	*Apus pacificus*	Pacific Swift	MI	MI	Aerial over most habitats, largest numbers usually over coastal and near coastal plains.	Returned from DBCA, EPBC and eBird searches; nearest record (latest 2007) from c. 31 km southeast of survey area.	Moderate (aerial only)	Likely to occur / High
Cuculidae	*Cuculus optatus*	Oriental Cuckoo	MI	MI	Dense to open woodlands and forest, especially riparian areas, rainforest patches, vine thickets, mangroves.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low

Family	Species Name	Common Name	Conservation Status		Preferred Habitat	Occurrence in Locality	Preferred Habitat in Survey Area	Likelihood of Occurrence in Survey Area
			State	Federal				
Charadriidae	*Pluvialis squatarola*	Grey Plover	MI	VU; MI	Coastal and estuarine intertidal flats, sandy beaches, salt ponds, and adjacent rocky shorelines. Less commonly on near-coastal salt lakes and sewage ponds.	Returned from DBCA and EPBC PMST search; nearest record c. 40 km north of survey area.	Low	Unlikely to occur / Low
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	MI	MI	Coastal and estuarine intertidal flats, sandy beaches and adjacent rocky shorelines, shallow margins of freshwater wetlands including sewage ponds, short grasslands including sport fields.	Returned from DBCA and EPBC PMST search; nearest record c. 40 km north of survey area.	Low	Unlikely to occur / Low
Charadriidae	*Charadrius veredus*	Oriental Plover	MI	MI	Open plains, bare, rolling country, muddy or sandy wastes near inland swamps or tidal mudflats; bare claypans, margins of coastal marshes; grassy airfields, sports fields, lawns and coastal dune areas.	Returned from DBCA and EPBC PMST search; nearest record c. 40 km north of survey area.	Moderate	May occur / Moderate
Charadriidae	*Anarhynchus mongolus*	Siberian Sand Plover	EN[1]	EN; MI	Coastal and estuarine intertidal flats, sandy beaches, salt ponds.	Returned from ALA search and EPBC PMST; records confined to coast c.40 km north of survey area.	Low	Unlikely to occur / Low
Charadriidae	*Anarhynchus leschenaultii*	Greater Sand Plover	VU[1]	VU; MI	Coastal and estuarine intertidal flats, sandy beaches, occasionally adjacent rocky shorelines; less commonly near-coastal wetlands, salt lakes and salt ponds.	Multiple DBCA database records (2015) from c. 37 km north.	Low	Unlikely to occur / Low
Rostratulidae	*Rostratula australis*	Australian Painted-snipe	EN	EN	Shallow vegetated ephemeral wetlands. Less commonly saltmarsh, claypans, sewage farms, dams, bores and irrigation channels.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Scolopacidae	*Numenius phaeopus*	Eurasian Whimbrel	MI	MI	Coastal and estuarine intertidal flats, saltmarsh, tidal creeks and mangroves; less commonly sandy beaches and rocky shorelines.	Multiple DBCA database records (2015) from c. 40 km north.	Low	Unlikely to occur / Low
Scolopacidae	*Numenius minutus*	Little Curlew	MI	MI	Short grassland plains and bare country, roosts on sandy beaches and mudflats or margins of wetlands.	Returned from ALA search and EPBC PMST; records confined to coast c. 40 km north of survey area.	Moderate	May occur / Moderate
Scolopacidae	*Numenius madagascariensis*	Far Eastern Curlew	CR[1]	CR; MI	Coastal and estuarine intertidal mudflats and sandflats, adjacent sandy beaches, saltmarsh, tidal creeks and mangrove fringes.	Multiple DBCA database records (2015) from c. 40 km north.	Low	Unlikely to occur / Low
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	CR[1,2] (ssp. *menzbieri*) / VU[1] (ssp. *baueri*)	EN (both ssp.); MI	Coastal and estuarine intertidal flats, adjacent sandy beaches and rocky shorelines, near-coastal salt lakes and saltworks ponds.	Multiple DBCA and ALA database records (2015) from c. 40 km north.	Low	Unlikely to occur / Low
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	MI	EN; MI	Shallow freshwater wetlands, coastal and estuarine intertidal mudflats, preferring softer, muddy substrates, adjacent sandy beaches, saltworks ponds.	Multiple DBCA and ALA database records (2015) from c. 40 km north.	Low	Unlikely to occur / Low
Scolopacidae	*Gallinago megala*	Swinhoe's Snipe	MI	MI	Shallow margins of well-vegetated freshwater wetlands, including sewage ponds, damp grasslands.	One previous DBCA database record (1979) from c. 21 km south of Shay Gap townsite sewage ponds.	Low	Unlikely to occur / Low
Scolopacidae	*Gallinago stenura*	Pin-tailed Snipe	MI	MI	Shallow margins of well-vegetated freshwater wetlands, including sewage ponds, damp grasslands.	One DBCA database record (1979) from c. 21 km south of Shay Gap townsite sewage ponds.	Low	Unlikely to occur / Low
Scolopacidae	*Xenus cinereus*	Terek Sandpiper	MI	VU; MI	Coastal and estuarine intertidal flats, saltworks ponds, adjacent sandy beaches and rocky shorelines.	Multiple DBCA and ALA database records (2015) from c. 40' km north.	Low	Unlikely to occur / Low
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	MI	MI	Margins of coastal and inland wetlands, including mangroves/mangrove creeks, rocky shorelines, riverbanks, sewage ponds, but less often intertidal flats.	Multiple DBCA and ALA records from coast, c. 37 km north (most recent in 2007).	Low	Unlikely to occur / Low

Family	Species Name	Common Name	Conservation Status		Preferred Habitat	Occurrence in Locality	Preferred Habitat in Survey Area	Likelihood of Occurrence in Survey Area
			State	Federal				
Scolopacidae	*Tringa brevipes*	Grey-tailed Tattler	MI; P4	MI	Coastal and estuarine intertidal flats and adjacent sandy beaches and rocky shorelines, mangrove fringes, near-coastal wetlands.	Multiple DBCA and ALA database records (2015) from c. 40 km north.	Low	Unlikely to occur / Low
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	MI	MI	Shallow freshwater wetlands and wetland margins, less commonly intertidal mudflats.	Returned from DBCA and ALA searches, nearest record (1980) from c. 30 km northwest of survey area.	Low	Unlikely to occur / Low
Scolopacidae	*Tringa glareola*	Wood Sandpiper	MI	MI	Shallow freshwater wetlands and wetland margins, particularly ones with taller fringing vegetation, including sewage ponds.	One DBCA record (2007) from c. 41 km south.	Low	Unlikely to occur / Low
Scolopacidae	*Tringa totanus*	Common Redshank	MI	MI	Most Australian records from coastal and estuarine tidal flats or roosting on adjacent sandy beaches or rocky shorelines. Uses a broad range of wetland habitats overseas.	Returned from ALA search; multiple records, most recent in 2015 from c. 35 km north of survey area along coastal habitats.	Low	Unlikely to occur / Low
Scolopacidae	*Tringa nebularia*	Common Greenshank	MI	EN; MI	Inhabits a variety of coastal and freshwater habitats, intertidal flats and adjacent sandy beaches, mangrove fringes, shallow freshwater wetlands and wetland margins, salt ponds; less commonly on sandy beaches.	Returned from DBCA search, nearest record (2015) from c. 37 km north of survey area.	Low	Unlikely to occur / Low
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	MI	VU; MI	Coastal and estuarine intertidal flats, sandy beaches esp. with extensive tide wrack, rocky shorelines, near-coastal salt lakes and salt ponds.	Returned from DBCA and ALA searches (2015), from c. 37 km northwest of survey area.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris tenuirostris*	Great Knot	CR	VU; MI	Coastal and estuarine intertidal mudflats, adjacent sandy beaches and rocky shorelines, near-coastal salt lakes and salt ponds.	Returned from DBCA search, nearest record (2015) from c. 37 km north of survey area.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris canutus*	Red Knot	EN	VU; MI	Coastal and estuarine intertidal mudflats, adjacent sandy beaches and rocky shorelines, near-coastal salt lakes and salt ponds, occasionally near-coastal freshwater wetlands.	Returned from DBCA search, nearest record (2015) from c. 37 km north of survey area.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris pugnax*	Ruff	MI	MI	Shallows and margins of coastal and inland wetlands, preferring freshwater, less commonly estuarine intertidal mudflats and salt ponds.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris falcinellus*	Broad-billed Sandpiper	MI	MI	Coastal and estuarine intertidal mudflats, adjacent sandy beaches and rocky shorelines, salt ponds, less commonly shallow margins of freshwater wetlands.	Returned from ALA search, multiple records from c. 35 km north of survey area along coastal habitats.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	MI	MI	Freshwater wetlands.	One DBCA database record (1980) from c. 30 km northwest.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR; MI	CE; MI	Intertidal zones.	One DBCA database record (1980) from c. 30 km northwest.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	MI	MI	Variety of wetland habitats including coastal and estuarine intertidal flats, adjacent sandy beaches and rocky coasts, muddy fringes of freshwater wetlands, sewage ponds, salt ponds.	One DBCA database record (1982) from c. 30 km north-west.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris alba*	Sanderling	MI	MI	Sandy ocean beaches; less commonly tidal sand or reef flats.	Multiple DBCA and ALA database records (2015) from c. 40 km north.	Low	Unlikely to occur / Low
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	MI	MI	Shallows and margins of freshwater wetlands, occasionally coastal or estuarine intertidal flats and flooded samphire.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low

Family	Species Name	Common Name	Conservation Status		Preferred Habitat	Occurrence in Locality	Preferred Habitat in Survey Area	Likelihood of Occurrence in Survey Area
			State	Federal				
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	MI	MI	Primarily forages aerially over open country, roosts on bare ground near water (e.g. tidal flats, sandy beaches, margins of freshwater wetlands).	Two regional records from DBCA (2013), from c. 50 km northwest of survey area.	Moderate	May occur / Moderate
Laridae	*Sternula albifrons*	Little Tern	MI	MI	Sheltered coastal waters, estuaries, and tidal creeks, roosting on adjacent sandy and rocky shorelines; breeds on open sandy beaches.	Returned from DBCA and ALA searches, nearest record (2015) from c. 40 km northwest of survey area.	Low	Would not occur
Laridae	*Gelochelidon nilotica*	Common Gull-billed Tern	MI	MI	Coasts and estuaries, often in vicinity of tidal mudflats, near-coastal wetlands, sometimes forages over coastal grassland and samphire flats. Breeds in northern hemisphere.	Returned from DBCA and ALA searches, nearest record from c. 40 km northwest of survey area (2009).	Low	Unlikely to occur / Low
Laridae	*Gelochelidon macrotarsa*	Australian Tern	MI	MI	Coasts and estuaries, particularly in vicinity of intertidal flats, inland wetlands, grasslands and open country (sometimes far from water). Breeding primarily on large ephemeral wetlands inland.	Returned from ALA search, multiple records from 35 km north of survey area along coastal habitats.	Moderate	May occur / Moderate
Laridae	*Hydroprogne caspia*	Caspian Tern	MI	MI	Sheltered coastal waters, estuaries, and larger inland water bodies (including larger rivers, reservoirs, fresh and salt lakes, salt ponds).	Returned from DBCA search, nearest regional record 37 km northeast of survey area.	Low	Unlikely to occur / Low
Laridae	*Chlidonias leucopterus*	White-winged Tern	MI	MI	Estuaries, sheltered seas, freshwater wetlands, sewage ponds, and flooded grasslands and samphire flats.	Returned from ALA search, multiple records from 35 km north of survey area along coastal habitats.	Low	Unlikely to occur / Low
Laridae	*Sterna hirundo*	Common Tern	MI	MI	Sheltered seas, coasts, estuaries, salt ponds, occasionally other near-coastal wetlands.	Returned from DBCA search, nearest regional record 37 km northeast of survey area.	Low	Would not occur
Laridae	*Thalasseus bergii*	Greater Crested Tern	MI	MI	Coastal seas and estuaries, primarily inshore but foraging offshore as far as continental shelf edge; roosts on sandy beaches, rocks and man-made structures. Breeds on sandy or rocky offshore islands.	Returned from DBCA search, nearest record c. 37 km northeast of survey area (1978).	Low	Would not occur
Fregatidae	*Fregata ariel*	Lesser Frigatebird	MI	MI	Aerial over tropical coasts and seas, breeding on offshore islands.	Returned from ALA search, records confined to coastal region 40 km north of survey area.	Low	Would not occur
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	MI	MI	Shallows of wetlands and floodplains, occasionally dry grasslands.	Returned from DBCA search, nearest record 29 km south of survey area (2007).	Low	Unlikely to occur / Low
Pandionidae	*Pandion haliaetus*	Osprey	MI	MI; MA	Estuaries, coasts and offshore islands, less commonly large inland wetlands.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Accipitridae	*Erythrotriorchis radiatus*	Red Goshawk	VU	EN	Tall open forest and woodland, especially along watercourses with tall eucalypts and melaleucas, potentially occupying wider range of habitats post-breeding.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Falconidae	*Falco hypoleucos*	Grey Falcon	VU	VU	Lightly wooded or untimbered arid plains, especially those that are crossed by major watercourses lined with taller trees, or isolated man-made structures such as communications towers.	Twp DBCA database historical records (1999), closest c. 40 km southwest.	Moderate	Likely to occur / High
Falconidae	*Falco peregrinus*	Peregrine Falcon		OS	Most habitats, favouring areas with concentrations of bird prey (e.g. wetlands, coastal cliffs with seabird colonies, cities with large numbers of feral pigeons). Cliff faces preferred for breeding, but also nests in trees (using old stick nests of other species or tree hollows) where cliffs are in short supply.	Returned from DBCA and ALA searches, nearest record 34 km east of survey area (1999).	Moderate	Likely to occur / High
Psittacidae	*Pezoporus occidentalis*	Night Parrot	CR	EN	Old growth spinifex, often in association with samphire.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Hirundinidae	*Hirundo rustica*	Barn Swallow	MI	MI	Open country with low vegetation, often near man-made structures.	Returned from DBCA search, one record ~45 km north of survey area (2000).	Low	Unlikely to occur / Low

Family	Species Name	Common Name	Conservation Status		Preferred Habitat	Occurrence in Locality	Preferred Habitat in Survey Area	Likelihood of Occurrence in Survey Area
			State	Federal				
Motacillidae	*Motacilla tschutschensis*	Eastern Yellow Wagtail	MI	MI	Short grasslands and bare ground (including sports ovals, agricultural areas), wetland margins, sewage ponds.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low
Motacillidae	*Motacilla cinerea*	Grey Wagtail	MI	MI	A variety of habitats near water, particularly along fast-flowing freshwater waterways. Rare migrant to the Kimberley region, vagrant elsewhere in the state.	Returned from EPBC PMST search only; no database records within desktop study area.	Low	Unlikely to occur / Low

1. The Migratory listing under the BC Act has been repealed for species also listed as threatened (i.e. CR, EN. VU), but note that these species still satisfy all other criteria for Migratory listing in addition to the criteria for their threatened listings, and would be expected to be re-listed as Migratory should they be delisted as threatened.
2. Subspecies *menzbieri* listed as Critically Endangered, subspecies *baueri* as Vulnerable – field identification can be challenging, but vast majority of Bar-tailed Godwit in Western Australia belong to ssp. *menzbieri*.

Appendix 5

Flora Site Raw Data

Yarrie Water Bore Survey Site YWB-01

Described by	CEF
Date	23/07/2024
Type	Relevé 50x50m
Central Coordinate	51 207486 mE, 7752290 mN
Habitat	Undulating sandy plain.
Soil	Orange sand.
Rock Type	None present.
Vegetation	Scattered low trees of *Corymbia zygophylla*, *Erythrophleum arenarium* over tall open shrubland of *Acacia monticola*, (*A. eriopoda*) over open hummock grassland of *Triodia schinzii*.
Veg Condition	Very Good: some cow scats, very dry.
Fire Age	Burnt 3-5 years ago.
Notes	Some dead *Acacia monticola*.

Species	Cover (%)	Height (cm)	Specimen Code	Notes
Acacia eriopoda	1	250	=CF01	
Acacia monticola	5	220		
Acacia tumida var. *kulparn*	0.1	200		
Bonamia alatisemina	0.1	10		
Bonamia erecta	0.1	25		
Corymbia zygophylla	0.5	350	=CF05	
Eragrostis eriopoda	0.1	20	YWB01-01	
Eriachne obtusa	0.1	25		
Erythrophleum arenarium	1.5	180	=CF02	Potentially resprouting
Jacksonia aculeata	0.1	35	=CF03	
Rhynchosia minima	0.1	10		
Trigastrotheca molluginea	0.1	15		
Triodia schinzii	29	35	=CF07	

YWB-01

Yarrie Water Bore Survey Site YWB-02

Described by CEF
Date 23/07/2024
Type Relevé 50x50m
Central Coordinate 51 207682 mE, 7752667 mN
Habitat Undulating sandy plain.
Soil Orange sand.
Rock Type None present.
Vegetation Scattered low trees of *Owenia reticulata* over tall shrubland of *Acacia eriopoda, A. ancistrocarpa* over open hummock grassland of *Triodia schinzii* and scattered tussock grasses of *Eragrostis eriopoda*.
Veg Condition: Very Good: potential asbestos, camel tracks.
Fire Age Burnt 3-5 years ago.

Species	Cover (%)	Height (cm)	Specimen Code	Notes
Acacia ancistrocarpa	6	220		
Acacia eriopoda	6	210	=CF01	
Acacia stellaticeps	0.1	40	=CF10	
Acacia tumida var. *kulparn*	0.1	200	CF14	
Bonamia erecta	0.1	25		
Calytrix carinata	0.1	45		
Cassytha capillaris	0.1	40		
Eragrostis eriopoda	0.5	25	= YWB01-01	
Erythrophleum arenarium	0.1	120	=CF02	
Evolvulus alsinoides	0.1	10		
Owenia reticulata	1	500		
Scaevola parvifolia	0.1	25		
Sida sp.	0.1	15	=CF04	*Sida* sp. Pindan (B.G. Thomson 3398)
Trigastrotheca molluginea	0.1	10		
Triodia schinzii	28	25	=CF07	


YWB-02

Appendix 6

Vascular Flora Species List

Family	Species
Boraginaceae	*Halgania solanacea* (inadequate material; var. not determined)
Convolvulaceae	*Bonamia alatisemina*
Convolvulaceae	*Bonamia erecta*
Convolvulaceae	*Evolvulus alsinoides* (sterile; var. not determined)
Fabaceae	*Acacia ancistrocarpa*
Fabaceae	*Acacia eriopoda*
Fabaceae	*Acacia monticola*
Fabaceae	*Acacia stellaticeps*
Fabaceae	*Acacia tumida* var. *kulparn*
Fabaceae	*Erythrophleum arenarium*
Fabaceae	*Jacksonia aculeata*
Fabaceae	*Leptosema anomalum*
Fabaceae	*Rhynchosia minima*
Fabaceae	*Tephrosia* sp. D Kimberley Flora (R.D. Royce 1848)
Fabaceae	*Zornia chaetophora*
Goodeniaceae	*Scaevola parvifolia* (sterile; subsp. not determined)
Lamiaceae	*Newcastelia cladotricha*
Lauraceae	*Cassytha capillaris*
Malvaceae	*Sida arenicola*
Malvaceae	*Sida* sp. (*Sida* sp. Pindan (B.G. Thomson 3398))
Meliaceae	*Owenia reticulata*
Molluginaceae	*Trigastrotheca molluginea*
Myrtaceae	*Calytrix carinata*
Myrtaceae	*Corymbia zygophylla*
Poaceae	*Aristida holathera* var. *holathera*
Poaceae	*Aristida inaequiglumis*
Poaceae	*Chrysopogon fallax*
Poaceae	*Eragrostis eriopoda*
Poaceae	*Eriachne obtusa*
Poaceae	*Triodia schinzii*
Proteaceae	*Grevillea eriostachya*
Proteaceae	*Grevillea wickhamii* (sterile; subsp. not determined)
Rubiaceae	*Gardenia pyriformis* subsp. *keartlandii*