RECONNAISSANCE FLORA, VEGETATION AND BASIC FAUNA SURVEY REPORT

CBH Perenjori Receival Site

Perenjori, WA 6620

Final

16/09/2022

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

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1. Introduction, Scope and Background Information

CBH Group, here in referred to as "the client" commissioned Bio Diverse Solutions as Environmental Consultants to undertake an out of season reconnaissance flora and vegetation survey and a basic (previously reconnaissance) fauna assessment of the proposed Perenjori CBH Receival Site.

The scope of works include:

- Desktop assessment of the survey area, including all publicly available database searches for threatened flora, vegetation communities and threatened fauna data;
- An out-of-season reconnaissance flora and vegetation survey across survey area to identify vegetation units, condition, possible ecological communities and conservation significant flora habitat;
    - This included a likelihood of occurrence assessment for all conservation significant flora species identified in desktop searches;
    - TPFL forms for new populations of Priority or Threatened flora to be submitted to DBCA;
- Identification and mapping of the vegetation condition within the survey area using the EPA (2016) condition scale, including the location of any Weeds of National Significance or Declared Weeds;
- Identification of flora species, including herbarium identification if required;
- Undertake a basic fauna (including targeted threatened fauna) survey across the survey area, field GPS fauna habitat and threatened and priority fauna (if present);
    - This included a likelihood of occurrence assessment for all conservation significant fauna species identified in desktop searches; and
    - Black Cockatoo habitat assessment.
- Prepare IBSA data package as per EPA guidelines; and
  Preparation of a reconnaissance flora, vegetation, and basic fauna survey report, which will be aligned with the appropriate government agency legislation and guidelines.

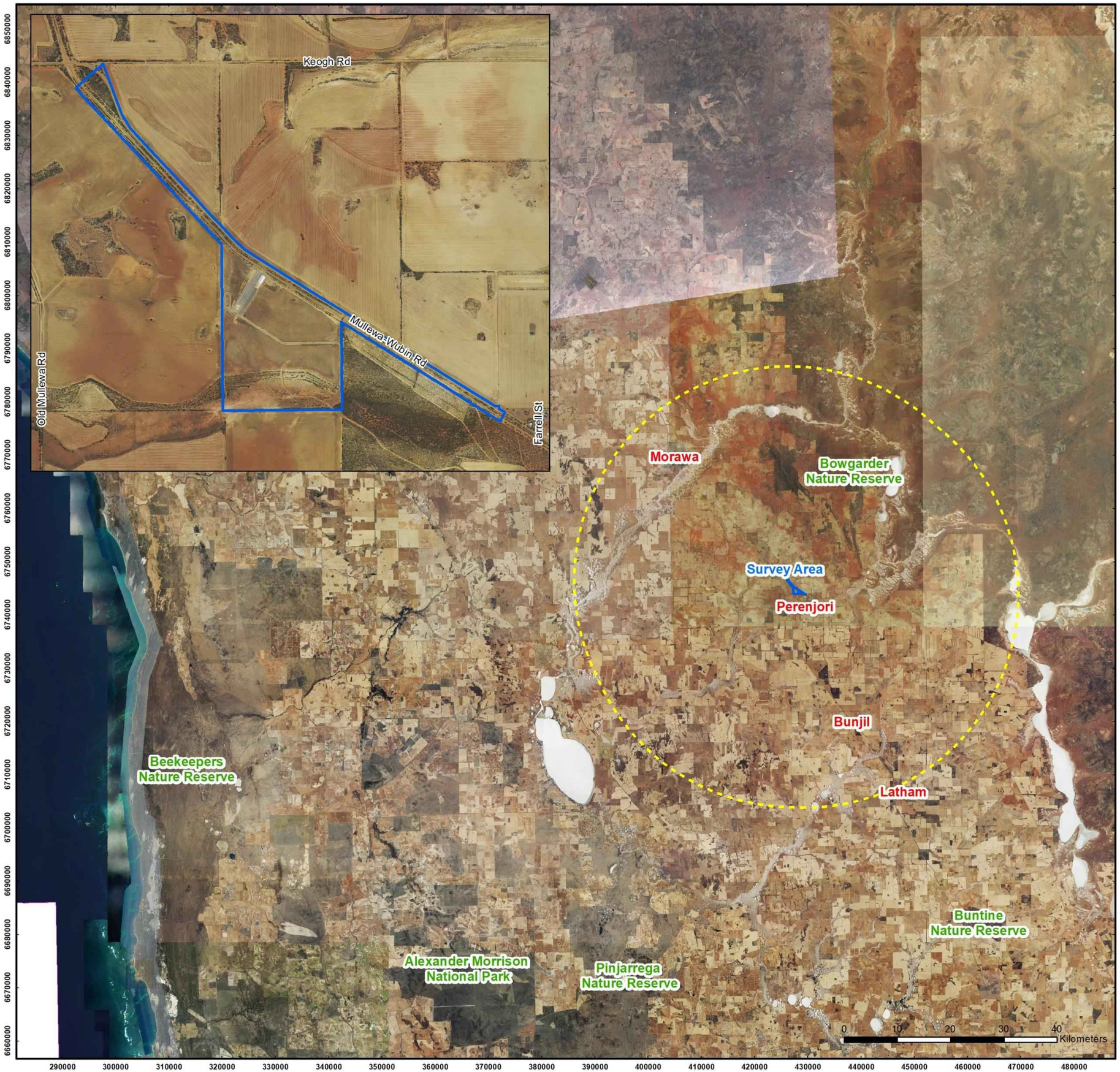
1.1. Location and Development Proposal

The "survey area" is defined as the 140.4 ha area situated to the northwest of the Perenjori townsite within the direct vicinity of the CBH Perenjori receival site on Wubin-Mullewa Road, in the Shire of Perenjori. This area has been earmarked by CBH as a future expansion of the existing Perenjori Receival Site. The survey area contains the existing CBH lot, Wubin -Mullewa Road, and the existing railway infrastructure. A map of the survey area locality is provided in Figure 1. The "study area" consists of the 40 km radius around the survey area, used for indications of likelihood of occurrence of threatened or priority flora and ecological communities. It provides a broader local context and assessment of the survey area.

1.2. Alignment to Legislation, Guidelines and Policies

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

- *Environmental Protection and Biodiversity Conservation Act 1999* (EP Act). Administered by the Australian Government of Department of Agriculture, Water and Environment (DAWE);
- *Biodiversity Conservation Act 2016* (BC Act). Administered by the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA);
- *Environmental Protection Act 1986* (EP Act). Administered by the Western Australian Department of Water and Environmental Regulations;
- *Biosecurity and Agriculture Management Act 2007* (BAM Act);
- EPA (2016) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment;
- EPA (2020) Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact;
- DEWHA (2010) Survey Guidelines for Australia's Threatened Birds;
- DSEWPaC (2011) Survey Guidelines for Australia's Threatened Mammals; and
- DSEWPaC (2012) Referral Guidelines for Three Threatened Black Cockatoo Species.
- DAWE (2022) Referral guideline for 3 WA threatened black cockatoo species.



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Overview Map Scale 1:10,000,000

Legend

- Survey Area
- 40 km Study Area

Scale
1:700,000 @ A3
GDA MGA 94 Zone 50

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

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Figure 1: Survey Area Locality

	QA Check	*Drawn by*
	BMT	**CvdM**
STATUS **FINAL**	*FILE* **CBH0019**	*DATE* **26/07/2022**

1.3. Geology and soils

Database searches shows the survey area lies within the Granada System (271Gn). The Granada System is described as *"Undulating terrain, broad ridges & shallow valleys. Weathered adamellite-granodiorite. Yellow and brown deep sands, brown and red sandy earths, red-brown hardpan shallow loams & sandy and loamy duplexes. Scrub heath & York gum - salmon gum."* (DPIRD, 2021).

The Irwin River Zone is described as "*The Irwin and Lockier River catchments within the Yilgarn Craton. Archaean granites, gneisses, metasediments and basic igneous rocks."* (DPIRD, 2018a). The soil types within the application area are mapped as the Granada 1 Subsystem (271Gn_1) and the Granada 5 Subsystem (271Gn_5). The Granada 1 Subsystem is described as "*Undulating plain to low rises with broad convex gently inclined slopes; yellow and brown deep sands and loamy earths, some shallow loams over red-brown hardpans"* and the Granada 5 Subsystem is described as *"Undulating rises with broad gravelly ridge crests, long gentle gradients; Yellow deep sands and sandy earths, some gravels"* (DPIRD, 2019a).

1.4. Climate

The closest open Bureau of Meteorology (BoM) site is Morawa Airport (008296). The average annual temperature in Morawa ranges from 12.9–28.3°C. The average summer temperature ranges between 17.6-37.4°C, whilst average winter temperatures range between 6.2-20.3°C. The annual mean rainfall for Morawa Airport is 286.6mm (BoM, 2022). On average the months of May – August are the months with the highest rainfall (Figure 2). There was higher than average rainfall recorded in the months of July and October 2021 and February and March 2022 (Figure 2). The total rainfall in the year previous to the survey (June 2021 – May 2022) was 323.4 mm which is 36.8mm above average and equates to 12.8% increase in average rainfall.

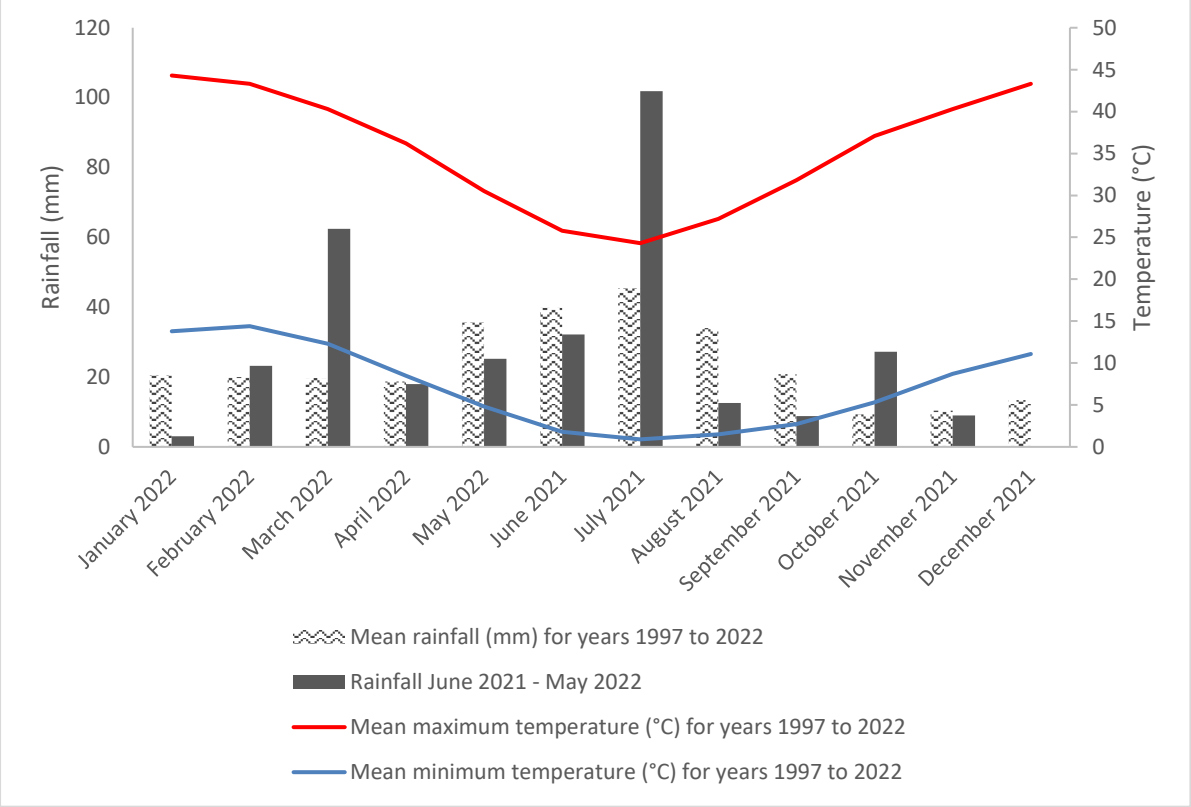


Figure 2: Temperature and Rainfall Data for Morawa Airport BoM Weather Station No. 008296

1.5. Habitat Connectivity

Habitat connectivity assessments rely on a bioregional and landscape-scale approach to evaluate habitat for fauna movement and ecological linkage across a region. Habitat connectivity is largely reliant on remnant vegetation, recognising it plays a very important role in developing corridors between protected areas to assist in achieving long-term biodiversity management

outcomes (Wilkins *et al*. 2006). The survey area lies within a highly modified landscape consisting of agricultural properties. The Buntine Nature Reserve is located approximately 66 km south-southeast of the survey area. The Pinjarrega Nature Reserve and Alexander Morrison National Park are located approximately 73 and 78 km to the south-southwest, respectively. There are other small to large areas of remnant bushland located to the north, south, east and east of the survey area. The survey area is ultimately linked to these surrounding areas of vegetation through the existing road reserves, and vegetation within private property.

1.6. Water and Wetlands

The survey area does not lie within any Public Drinking Water Source areas (DWER, 2020a). The survey area lies within the Northern Zone of Ancient Drainage (HZ07_NAD) Hydrological Zone (DPIRD, 2018b). The Northern Zone of Ancient Drainage zone is described as "*An ancient plain of low relief & lateritic uplands on weathered granite. Ranges & stony plains in the north-east. No connected drainage, remnant salt lake chains occur in ancient drainage systems which now only function in very wet years.*" (DPIRD, 2018b). The survey area lies within the Yarr Monger Hydrographic Catchment (DWER, 2018a) and within the Yarra Hydrographic Sub catchment (DWER, 2018b).

1.7. Environmentally Sensitive Areas

The survey area does not contain any Environmentally Sensitive Areas (ESA), the nearest site lying approximately 12km to the north east (DWER, 2020b).

1.8. Remnant Vegetation

The survey area lies within the Avon Wheatbelt Bioregion and the Merredin (AW01) subregion. Beecham (2001) describes the Avon Wheatbelt Bioregion as "an area of active drainage dissecting a Tertiary plateau in Yilgarn Craton. Gently undulating landscape of low relief. Proteaceous scrubheaths, rich in endemics, on residual lateritic uplands and derived sandplains; mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on Quaternary alluvials and eluvials." The AW01 subregion is described as "an ancient peneplain with low relief, gently undulating landscape. There is no connected drainage; salt lake chains occur as remnants of ancient drainage systems that now only function in very wet years. Lateritic uplands are dominated by yellow sandplain" (Beecham, 2001).

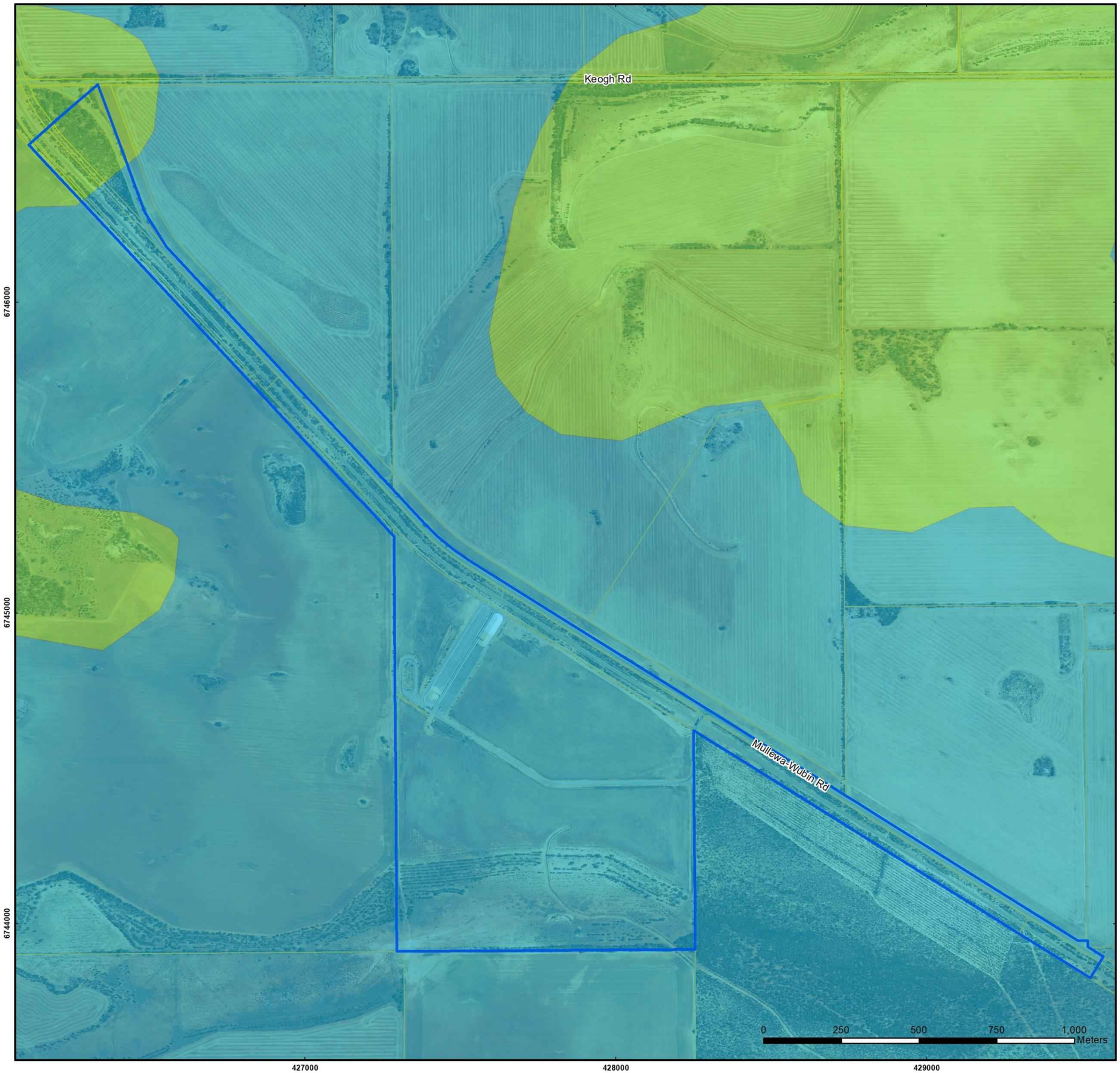
The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd *et al.* 2002) in the 1970s where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett, 2010). Vegetation units were regarded as associations and were grouped into Vegetation Systems representing a particular pattern of association distribution within a given area. A GIS search of J.S. Beards (Beard *et al.* 2013) vegetation classification places the survey area within two Vegetation Association (DPIRD, 2019b) Refer to Figure 21 in Appendix A:

- **System Association Name**: Perenjori
- **Vegetation Association Number:** 352
- **Structure Description:** Woodland other
- **Floristic Description:** Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia. Goldfields; gimlet, redwood etc. E. salubris, E. oleosa. Riverine; rivergum E. camaldulensis. Tropical; messmate, woolybush.
- **Remnant Vegetation by Beard Association Rarity in LGA:** 29.99% remaining (GoWA, 2019).
- **Remnant Vegetation by Beard Association Rarity in IBRA Region:** 7.88% remaining (GoWA, 2019).

- **System Association Name**: Perenjori
- **Vegetation Association Number:** 551
- **Structure Description:** Thicket
- **Floristic Description:** Wattle, casuarina and tea tree acacia-allocasuarina-melaleuca alliance.
- **Remnant Vegetation by Beard Association Rarity in LGA:** 7.92% remaining (GoWA, 2019).
- **Remnant Vegetation by Beard Association Rarity in IBRA Region:** 11.63% remaining (GoWA, 2019).

1.9. Heritage

The survey is located within the Wudjari Nyungar nation, and not located within a registered heritage site (DPLH, 2022). The closest Aboriginal heritage site is the Mongers Lake Waterway (Site 24380) located approximately 1.3 km to the southeast of the survey area. It is recognised that there has been a large scale of loss of cultural knowledge and information, and the survey area may contain additional heritage values that are not recognised through Department of Planning Lands and Heritage Aboriginal Heritage Inquiry System (AHIS; DPLH, 2022).



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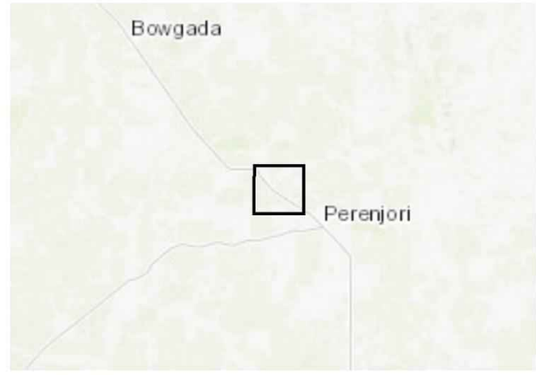

Overview Map Scale 1:5,000,000

Legend

- Survey Area
- Cadastre

Pre European Vegetation (DPIRD_006)

System, Vegetation Association

- Perenjori, 352
- Perenjori, 551

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

Scale
1:12,000 @ A3
GDA MGA 94 Zone 50

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Figure 3: Desktop Vegetation Data

	QA Check	*Drawn by*
	BMT	**CvdM**
STATUS **FINAL**	*FILE* **CBH0019**	*DATE* **26/07/2022**

2. Methodology – Desktop Assessment

2.1. Flora and Vegetation

Desktop inventory of potential conservation significant flora species likely to occur within 10-30 km of the survey area was undertaken using the following databases:

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

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

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

2.2. Fauna

A desktop inventory of conservation significant fauna species known to occur within 30-40 km of the survey area was undertaken using the following databases:

- 30 km Nature Map Database Search (combined data from DBCA, WA Museum and WA Herbarium);
- 30 km Protected matters search tool (DAWE, 2022a); and
- 40 km Fauna DBCA database records (DBCA, 2022c).

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

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

Desktop assessment for the Black Cockatoo habitat consisted of reviewing DBCA locational records and a range of publicly available datasets relevant to Black Cockatoo breeding, roosting and foraging areas. These included:

- Carnaby's Cockatoo Confirmed (DBCA_050; DBCA, 2018a) and Unconfirmed Roost Sites (DBCA_051; DBCA, 2018b).
- Carnaby's Cockatoo Confirmed (DBCA_52; DBCA, 2018c) and Unconfirmed Roost Sites Buffered 6km (DBCA-053; DBCA, 2018d).
- Carnaby's Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA_054; DBCA, 2018e).
- Carnaby's Cockatoo Unconfirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-055; DBCA, 2018f).
- Black Cockatoo Breeding Sites - Buffered DBCA_063 (DBCA, 2019a).
- Black Cockatoo Roosting Sites – Buffered DBCA_064 (DBCA, 2019b).

3. Methodology – Field Survey

3.1. Flora and Vegetation

The aim of this survey was to provide context and gather knowledge of the survey area. This type of survey aims to verify the desktop information obtained, and to characterise the flora and vegetation units present within the survey area.

An out-of-season season reconnaissance level flora and vegetation survey was undertaken by Kylie Sadgrove (Botanist/Ecologist) and Taryn Brebner (Botanist) of Natural Area Holdings on the 22nd, 23rd and 24th June 2022. The survey area was surveyed on foot using traverses and relevés. The intent of the traverses was to identify and map the different vegetation units, their condition category and to undertake more intensive targeted surveys within suitable habitat for conservation significant species. In addition, three relevés were systematically surveyed within representative vegetation units to enable thorough recording of species occurrence and representative vegetation descriptions. The vegetation units occurring within the survey area were mapped and described using opportunistic mapping and relevés. Vegetation units were formally described based on data collected within the relevé, using the basic survey general descriptions as a guide. Vegetation units were distinguished through changes in structure, dominant taxa and cover characteristics, which is described in both Muirs and NVIS Level 5 (sub-association) description methods.

Three relevés were systematically surveyed within representative vegetation units to enable analysis and categorisation across the ecological communities present (refer to Appendix D). The flora was systematically recorded within the relevés and collections of plant specimens were made where further identification was required, using Kylie Sadgrove's Regulation 62 Flora Taking Licence FB62000234. For species that were not flowering and where foliage or nuts / fruit couldn't be used for identification, potential habitat was used as an indication of the likelihood of species occurrence.

Information collected within each relevé included:

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

3.2. Flora and Vegetation Survey Limitations and Constraints

An assessment of potential survey limitations was undertaken as per the EPA (2016) document *Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment* refer to Table 1 below. Limitations were present, primarily relating to the timing of the out-of-season nature of the reconnaissance survey.

Table 1: Assessment of potential survey limitations.

Limitation	Significance of limitation	Comment
Experience of personnel	Nil	Kylie Sadgrove has over 5 years' experience at conducting targeted, reconnaissance and detailed flora surveys, and is competent in taxonomic identification and assessment of vegetation. Taryn Brebner has over 5 years' experience at conducting basic and targeted flora surveys and providing assistance in the field collection of data.
Survey timing	Major	The Shire of Perenjori is categorised as part of the Avon Wheatbelt botanical province. The primary survey period for this area is spring (September – November). As such this survey was undertaken outside of the ideal flowering period for the region.
Access restrictions	Nil	No access restrictions were encountered during the survey.

Table 1 cont.

Limitation	Significance of limitation	Comment
Availability of contextual information	Nil	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. Database searches were conducted through DBCA (DBCA, 2022a; b) providing more comprehensive context of potential conservation significant species potentially present within the survey area.
Survey effort and extent	Nil	134 species were identified during the survey and three relevé data sets collected to gain as complete a picture as possible of flora species present at the site. An additional five species contained no diagnostic characteristics to enable identification, with four species only able to be identified to genus level. A random meandering traverse ensured that all areas within 5 m of each other were covered. The survey effort expended was appropriate for a reconnaissance survey which was conducted outside of the optimal season.
Disturbances that may affect results	Nil	The primary form of disturbance within the survey area is the presence of roads which transect the site, the existing CBH railway line and access tracks to the CBH site. These consist of cleared areas lacking vegetation and are prone to regular disturbance in the form of vehicle movements. No signs of other disturbances such as fire was noted at the time of the survey.
Identification issues	Minor	The survey was undertaken on 22nd to 24th of June which is outside of the peak flowering season for the Avon Wheatbelt. Given that not all flora species flower during this time of year some species will be more difficult to observe in the field than others and can limit the capacity for identification. Of the 134 species, the vast majority contained sufficient taxonomic information for identification (such as nuts, fruit, leaf structure or flowers). Five additional species contained no diagnostic features at the time of the survey and were not able to be identified with four species only able to be identified to the genus level. Annual species were not observed during the survey with the capacity for these species to occur which may result in a reduction of total biodiversity at the site.

3.3. Basic Fauna Survey Methodology

Field survey work was carried out by Charlize van der Mescht (Environmental Consultant) of Bio Diverse Solutions, Kylie Sadgrove (Botanist/Ecologist) and Taryn Brebner (Botanist) of Natural Area Holdings Pty Ltd on the 22nd to 24th June 2022, in accordance with in accordance with Guidance Statement 56: *Terrestrial Fauna Surveys* (EPA 2020).

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

- EPA (2020) Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment;
- DEWHA (2010) Survey guidelines for Australia's threatened birds;
- DSEWPaC (2011) Survey guidelines for Australia's threatened mammals; and
- DSEWPaC (2012) Referral Guidelines for Three Threatened Black Cockatoo Species.

The vegetation units described in Section 5.2 broadly define habitat units across the survey area. The aim of the basic fauna survey was to assess and map the fauna habitat within the survey area, assess the likelihood of conservation fauna species

utilising the general area and/or particular vegetation units, recording actual presence of conservation fauna taxa, and undertaking an opportunistic inventory of vertebrate species encountered whilst traversing the survey area on foot.

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

3.4. Targeted Black Cockatoo Habitat Assessment

Surveys for cockatoos and their habitat were based on a targeted systematic assessment of hollow-bearing trees, foraging habitat, feeding activity and roosting sites.

3.4.1. Surveys for Breeding Hollows

The aim of the cockatoo habitat assessment was to identify all potential breeding trees (refer to Table 2) with a diameter, measured at 1.5 metres from the base of the tree, of 500 millimetres (300 millimetres for Wandoo and Salmon Gum) or greater and that contained one or more hollows of potential suitability for breeding by Carnaby's Cockatoo. These trees are referred to hereafter as significant trees.

If present, significant trees were GPS located using a handheld GPS, measured 1.5 m above ground (DBH) using a diameter tape, photographed, and the presence or absence of potential breeding hollows determined. Where present, hollows were photographed, the entrance type (chimney, side or elbow) and dimensions of the hollow were recorded and hollows were assessed for signs of use by cockatoos, based on evidence such as chewing around the hollow entrance, and activity at the base of the tree, e.g., feathers, faecal material, and feeding debris.

Long term studies on Carnaby's Black Cockatoos have shown that they utilise tree hollows ranging from 100mm – 650mm (average 260mm) in diameter (Saunders et al. 2014a, 2014b), whilst Forest Red-tailed Black Cockatoos utilise hollows with diameters ranging from 100mm x 120mm to 440mm x 1500mm (mean 280mm x 300mm; Johnstone and Storr, 1998; Johnstone et al. 2013). There is little published about dimensions of hollows utilised by Baudin's Black Cockatoo; however, it is expected they would be similar to those utilised by Carnaby's. In all instances, these species also require a hollow with significant depth. Based on the published information, hollows with an entrance diameter larger than 100mm x 100mm that occurred in branches or trunks with the capacity for deep hollows were recorded as potential cockatoo hollows. Smaller hollows with the potential to develop into suitable nesting hollows were also recorded.

3.4.2. Surveys for Foraging Habitat and Feeding Activity

The *EPBC Guidelines for Black Cockatoos* (DSEWPaC, 2012 and DAWE, 2022b) outline general criteria for identifying foraging habitat for black cockatoos (Table 2) but do not provide detailed criteria for assessing quality. Vegetation units that do not contain known foraging species were not considered to contain foraging habitat.

Assessment of foraging habitat was based on published foraging preferences for Carnaby's Cockatoo. Carnaby's Cockatoo is known to prefer Kwongkan heathland, shrublands and woodlands dominated by Proteaceous species as foraging habitat but will feed on individual Eucalypts and small stands of Eucalypt woodland or forest (Table 2). The presence of foraging habitat was mapped in the field, and individual locations where feeding activity was encountered were GPS recorded.

3.4.3. Surveys for Roosting Habitat and Activity

A known roosting tree is defined by DAWE, (2022b) as a tree (generally the tallest), native or introduced know to be used for night roosting or which demonstrates evidence of roosting. Usually close to an important water source and within an area of high-quality foraging habitat. A potential roosting tree is described as a tall tree of any species within close proximity to water (DAWE, 2022b). A Night roosting site is defined as habitat that contains one or more known night roosting tree and includes all vegetation within a 500 m radius of each known night roosting tree (DAWE, 2022).

In this survey, the presence of cockatoo feathers and faecal material were used as indicators of roosting activity.

The presence of roosting habitat if present was mapped in the field, and individual locations where roosting activity was encountered were GPS recorded.

Table 2: Habitats used by Carnaby's Cockatoos (DAWE, 2022b).

Habitat type	Habitat description
Breeding	Generally in woodland or forest, but also breeds in partially cleared woodland or forest, including isolated trees. Nest in hollows in live or dead trees (many eucalypt species may provide suitable hollows), particularly Salmon Gum, Wandoo, Tuart, Jarrah, Flooded Gum *(E. rudis)*, York Gum, Powderbark *(E. accedens)*, Karri and Marri.
Roosting	Generally in or near riparian environments or natural and artificial permanent water sources. Any tall trees may provide roosting habitat, but particularly Flat-topped Yate *(E. occidentalis),* Salmon Gum, Wandoo, Marri, Karri, Blackbutt, Tuart, introduced eucalypts and introduced pines.
Foraging: common food items	Native shrubland, kwongan heathland and woodland on seeds, flowers and nectar of native proteaceous plant species (*Banksia* spp., *Hakea* spp. and *Grevillea* spp.), as well as *Callistemon* spp. and Marri. Also seeds of introduced species including *Pinus* spp., *Erodium* spp., wild radish, canola, almonds, macadamia and pecan nuts; insects and insect larvae; occasionally apples and persimmons; and liquidambar.

3.5. Fauna Survey Limitations and Constraints

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

Table 3: Fauna survey limitations and constraints.

Limitation	Constraint	Comment
Scope	Nil	The scope was a basic terrestrial vertebrate fauna survey to generally assess the presence / evidence of fauna species within the survey area, map the fauna habitat, undertake opportunistic inventory of species including priority conservation species. Additional targeted assessment of black cockatoo habitat was undertaken to identify breeding, roosting or foraging habitat for Carnaby's Cockatoo.
Disturbances that may affect results	Nil	No recent disturbances which may affect results of the survey were identified, e.g., recent fire or grazing. Historical and ongoing disturbances from the existing operational activities at CBH site may impact the presence of fauna within the survey area. However, given these disturbances are long-term and continuous, they are unlikely to have resulted in a significant limitation on detection probability or species occurrence during the survey period (i.e. activities would result in some fauna moving away / not utilising the survey area at all times).
Intensity of survey	Nil	The basic fauna survey and targeted components of the survey were deemed appropriate given the scope was to identify the general presence of fauna species and fauna habitat in the survey area.
Sources of information (recent or historic) and availability of contextual information	Minor	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. Database searches were conducted through DBCA (DBCA 2022c) providing more comprehensive context of potential conservation significant species potentially present within the survey area.
Remoteness or access issues	Nil	No access restrictions were encountered.

Table 3 cont.

Limitation	Constraint	Comment
Species detection probability (e.g. as a result of seasonal activity and fauna movement patterns)	Minor	Cockatoo breeding periods affect the ability of surveys to detect breeding individuals, however assessment of activity around potentially suitable hollows and protection of all potentially suitable hollows negates this limitation. Cockatoos also use a range of areas for foraging and roosting. Again, the use of activity indicators such as feeding debris (nuts) and faecal material negate this limitation and enable determination of the regularity with which an area is visited. While the detection probability for target species during the survey period was relatively high, the conclusions presented in this report are based upon field data collected over a limited period of time. The results are therefore indicative of the environmental condition of the site at the time and the survey timing. E.g. some species are more likely to use seasonally inundated areas when they are dry, transient wide-ranging species may not have been present during the survey period, some cryptic species are less detectable particularly when they are inactive. Species-level detection probabilities are dealt with in the Threatened fauna likelihood of occurrence (LOO) in Table 15, Appendix B.
Survey limitations	Minor	Identifying hollows from the ground has limitations, as the full characteristics of a hollow are not evident (e.g., internal dimensions such as depth). The entrance dimensions and size of the branch / trunk into which the hollow was forming were used as indicators of the potential internal dimensions. The relative visibility of the canopy can also be limiting in identifying potential hollows, particularly where hollows are upward facing or obscured by foliage. This survey was aimed at assessing the area for terrestrial vertebrate fauna, as such invertebrate fauna listed within the 40 km study area were not specifically surveyed for. However, the presence of suitable habitat can be inferred from the vegetation present within the survey area.
Experience of personnel	Nil	Kylie Sadgrove has over 5 years' experience at conducting basic and detailed fauna surveys, and is competent in species identification and conducting Black Cockatoo habitat assessment. Taryn Brebner has over 4 years' experience at conducting basic and targeted fauna surveys and conducting Black Cockatoo habitat assessments. Charlize van der Mescht has been with Bio Diverse Solutions since 2019 and has undertaken the role of Technical Assistant since 2020. She has assisted Bianca Theyer and Dr. Karlene Bain on multiple fauna surveys during this time.

4. Results – Desktop Assessment

4.1. Threatened and Priority Flora

The full species list compiled from all available data (Table 13 in Appendix B) is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct. Conservation categories for Threatened and Priority flora are presented in Tables 17 and 18 in Appendix C. NatureMap and Protected matters search tool database searches are provided in Appendix F.

As a result of the above-mentioned database searches 20 Threatened and 47 Priority species were identified within the study area (30km buffer). Of these, 38 were assessed to be "Possible" to occur. Refer to Table 13 in Appendix B for likelihood of occurrence (LOO) analysis. Species that have previously been recorded within a 10 km radius of the survey area are shown in Figure 4.

Suitable habitat for species considered to have historically been possible to occur is mostly no longer present within portions of the site, likely due to the extensive degradation resulting in a completely degraded condition across the survey area within these disturbed areas. It is also likely that if populations of species assessed as "Possible" to occur were historically present at the site, the soil seed bank has been significantly impacted and compromised from disturbance through hooved grazers, off-site effects of chemical and fertiliser from surrounding agricultural use.

4.2. Threatened and Priority Ecological Communities

Database results indicate that two Threatened or Priority ecological communities may be present within the survey area, and are further outlined within Table 14 of Appendix B. The communities that are mapped as within the survey area are the 'Eucalyptus Woodlands of the Western Australian Wheatbelt', and 'Koolanooka System as originally described in Beard (1976)'. Ecological communities that are potentially within the 30 km study area are shown in Figure 4. Conservation categories for Threatened and Priority ecological communities are presented in Tables 19 and 20 in Appendix C. Protected Matters Search Tool database searches are provided in Appendix F.

Eucalypt Woodlands of the Western Australian Wheatbelt (Wheatbelt Woodlands)

Wheatbelt Woodlands is listed as a Priority 3 (P3) Priority Ecological Community (PEC) under the BC Act 2016 and an Endangered TEC under the EPBC Act 1999. The survey area lies within the Avon Wheatbelt IBRA Bioregion and Merredin IBRA subregion (AVW01), within the boundaries of the location criteria for Wheatbelt Woodlands. It is therefore a possibility that Wheatbelt Woodlands may be present within the survey area.

Wheatbelt Woodlands is comprised of Eucalypt woodlands that formerly were the most common type of vegetation across the wheatbelt landscape of south-western WA, inland between the Darling Range and western edge of the Goldfields. The woodlands are dominated by a complex mosaic of eucalypt species with a tree or mallet form over an understorey that is highly variable in structure and composition. Woodlands dominated by mallee forms or vegetation with a very sparse eucalypt tree canopy are not part of the ecological community (DoEE, 2015).

Wheatbelt Woodlands is recognised by the below key diagnostic features and minimum condition thresholds as outlined in the approved conservation advice guidelines (DoEE, 2015):

1) Occurs within the IBRA Avon Wheatbelt subregions Merredin (AVW01) and Katanning (AVW02), Western Mallee subregion (MAL02) and jarrah forest subregions Northern Jarrah Forest (JAF01) and Southern Jarrah Forest (JAF02) when adjacent to the Avon Wheatbelt.
2) Structure of the ecological community is a woodland, with minimum crown cover of tree canopy of mature woodland being 10% (crowns measured as if opaque).
3) Key species of the tree canopy are species of Eucalyptus identified in Table 2a of approved conservation guidelines (DoEE, 2015). These are species that typically have a single trunk. One or more tree species are dominant or co-dominant within the patch of the ecological community. If other species are present in the tree canopy, then these do not occur as dominant in the tree canopy.

4) Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs, as specified in Table 14 of Appendix B.

Condition thresholds for the ecological community are described in Table 4. General notes on the condition thresholds of the ecological community are outlined in the Approved Conservation Guidelines for Wheatbelt Woodlands (DoEE, 2015).

Table 4: Condition thresholds for Wheatbelt Woodlands TEC diagnostic criteria
Note: Condition is referenced to Keighery (1994) and Relative Conservation Value (RCV) is related to Roadside Conservation Committee (2014).

Category and comment	Cover of exotic plants (weeds) AND	Mature trees AND	Minimum patch size (non-roadside patches) OR	Minimum patch width (roadsides only)
A: patches likely to correspond to condition of Pristine / Excellent / Very Good or a High RCV.	Exotic plants account for 0 to 30% of total vegetation cover in the understorey layers i.e., below the tree canopy.	Mature trees may be present or absent.	>2ha	>5m
B: Patches likely to correspond to a condition of Good or a Medium-High RCV AND retains important habitat features.	Exotic plant species account for 30-50% of total vegetation cover in the understorey layers i.e., below the tree canopy.	Mature trees are present, >5 trees/ha.	>2ha	>5m
C: Patches likely to correspond to a condition of Good or a Medium-High RCV.	Exotic plant species account for 30-50% of total vegetation cover in the understorey layers i.e., below the tree canopy.	Mature trees either absent or <5 trees/ha.	>5ha	>5m
D: Patches likely to correspond to a condition of Degraded to Good or medium-low RCV BUT retains important habitat features.	Exotic plant species account for 50-70% of total vegetation cover in the understorey layers i.e., below the tree canopy.	Mature trees present at >5 trees/0.5ha.	>5ha	>5m

Koolanooka System as originally described in Beard (1976)

Koolanooka System is listed as a VU Threatened Ecological Community (TEC) under the BC Act 2016. Located within Archaean metamorphic rocks of the Koolanooka Hills, the surrounding footslopes and the fork shaped range to the south-east, containing Perenjori Hills. The plan assemblage comprises of *Eucalyptus ebbanoensis* subsp. *ebbanoensis* Mallee and *Acacia sp.* scrub with scattered *Allocasuarina huegeliana* over red loam and ironstone on the upper slopes and summits. Allocasuarina campestris scrub over red loam on hill slops. Shrubs and emergent Mallees on shallow red loam over massive ironstone on steep rocky slopes. *Eucalyptus loxophleba* woodland over scrub on the footslopes and mixed *Acacia sp*. scrub on granite (Hamilton-Brown, 2000).

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Overview Map Scale 1:5,000,000

Legend

Survey Area

40 km Study

Threatened & Priority Flora [FL_WAHerb]

Cons_Code

- P1
- P3
- P4
- T

Threatened & Priority Flora [FL_TPFL]

ConsStatus, WARank

- P1
- P3
- T, CR

Threatened & Priority Ecological Communities [33_0522EC]

STATE_CATG, COMM_CATG

- P3, CR
- VU

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

Scale
1:300,000 @ A3
GDA MGA 94 Zone 50

CLIENT
CBH Group
Perenjori Receival Site
Perenjori, WA 6620

Figure 4: Desktop Flora & TEC/PEC Data (DBCA, 2022a; b)

	QA Check	*Drawn by*
	BMT	**CvdM**
STATUS	*FILE*	*DATE*
FINAL	**CBH0019**	**26/07/2022**

4.3. Fauna

The desktop assessment identified 15 Threatened and Priority species within 30-40 km of the survey area. Of these, 13 were Threatened taxa under the BC Act 2016 and / or EPBC Act 1999 (critically endangered, endangered or vulnerable), one was a specially protected taxon and one was a migratory species protected under international agreements. Of the 13 Threatened taxa, one taxon is also migratory species protected under international agreements (Table 15, Appendix B). Conservation categories for Threatened and Priority fauna are presented in Tables 17 and 18 in Appendix C. PMST database searches are provided in Appendix F.

Of these 15 species, nine were assessed as being 'Possible' to occur prior to the survey being undertaken, based on potential habitat being present within the survey area. Refer to Table 15, Appendix B for more detail. Species assessed as 'Possible' to occur were:

- Fork-tailed Swift (*Apus pacificus*, MI);
- White-tailed Black Cockatoo (*Calyptorhynchus sp.,* EN);
- Carnaby's Cockatoo (*Calyptorhynchus latirostris,* EN);
- Gilled slender blue-tongue (*Cyclodomorphus branchialis*, VU);
- Western spiny-tailed skink (*Egernia stokesii badia,* VU);
- Grey Falcon (*Falco hypoleucos,* VU);
- Peregrine Falcon (*Falco peregrinus*, OS);
- Shield-backed Trapdoor Spider (*Idiosoma nigrum,* EN); and
- Malleefowl (*Leipoa ocellata,* VU).

The full species list compiled from all available data (Table 15, Appendix B) is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct.

4.3.1. Targeted Black Cockatoo Habitat Assessment

Carnaby's Cockatoo breed within the inland parts of its distribution, in areas with 300-750mm annual average rainfall (DPaW, 2013). This breeding range has expanded in recent years to extend further south into Jarrah-Marri forests and the coastal Tuart forests south of Perth (Johnstone and Storr 1998; Johnstone et al. 2011). Although the survey area does not fall within the modelled predicted breeding area, there is potential for suitable breeding habitat to be present, as such an assessment of all trees onsite was undertaken.

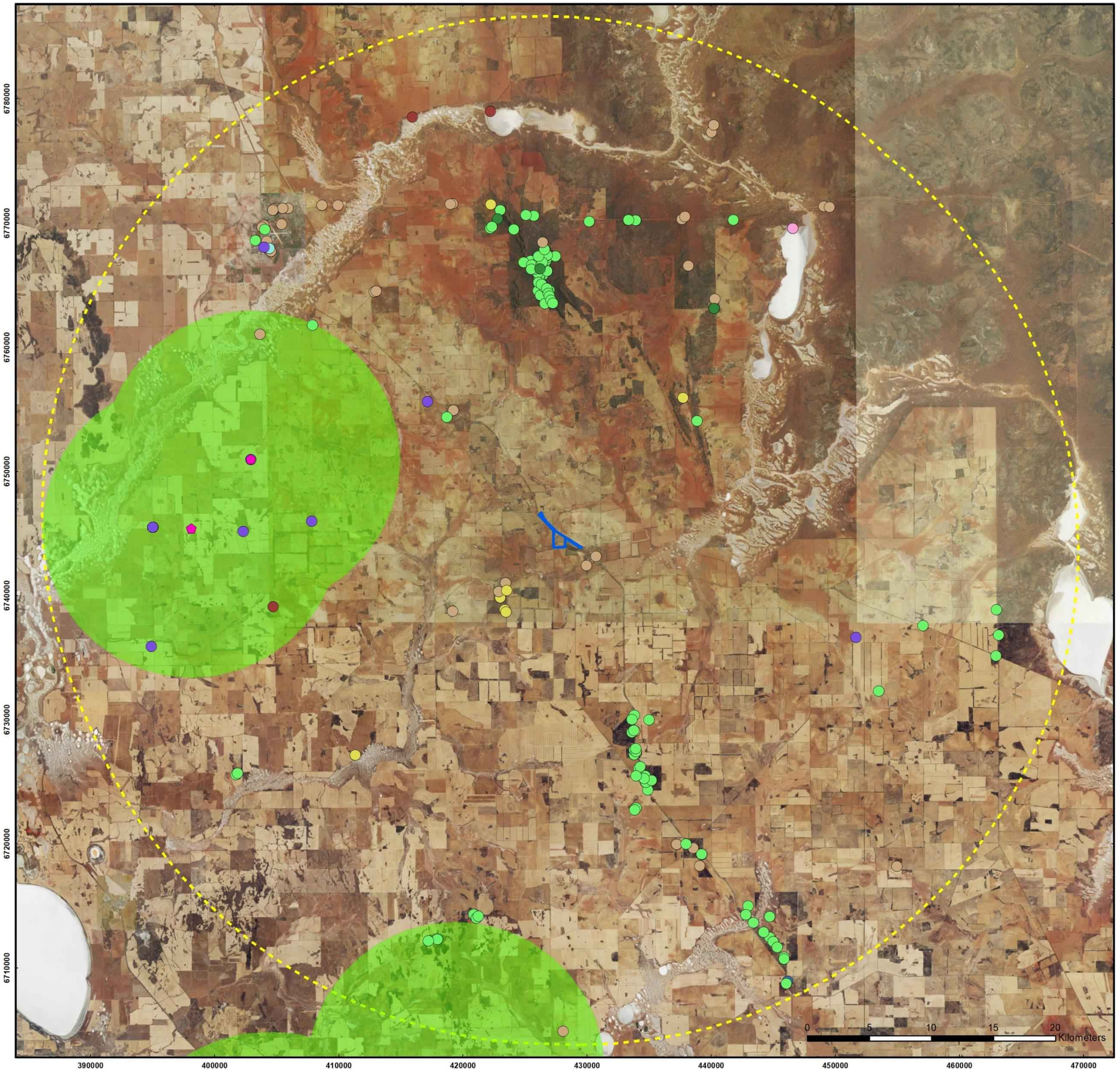
Carnaby's Cockatoo has a wide-spread distribution across Western Australia, which extends from Kalbarri and Geraldton in the northwest of the state, inland to Morawa, Dowerin and Merredin and to the east of Esperance (DSEWPaC, 2012; DoEE, 2017; EPA, 2020; DAWE, 2022b). The survey area lies within the known foraging range and breeding range of the Carnaby's Cockatoo (DSEWPaC, 2012; DoEE, 2017; Rycken 2019 and DAWE, 2022b).

Baudin's Cockatoo is most commonly found in forested areas but is also found in the open agricultural areas within the southwest (DEC, 2008). The survey area is not within the known distribution area for Baudin's Cockatoo, which extends from Bullsbrook / Gideganup south to Kojonup and Albany, and inland to the Stirling Ranges (DEC, 2008; DSEWPaC, 2012; DoEE, 2017; Rycken 2019 and DAWE, 2022b). The survey area does not occur within the foraging or breeding range for this species (DSEWPaC, 2012; DoEE, 2017; Rycken 2019 and DAWE, 2022b). The breeding ecology for this species is not well known outside of the southwest forests where it is known to breed within the Jarrah, Marri and Karri Forest (Refer to Table 2) of the far southwest of WA.

Forest Red-tailed Black Cockatoo occur within the south-west humid and sub-humid zones of Western Australia, in the dense Jarrah, Karri and Marri forests that receive more than an average of 600mm annual rainfall (DEC, 2008). The DAWE (2022b) distribution modelling depicts two distribution areas "Likely to Occur" and "May Occur". The modelled "Likely to Occur" distribution extends from Gingin, east to Wundowie and south through to Williams, Kojonup, west into the Tone-Perup and Lake Muir areas and east to Mount Barker and Albany (DAWE, 2022b). The "May Occur" distribution commences at the 'Likely to Occur' boundary and extends further east from Toodyay in the north, and south to Northam, Narrogin, Katanning, Cranbrook

and east of Albany (DAWE, 2022b). The survey area is outside of the modelled distribution and breeding range for this species (DSEWPaC, 2012; DoEE, 2017; Rycken 2019 and DAWE, 2022b).

One confirmed Black Cockatoo roosting site is located approximately 23 km west-northwest of the survey area (DBCA, 2022c; 2019b) Publicly available DBCA database records also indicate there is a confirmed breeding area approximately 12 km to the west of the survey area (DBCA, 2018e).



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Overview Map Scale 1:5,000,000

Legend

- Survey Area
- 40 km Study Area
- White-tailed Black Cockatoo Breeding Data [7141]
- Carnabys Cockatoo Confirmed Breeding Areas (DBCA-054)

Threatened & Priority Fauna [7141]

WA_status, EPBCstatus

- EN
- EN, EN
- MI, MI
- OS
- P3
- P4
- VU
- VU, EN
- VU, VU

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

Scale
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GDA MGA 94 Zone 50

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Perenjori, WA 6620

Figure 5: Desktop Fauna Data (DBCA, 2022c).

	QA Check **BMT**	*Drawn by* **CvdM**
STATUS **FINAL**	*FILE* **CBH0019**	*DATE* **16/08/2022**

5. Results – Field Survey

5.1. Flora Diversity

During the survey 134 flora species, consisting of 33 families and 92 genera were found. The most commonly occurring families were Fabaceae and Myrtaceae. However, as described above, this flora list is incidental and incomplete, as conducted out-of-season and limitations for numerous genera and family likely to be present. The list includes 115 native species (refer to Table 21 in Appendix D), and 19 introduced / alien species. The vegetation units identified across the survey area are described in Section 5.2. Refer to Figure 9 for vegetation mapping, and Appendix D for full species list

5.2. Vegetation Units

Three vegetation units were identified during the survey period, vegetation descriptions can be found in the following sections, with relevé data presented in Appendix D. Refer to Figures 6 – 8 for photographs of vegetation units and Figure 9 for extent. Areas that have been cleared or contain predominantly weed / introduced species (i.e. Completely Degraded or Degraded areas) have not been described.

Cleared areas were also present throughout the survey area, occurring as bare ground along access tracks or hardened laydown areas. A total of 29.9 ha of cleared area was present within the survey area. Minor, invasive herbs or agricultural grasses were often present within these bare areas.

1a. Vegetation unit: *Eucalyptus loxophleba* Open Woodland (native) [ElOWn]

The *Eucalyptus loxophleba* Open Woodland (native) [ElOWn] vegetation unit consisted of open Eucalyptus Woodland characterised by *Eucalyptus loxophleba* woodland and an open, mixed shrubland middle storey. Common middle storey species present include *Acacia acuaria, Acacia acuminata, Enchylaena lanata* and *Austrostipa elegantissima.* Overall, however there is a lower diversity of species within this vegetation unit, with only 21 species recorded due to the sparse nature of the middle storey and the lack of annual species.

Vegetation Description (NVIS): U ^*Eucalyptus loxophleba*\^Tree\6\r;M ^^ *Acacia acuaria, Acacia acuminata, Enchylaena lanata* \^^scrub,forb\3\bc;G ^ Austrostipa elegantissima\^grass\1\bc.

Vegetation Description (Muirs): *Eucalyptus loxophleba* Open Woodland, over *Acacia acuaria, Acacia acuminata* and *Enchylaena lanata* over *Austrostipa elegantissima.*

Area: 4.29 ha.

Site description: Plain.

Condition: Good.

Represented in R1 (refer to Appendix D).

1b. *Eucalyptus loxophleba* Open Woodland (planted) [ElOWp]

One section of the site consisted of planted *Eucalyptus loxophleba* over introduced weeds which was classified as Completely Degraded (18.49 ha). These trees were clearly planted in regular rows within a section of paddock within the CBH compound and contained limited native understorey.

Area: 18.49 ha.

Site description: Plain.

Condition: Completely Degraded.


Eucalyptus loxophleba Open Woodland (native) [ElOWn]


Eucalyptus loxophleba Open Woodland (planted) [ElOWp]

Figure 6: *Eucalyptus loxophleba* Open Woodland [ElOW] vegetation units present within the survey area.

2. Vegetation unit: Tecticornia Shrubland [TS]

The Tecticornia Shrubland [TS] vegetation unit consisted of an open shrubland characterised by *Tecticornia indica* subsp. *bidens* and *Atriplex vesicaria*. Overall, there is a lower diversity of species within this vegetation unit, with only 9 species recorded due to the degraded nature of the site. The vegetation unit is present within an area which is potentially subject to saline conditions and within a slight depression which has characteristics of being seasonally wet although at the time of survey there was no standing water. No Priority or Threatened flora were identified within Vegetation Unit 2.

Vegetation Description (NVIS): U ^^ *Tecticornia indica* subsp. *bidens, Atriplex vesicaria* \^^shrub\3\i; H *Mesembryanthemum nodiflorum\1\bc.

Vegetation Description (Muirs): *Tecticornia indica* subsp. *bidens* and *Atriplex vesicaria* open shrubland over a mixed understorey of native and introduced species.

Area: 8.55 ha

Site description: Flat site which appears to become seasonally inundated.

Condition: Degraded.

Represented in R2 (refer to Appendix D).


Figure 7: Tecticornia Shrubland [TS] vegetation unit present within the survey area.

3. Vegetation unit: Mixed Native Shrubland [MNS]

The Mixed Native Shrub [MNS] vegetation unit consisted of a mixture of native shrubs throughout the vegetation unit with *Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma* consistent throughout. Common understorey species present include *Ecdeiocolea monostachya, Arctotheca calendula, Cassytha nodiflora and Rytidosperma caespitosum.* Overall, there is a relatively high diversity of species within this vegetation unit, with 114 species recorded although there was a lack of annual species present. Due to the timing of the survey five species within the vegetation unit lacked diagnostic features to enable identification and two species could only be identified to genus level. Three Priority flora species were identified within Vegetation Unit 3 and it did not bear any similarity to any PEC/TEC criteria.

Vegetation Description (NVIS): M ^^*Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma*\^^shrub\3\r;F *Ecdeiocolea monostachya, Arctotheca calendula, Cassytha nodiflora*\^^forb\2\r.

Vegetation Description (Muirs): Mixed Native Shrub mainly consisting of *Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma* over *Ecdeiocolea monostachya, Arctotheca calendula, Cassytha nodiflora.*

Area: 19.54 ha

Site description: Plain.

Condition: Very Good.

Represented in R3 (refer to Appendix D).


Figure 8: Mixed Native Shrubland [MNS] vegetation unit present within the survey area.

5.3. Vegetation Condition

The vegetation condition for the survey area (Table 5) has been mapped using the condition rating scale (adapted from Keighery 1994) outlined in *EPA Flora and Vegetation Survey Technical Guidance* (2016).

The vegetation ranged from Completely Degraded to Very Good condition throughout the survey area. These classification levels are related to degradation of structure and vegetation integrity by processes such as clearing, fire, weeds, grazing, Phytophthora Dieback and vehicle tracks. The 'ElOWn' unit is classified as being in Degraded and Good condition, the 'ElOWp' unit is in Completely Degraded condition, the 'TS' unit is in Degraded condition and the 'MNS' unit ranges from Completely Degraded to Very Good condition.

Table 5: Vegetation condition rating.

Vegetation unit	Condition rating	Area (ha)
Vegetation unit 1: *Eucalyptus loxophleba* Open Woodland (native) [ElOWn]	Degraded	3.25
	Good	1.03
Vegetation Unit 1b: *Eucalyptus loxophleba* Open Woodland (planted) [ElOWp]	Completely Degraded	18.49
Vegetation Unit 2: Tecticornia Shrubland [TS]	Degraded	8.55
Vegetation Unit 3: Mixed Native Shrubland [MNS]	Completely Degraded	1.48
	Degraded	9.74
	Good	4.23
	Very Good	4.09
Total		**110.58 ha**

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Overview Map Scale 1:5,000,000

Legend

- Survey Area
- Cadastre
- Releve

Vegetation Condition

- Completely Degraded
- Degraded
- Good
- Very Good

Vegetation Units

- 1a. *Eucalyptus loxophleba* Open Woodland (native)
- 1b. *Eucalyptus loxophleba* Open Woodland (planted)
- 2. Tecticornia Shrubland
- 3. Mixed Native Shrubland
- Paddock

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

Scale
1:12,000 @ A3
GDA MGA 94 Zone 50

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CBH Group
Perenjori Receival Site
Perenjori, WA 6620

Figure 9: Vegetation Units & Condition

	QA Check	*Drawn by*
	BMT	**CvdM**
STATUS	*FILE*	*DATE*
FINAL	**CBH0019**	**16/08/2022**

5.4. Weeds and disturbance

Of the 134 flora species recorded within the survey area, 19 species are introduced. The full suite of weed species recorded is listed below in Table 6, with their corresponding ratings under the WA Weed Strategy (CALM, 1999) and the *BAM Act* (2007). The ratings given under the WA Weed Strategy relate to determining the significance of a weed, based on the criteria of invasiveness, impacts, potential for spread and socioeconomic and environmental values, and can be either 'High', 'Moderate', 'Mild', or 'Low' (CALM, 1999).

Under the Biosecurity and Agriculture Management Act 2007 Paterson's Curse (*Echium plantagineum*) is classed as 'Declared Pest - s22(2) (Exempt), while all remaining weed species are listed as 'Permitted - s11'. Under the Environmental Weeds Strategy for Western Australia (CALM, 1999) African lovegrass (*Eragrostis curvula*) and Mediterranean tulip (*Brassica tournefortii*) are listed as 'High'. All other species are listed as either 'Moderate', 'Mild', 'Low' or have no rating (Table 6).

It is strongly recommended that all machinery entering the survey area (if clearing is approved in the future) has rigorous and thorough biosecurity hygiene applied to limit the introduction of invasive species infestation and the potential to significantly degrade the surrounding vegetation in pristine to excellent condition.

Table 6: Weed species recorded from the survey area.

Family	Species	Vernacular	WA Weed Strategy rating (CALM 1999) / BAM Act (2007)
Pteridaceae	*Adiantum aethiopicum*	Common Maidenhair	- / Permitted (s11)
Poaceae	*Aira cupaniana*	Silvery Hairgrass	Moderate / Permitted (s11)
Asteraceae	*Arctotheca calendula*	Cape Weed	Moderate / Permitted (s11)
Poaceae	*Eragrostis curvula*	African Lovegrass	High / Permitted (s11)
Geraniaceae	*Erodium botrys*	Long Storkbill	Low / Permitted (s11)
Poaceae	*Avena barbata*	Bearded Oat	Moderate / Permitted (s11)
Boraginaceae	*Echium plantagineum*	Paterson's Curse	TBA / Declared Pest – s22(2) (Exempt)
Poaceae	*Ehrharta longiflora*	Annual Veldt Grass	Moderate / Permitted (s11)
Poaceae	*Lolium rigidum*	Wimmera Ryegrass	Moderate / Permitted (s11)
Aizoaceae	*Mesembryanthemum crystallinum*	Iceplant	Moderate / Permitted (s11)
Aizoaceae	*Mesembryanthemum nodiflorum*	Slender iceplant	Mild / Permitted (s11)
Asteraceae	*Monoculus monstrosus*		- / Permitted (s11)
Brassicaceae	*Sisymbrium irio*	London Rocket	Mild / Permitted (s11)
Asteraceae	*Sonchus asper*	Rough Sowthistle	Moderate / Permitted (s11)
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	Moderate / Permitted (s11)
Brassicaceae	*Brassica tournefortii*	Mediterranean Turnip	High / Permitted (s11)
Poaceae	*Briza maxima*	Blowfly Grass	Moderate / Permitted (s11)
Polygalaceae	*Rumex crispus*	Curled Dock	Mild / Permitted (s11)
Poaceae	*Triticum aestivum*	Wheat	Low / Permitted (s11)

5.5. Presence of Conservation Significant Flora

In total, three species of priority conservation status were identified within the survey area being *Grevillea asparagoides* (P3), *Grevillea granulosa* (P3) and *Leptospermum exsertum* (P1). Identification of some of these species was not conducted in the field at the time of the survey with only photographs taken. Identification of these species was made through the photographs with no specimens collected, as such only photos were submitted to DBCA with the Threatened and Priority report forms. *Leptospermum exsertum* (P1) was not identified as being Priority flora at the time of the survey and so no GPS location is present. Further details on presence of conservation significant flora is displayed in Table 7 and in species specific sections below. Targeted searches may be required to determine population extent and accurate number of individuals present.

A Threatened and Priority Report Form (TPFL) was submitted to DBCA Species and Communities Branch for all priority species observed in the survey area (existing and new) on the 30/08/2022, also a licence requirement under FB62000234 (Appendix E).

Plant identification was undertaken through the most relevant, current and available taxonomic literature, keys and herbarium reference specimens available (AVH, n.d.; Euclid, n.d.; Keeble 2021, Keeble 2020 WAH 1998-). All resources used were the most current to knowledge. Nomenclature used through this report follows the most recent scientific names through the Western Australian Herbarium (WAH, 1998-).

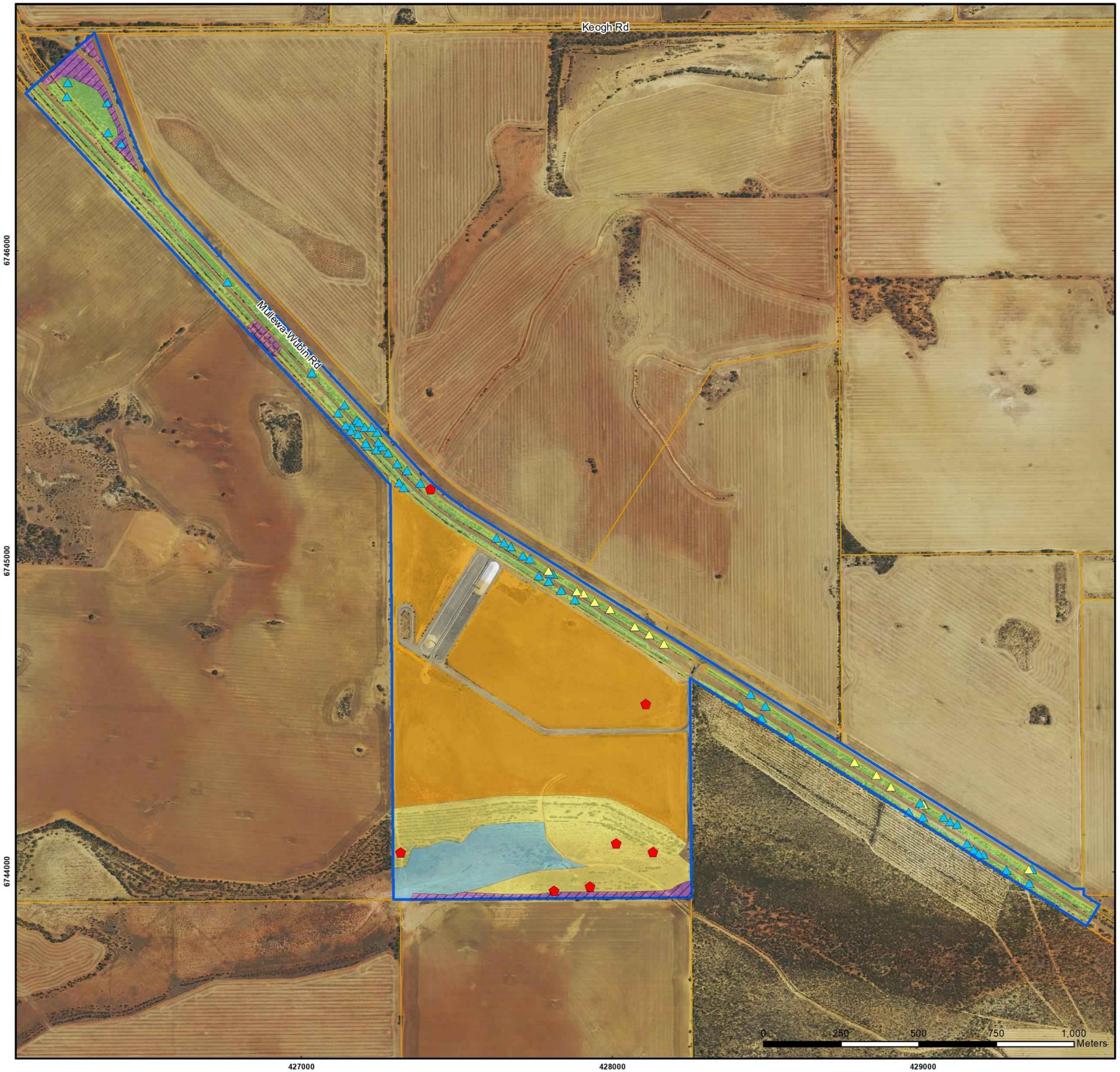
Two other species identified in the desktop analysis were assessed as possible to occur, but had restrictions in the ability to identify presence within the survey area. Further details are outlined below:

- *Baeckea sp*. Perenjori (J.W. Green 1516) - Rounded shrub, ca 0.5 m high, 1 m wide, flowering in August. Due to the flora surveys conducted outside of flowering period this species is difficult to determine presence at the time of the survey.
- *Enekbatus longistylus* - Shrub, 0.3-0.6 m high, flowering in September to October. Due to the flora surveys conducted outside of flowering period this species is difficult to determine presence at the time of the survey.

There is the potential for these species to occur in the area as they could not be discounted during identification of the recorded species during the survey, as Myrtaceae species were recorded that lack diagnostic features to enable accurate identification.

Table 7: Conservation significant flora identified within the survey area.

Family	Species	Cons Code	Population status	Vegetation Units Present	Abundance	Impact
Myrtaceae	*Leptospermum exsertum*	P1	New population	Mixed Native Shrubland	Minimum of 1 individual	Not assessed
Proteaceae	*Grevillea asparagoides*	P3	Known population	Mixed Native Shrubland	Approx. 15	Not assessed
Proteaceae	*Grevillea granulosa*	P3	Known population	Mixed Native Shrubland	Approx. 60	Not assessed



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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:500,000

Legend

- Survey Area
- Cadastre

Vegetation Units

- 1a. *Eucalyptus loxophleba* Open Woodland (native)
- 1b. *Eucalyptus loxophleba* Open Woodland (planted)
- 2. Tecticornia Shrubland
- 3. Mixed Native Shrubland
- Paddock

Potential PEC/TEC

- Wheatbelt Woodlands

Declared Pests

- *Echium plantagineum*

Threatened & Priority Flora

- *Grevillea asparagoides*, P3
- *Grevillea granulosa*, P3

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

Scale
1:12,000 @ A3
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Figure 10: Priority Flora, TEC & Declared Pests

	QA Check **BMT**	*Drawn by* **CvdM**
STATUS **FINAL**	*FILE* **CBH0019**	*DATE* **29/08/2022**

***Grevillea granulosa*, P3**

Grevillea granulosa (P3) has previously been recorded within the immediate vicinity of the survey area (183 m), record PERTH06466710 at WA Herbarium (DBCA, 2022a) and observable in Figure 10. The population of *Grevillea granulosa* was detected throughout the length of the survey area (Figure 10). Specifically, it was located occasionally in Vegetation Unit 1, *Eucalyptus loxophleba* Open Woodland and regularly within Vegetation Unit 3, Mixed Native Shrubland, which is considered consistent with suitable habitat for the species (Figure 10). A total of 60 occurrences of these plants were recorded within the survey area. Further assessments are recommended to accurately determine the population.

The plants of *Grevillea granulosa* counted represent a partial or edge survey, with only plants directly located within the survey area approximately counted. Further surveys may be required to quantify impact of proposed clearing of areas identified in the survey area, within the context of the total population and to accurately assess the number of individuals within the area.

The known distribution and records of *Grevillea granulosa* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998-) indicate that *Grevillea granulosa* is known from 87 records (Figure 12). It has been recorded within the Local Government Areas of Chapman Valley, Coorow, Dalwallinu, Greater Geraldton, Mingenew, Moora, Morawa, Murchison, Perenjori and Yalgoo, and IBRA subregions of Geraldton Hills, Lesueur Sandplain, Merredin and Tallering.

Figure 11: Photos of *Grevillea granulosa* within the survey area.

Figure 12:Regional distribution of *Grevillea granulosa* (AVH, n.d.).

***Leptospermum exsertum*, P1**

Leptospermum exsertum (P1) has previously been recorded within the study area, with the closest record being 1.3 km from the survey area (DBCA, 2022a) and observable Figure 10. The individual of *Leptospermum exsertum* was recorded within Vegetation unit 3 Mixed Native Shrubland which is considered consistent with suitable habitat for the species (Figure 10). One plant was recorded during the survey which was identified as present when back in the office and identification of unknown species was being conducted.

The plants of *Leptospermum exsertum* counted represent a partial or edge survey. It is likely that the population extends more broadly into the surrounding area. Further surveys may be required to quantify impact of proposed clearing of areas identified in the survey area, within the context of the total population and to determine number of individuals present.

The known distribution and records of *Leptospermum exsertum* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998-) indicate that it is known from 19 records (Figure 14). It has been recorded within the Local Government Areas of Greater Geraldton, Morawa and Perenjori, and IBRA subregions of Merredin.

Figure 13: Photos of *Leptospermum exsertum* within the survey area.

Figure 14:Regional distribution of *Leptospermum exsertum* (AVH, n.d.).

***Grevillea asparagoides*, P3**

Grevillea asparagoides (P3) has previously been recorded within the immediate vicinity of the survey area (183 m; DBCA, 2022a) and observable in Figure 15. The population of *Grevillea asparagoides* was detected throughout the length of the survey area. Specifically, it was only located in Vegetation Unit 3, Mixed Native Shrubland, which is considered consistent with suitable habitat for the species (Figure 10). A total of 15 occurrences of this plant was recorded within the survey area, with a summary of number of plants per area recorded in Table 9. Further assessments are recommended to accurately determine the population.

The plants of *Grevillea asparagoides* counted represent a partial or edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding salt lakes and the total population number is much higher. Further surveys may be required to quantify impact of proposed clearing of areas identified in the survey area, within the context of the total population, and to accurately assess the number of individuals within the area.

The known distribution and records of *Grevillea asparagoides* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998-) indicate that *Grevillea asparagoides* is known from 65 records (Figure 16). It has been recorded within the Local Government Areas of Dalwallinu, Moora, Morawa, Perenjori, Wongan-Ballidu and IBRA subregions of Katanning and Merredin.

Figure 15: Photos of *Grevillea asparagoides* within the survey area.

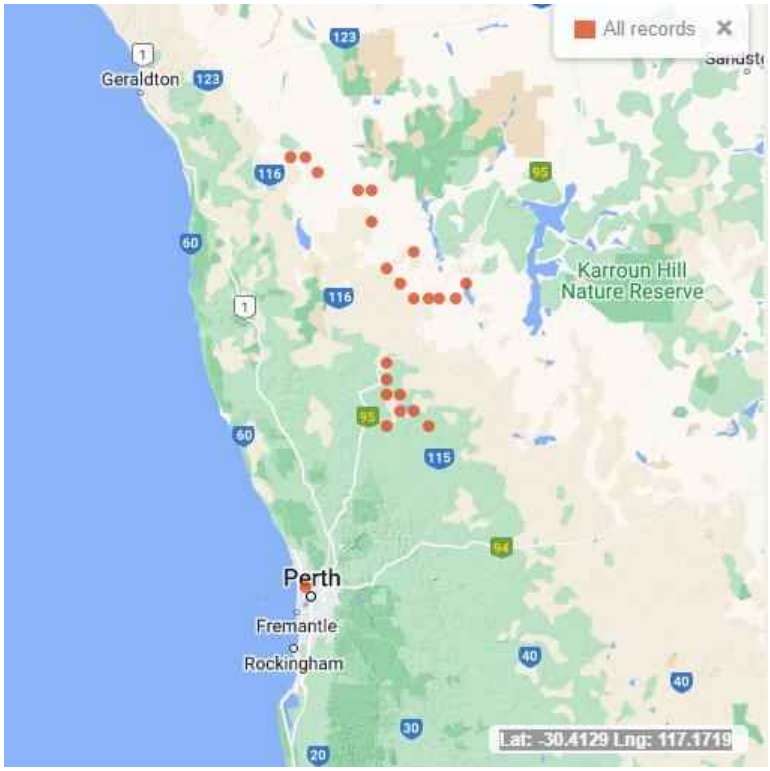


Figure 16:Regional distribution of *Grevillea asparagoides* (AVH, n.d.).

5.6. Threatened and Priority Ecological Communities

Two Threatened (TEC) and Priority (PEC) Ecological Communities were identified in the 30 km desktop analysis, 'Eucalypt Woodlands of the Western Australian Wheatbelt (Wheatbelt Woodlands)' and 'Koolanooka System as originally described in Beard (1976)' (Section 4.2; Table 14 Appendix B). Of these two ecological communities, the "Wheatbelt Woodlands' is determined as to be likely to be present (Figure 10).

Due to the out-of-season nature and reconnaissance nature of the survey, recommendations have been made on where the Wheatbelt Woodlands' TEC / PEC is likely to occur, specifically relating to the areas present within the survey area, that requires formal quadrat sampling to be undertaken for confirmation of presence of the TEC / PEC.

Eucalyptus Woodlands of the Western Australian Wheatbelt (Wheatbelt Woodlands)

Wheatbelt Woodlands is listed as a Critically Endangered TEC under the federal Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Wheatbelt Woodlands is listed as a Priority 3 PEC under the BC Act 2016. Analysis of the diagnostic criteria of Wheatbelt Woodlands outlined in Section 4.2 occurred, to determine if any vegetation potentially met criteria for the TEC/PEC. The survey area is located within the defined Avon Wheatbelt Floristic Bioregion as outlined in Key Diagnostic Feature 1, and therefore meets geographic boundary criteria.

During the survey, one vegetation unit was identified that is likely to meet Wheatbelt Woodland TEC / PEC criteria, namely vegetation unit 1 *Eucalyptus loxophleba* Open Woodland (native) [ElOWn] (Table 8). Vegetation unit 1 ElOWn meets Criteria 3 and 4 outlined in Section 4.2, with *Eucalyptus loxophleba* being a dominant tree species in the NVIS L5 overstorey description and a variable understorey of grasses, herbs and shrubs. Vegetation unit 1b *Eucalyptus loxophleba* Open Woodland (planted) [ElOWp] does not meet the Wheatbelt Woodland TEC / PEC criteria due to the lack of understorey species.

When addressing the condition thresholds and category analysis, *Eucalyptus loxophleba* Open Woodland (native) [ElOWn] meets patch size criteria (Table 8; Table 4, Section 4.2), as the minimum patch size threshold for roadside patches is >5 m width for areas in Degraded to Pristine condition. There is also potential for the patch to extend outside of the surveyed boundary. Further analysis to determine the extent of the patch size is required, and quadrat analysis to delineate cover of exotic weeds and mature tree density (Table 4, Section 4.2). These surveys can be conducted out of season, as the key feature required to be measured is Eucalyptus trees, which are distinctive and recognisable outside of peak flowering season (spring).

Table 8: Vegetation Units identified within the survey area that may meet the threatened ecological community, Wheatbelt Woodland criteria.

Vegetation Unit	Description	Code	Condition and Area (ha)	Meet Patch Size Criteria?	Meet criteria for TEC
1	*Eucalyptus loxophleba* Open Woodland (native)	ElOWn	Degraded – 3.25 Good – 1.03	Yes	Possible

6. Fauna Survey Results

6.1. Basic Fauna Survey

A description of the three vegetation units identified during the survey is given in Section 5.2, which correlate with fauna habitat units present within the survey area. Each habitat unit is presented below in Table 9.

Table 9: Fauna habitat units within the survey area.

Description	Photograph
York Gum Woodland Vegetation unit - *Eucalyptus loxophleba* Open Woodland [EloW]. Area: 4.29 (native) and 18.49 (planted) = 22.77 ha. This habitat unit comprises approximately 16.2% of the survey area and is found in the north-western corner of the survey area in the Mullewa-Wubin Road reserves, with a small patch situated in the road reserve southeast. The planted area is located to the south of the survey area in the CBH paddock area. Consists of a York gum (*Eucalyptus loxophleba*) overstorey. The midstorey and understorey is variable across the survey area. Where vegetation is more intact, there is an understorey of shrubs dominated by *Acacia acuaria* and *Acacia acuminata* and a mixed ground cover of native and introduced herbs and grasses. In the more disturbed areas, the midstorey is generally absent or scattered and contains a mixed ground cover of native and introduced herbs and grasses. <u>Habitat value for fauna species of conservation significance:</u> This habitat provides breeding, foraging and potential roosting habitat for Carnaby's Cockatoo. This habitat unit also provides marginal habitat for western spiny-tailed skink (*Egernia stokesii badia*) and malleefowl (*Leipoa ocellata*). Limited habitat value is provided in the planted areas due to the lack of mid and understorey species.	Native area:  Planted area: 
Samphire Shrubland Vegetation unit - Tecticornia Shrubland [TS]. Area: 8.55 ha. This habitat unit comprises approximately 6.1% of the survey area and is found in the southern portion of the survey area. Consists of a midstorey dominated by *Atriplex vesicaria* and *Tecticornia indica* subsp. *bidens*. The understorey consists of *Mesembryanthemum nodiflorum.* <u>Habitat value for fauna species of conservation significance:</u> This habitat does not provide any habitat for the Threatened and Priority species listed in the desktop assessment.	

Table 9 cont.

Description	Photograph
Mixed Native Shrub Vegetation unit - Mixed Native Shrub [MNS]. Area: 19.54 ha. This habitat unit comprises approximately 13.9% of the survey area and is found across the survey area. Consists of a mixture of native shrubs with *Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma* dominating the midstorey. Dominant understorey species include *Ecdeiocolea monostachya, Arctotheca calendula, Cassytha nodiflora and Rytidosperma caespitosum.* Habitat value for fauna species of conservation significance: This habitat provides potential foraging habitat for Carnaby's Cockatoo. This habitat unit also provides marginal habitat for malleefowl (*Leipoa ocellata*).	

A total of 14 species of fauna were recorded during the survey, including 10 birds, three mammals and one amphibian. Refer to full fauna species list in Table 22 in Appendix D.

Potential breeding and foraging habitat for Carnaby's Cockatoo (EN) is present throughout the survey area within the 'York Gum Woodland' fauna habitat unit, however the species was not detected during the survey period. Potential foraging habitat is also present within the 'Mixed Native Shrub' fauna habitat unit. Potential roosting habitat is present within the 'York Gum Woodland' fauna habitat unit for Carnaby's Cockatoo. See Section 6.2 for more details.

Potential habitat was present within the 'York Gum Woodland' fauna habitat unit for the western spiny-tailed skink (*Egernia stokesii* subsp. *badia*; VU) and marginal habitat is present for malleefowl (*Leipoa ocellata,* VU) in the 'York Gum Woodland' and 'Mixed Native Shrub' fauna habitat unit. A trapdoor like burrow was observed in 'York Gum Woodland' fauna habitat unit, however it was not disturbed and it is unknown what species is utilising the burrow (Figure 17).

High activity from the western grey kangaroo (*Macropus fuliginosus*), rabbit (*Oryctolagus cuniculus*) and fox (*Vulpes vulpes*) were observed across the survey area as evidenced from scats, tracks, diggings, dens and burrows.

Refer to Figure 17 for photographs of indicators of species presence observed during the survey and Figure 18 for locations of species detected.

a)

b)

c)

d)

e)

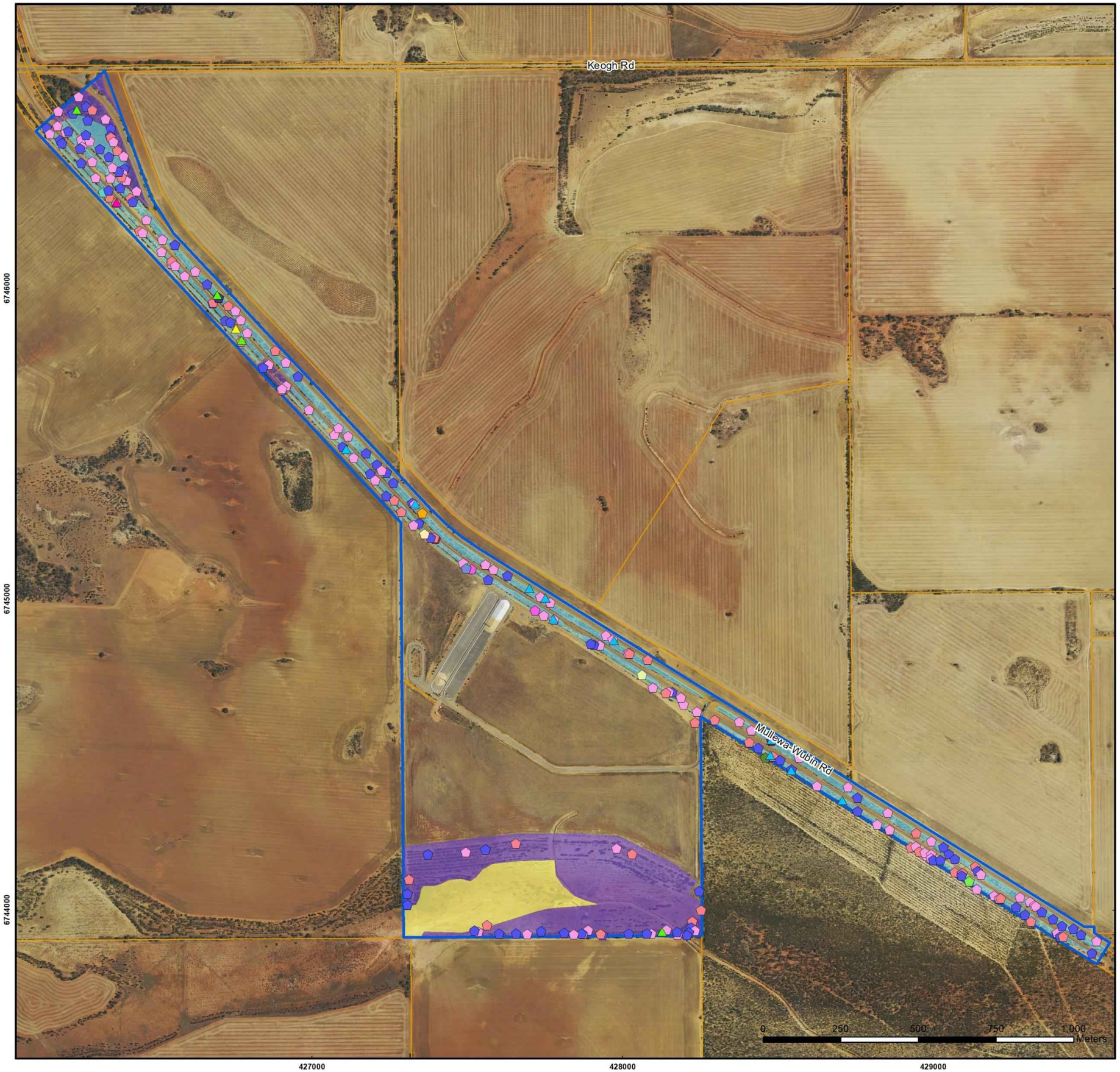
f)

Figure 17: Photographs of fauna presence within the survey area.
Fox a) scat; b) track; c) den; rabbit d) diggings and scat; e) burrow; f) western grey kangaroo tracks.

g)

Figure 17 cont.

g) trapdoor spider nest.



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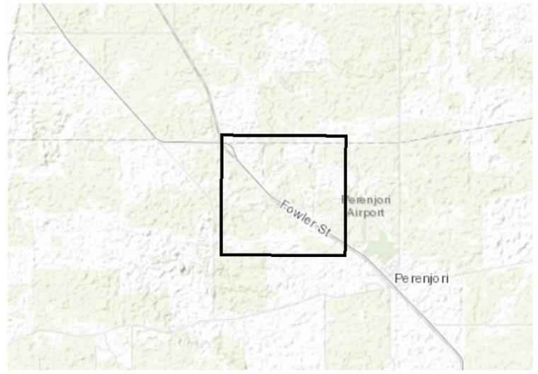

Overview Map Scale 1:200,000

Legend

Survey Area
Cadastre

Observed Fauna

- *Barnardius zonarius*
- *Corvus coronoides*
- *Cracticus nigrogularis*
- *Eolophus roseicapillus*
- *Glossopsitta porphyrocephala*
- *Grallina cyanoleuca*
- *Hirundo neoxena*
- *Lichenostomus virescens*
- *Macropus fuliginosus*
- *Manorina flavigula*
- *Ocyphaps lophotes*
- *Oryctolagus cuniculus*
- *Pseudophryne guentheri*
- *Vulpes vulpes*

Fauna Habitat Points

- Fox den
- Macropod runnel
- Rabbit warren
- Reptile burrow

Fauna Habitat Units

- Mixed Native Shrubland
- Samphire Shrubland
- York Gum Woodland

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

Scale
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Figure 18: Observed Fauna and Fauna Habitat.

	QA Check	*Drawn by*
	BMT	**CvdM**
STATUS	*FILE*	*DATE*
FINAL	**CBH0019**	**30/08/2022**

6.2 Targeted Carnaby's Cockatoo Assessment

6.2.1 Breeding habitat

A total of 16 significant trees were identified within the survey area, of these, three (Tree ID 3, 12 and 15) were >500 mm DBH, and the rest were <500mm DBH. Of the >500 mm DBH trees, two (Tree ID 3 and 15) contained hollows (Refer to Table 11), however, were not of a suitable size for Carnaby's Cockatoo (100 mm x 100 mm or greater; refer to Table 11). Of the 13 trees that had a DBH of <500 mm, all contained hollows. Tree ID 4 and 5 contained hollows of a suitable size for Carnaby's Cockatoo (100 mm x 100 mm or greater). Four of these trees (Tree ID 2, 6, 9 and 16) contained hollows with a suitably sized entrance, however they were all less than 3 m above ground, reducing the likelihood of Carnaby's Cockatoo utilising these for nesting. None of the identified hollows had chewing or scratching around the entrance. Refer to Figure 19 for tree locations and Table 11 and Figure 20 for details and images of trees with hollows.

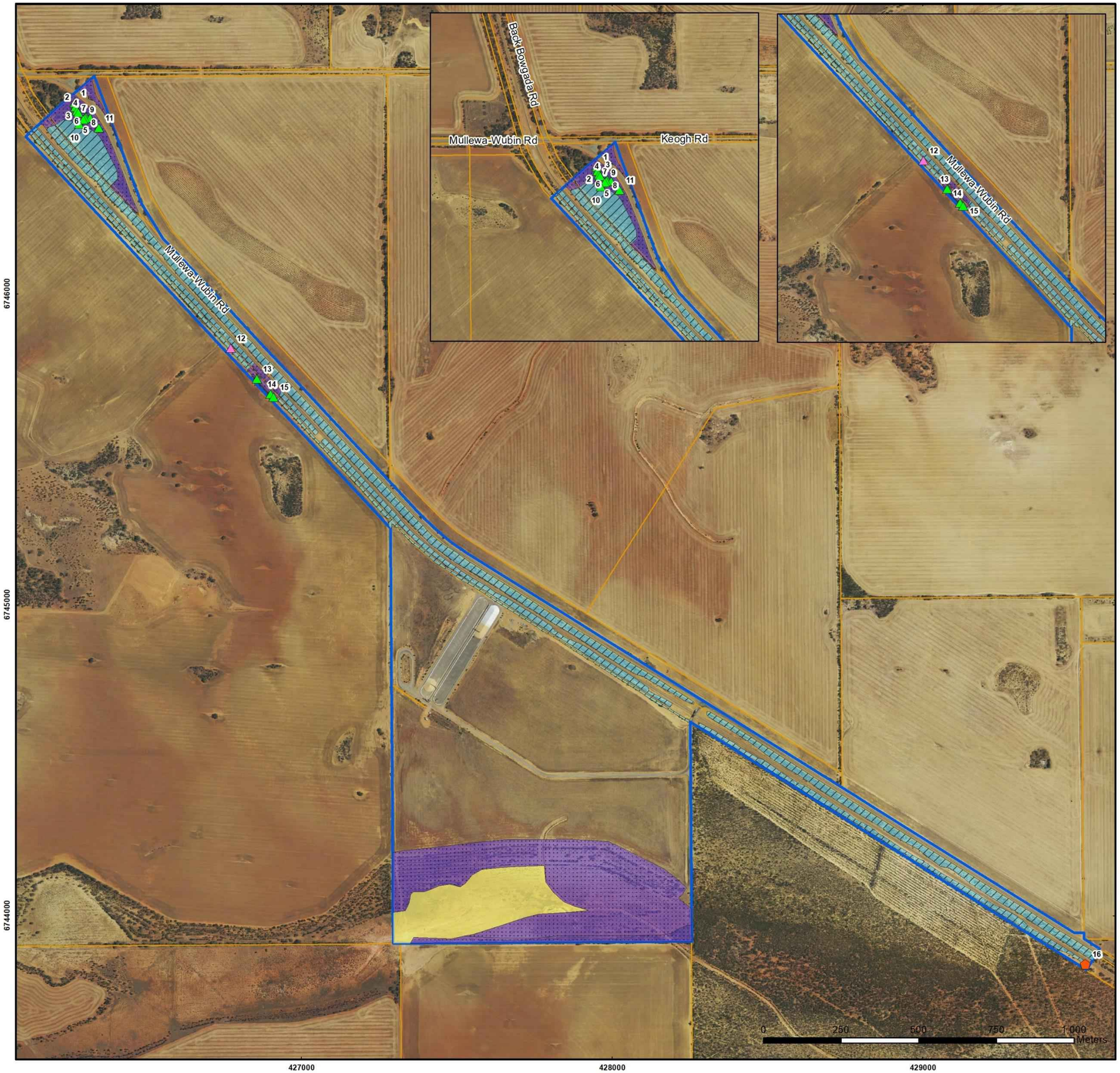
6.2.2 Foraging and Roosting Habitat

During this survey, no evidence of feeding events (chewed nuts) was observed within the survey area. The 'York Gum Woodland' and 'Mixed Native Shrub' habitat units are potential foraging habitat for the Carnaby's Cockatoo. Carnaby's Cockatoo feed predominantly on native shrubland, Kwongkan heathland and woodland dominated by proteaceous plant species such as *Banksia*, *Hakea* and *Grevillea*, as well as in eucalypt woodlands and forest that contain food plants (DSEWPaC, 2012 and DAWE, 2022b). The survey area contains a range of eucalypts known to be Carnaby's foraging food plants, however the overall diversity of food plants available is relatively low. Using the DAWE (2022b) foraging habitat scoring tool (refer to Table 16 Appendix C) the habitat has been assigned a score of 5. The lack of foraging evidence observed indicates that the survey area is not a favoured feeding area, or even being used by transient individuals. Overall, the potential foraging available for Carnaby's cockatoo equates to approximately 19.54 ha which is 46.2% of the cockatoo habitat identified within the survey area (see Table 10).

There was no evidence of Carnaby's Cockatoo roosting within the survey area, as assessed through the presence of accumulated feathers and faecal material. However, there is potential roosting habitat present within the 'York Gum Woodland' fauna habitat unit. The vegetation within the 'Samphire Shrubland' and 'Mixed Native Shrub' is predominately comprised of shrubs and scrubs and does not contain large roosting trees. Overall, the potential roosting habitat available for black cockatoos equates to approximately 22.77 ha which is 53.8% of the black cockatoo habitat identified within the survey area (see Table 10).

Table 10: Potential Carnaby's cockatoo habitat present within the survey area.

Habitat Unit	Description	Area(ha)	Percentage (%) of all mapped Cockatoo Habitat
Foraging Habitat	Mixed Native Shrub	19.54	46.2
Foraging and Roosting Habitat	York Gum Woodland	22.77	53.8
	Totals	**42.31**	**100**



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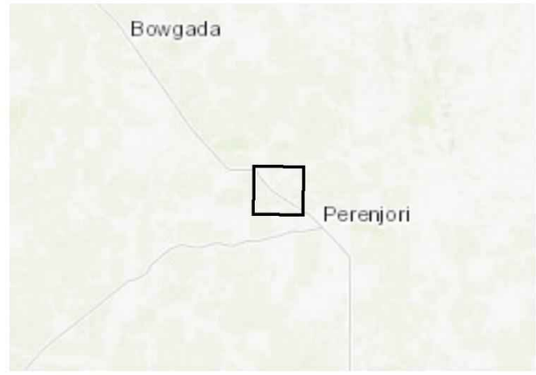

Overview Map Scale 1:5,000,000

Legend

Survey Area

Cadastre

Fauna Habitat Units

Mixed Native Shrubland

Samphire Shrubland

York Gum Woodland

Suitable DBH Trees

Species, Hollow Present

Eucalyptus loxophleba subsp. *supralaevis*, Yes

Eucalyptus loxophleba,

Eucalyptus loxophleba, No

Carnaby's Cockatoo Habitat

Potential Foraging (Low Quality) Habitat

Foraging and Roosting Habitat

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

Scale
1:12,000 @ A3
GDA MGA 94 Zone 50

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Perenjori, WA 6620

Figure 19: Suitable DBH Trees

	QA Check	Drawn by
	BMT	CvdM
STATUS	FILE	DATE
FINAL	CBH0019	29/08/2022

Table 11: Significant trees (>300mm DBH) and trees containing hollows or with hollow bearing potential identified.

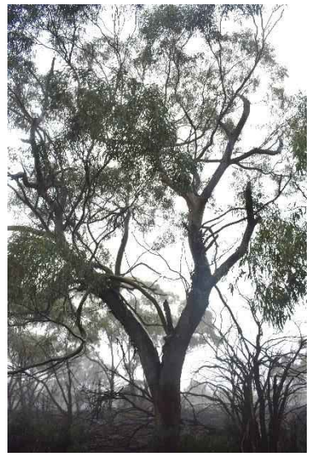
Tree ID	Species	DBH (mm)	Crown Senescent	Hollows Present	Location	Size of Entrance (cm)	Type of Entrance	Height Above Ground (m)	Rubbing or Chewing Around Entrance	Comments	Easting	Northing
1	*Eucalyptus loxophleba*	490	No	Yes	Trunk	5x5	Chimney	8	No	Not suitable as a black cockatoo hollow.	-29.4076	116.24
2	*Eucalyptus loxophleba*	430	No	Yes	Trunk	10x10	Chimney	2	No	Suitable hollow for Carnaby's Cockatoo. Height above ground likely limiting factor.	-29.4077	116.2401
					Trunk	10x10	Chimney	2	No	Suitable hollow for Carnaby's Cockatoo. Height above ground likely limiting factor.	-29.4078	116.2401
					Trunk	8x8	Chimney	2	No	Not suitable as a black cockatoo hollow.	-29.4079	116.2402
3	*Eucalyptus loxophleba*	510	No	Yes	Branch	5x5	Side	5	No	Not suitable as a black cockatoo hollow.	-29.408	116.2404
					Branch	8x8	Chimney	7	No		-29.408	116.2404
4	*Eucalyptus loxophleba*	450	No	Yes	Branch	10x10	Chimney	6	No	Suitable hollow for Carnaby's Cockatoo.	-29.4081	116.2406
5	*Eucalyptus loxophleba*	360	No	Yes	Branch	10x10	Chimney	5	No	Suitable hollow for Carnaby's Cockatoo. Bees in hollow.	-29.4081	116.2404
6	*Eucalyptus loxophleba*	440	No	Yes	Branch	10x10	Side	2	No	Suitable hollow for Carnaby's Cockatoo. Height above ground limiting factor, unlikely to be utilised.	-29.4081	116.2403
7	*Eucalyptus loxophleba*	420	No	Yes	Branch	5x5	Side	5	No	Not suitable as a black cockatoo hollow.	-29.4082	116.2402
8	*Eucalyptus loxophleba*	390	No	Yes	Branch	5x5	Chimney	5	No	Not suitable as a black cockatoo hollow.	-29.4083	116.2408
					Branch	3x3	Side	5	No		-29.4148	116.2452
9	*Eucalyptus loxophleba*	350	No	Yes	Trunk	10x10	Chimney	1	No	Suitable hollow for Carnaby's Cockatoo. Height above ground limiting factor, unlikely to be utilised.	-29.4157	116.246
					Branch	10x10	Chimney	3	No	Suitable hollow for Carnaby's Cockatoo. Height above ground limiting factor, unlikely to be utilised.	-29.4161	116.2465
10	*Eucalyptus loxophleba*	<300	No	Yes	Branch	3x3	Elbow	1	No	Not suitable as a black cockatoo hollow.	-29.4162	116.2466
11	*Eucalyptus loxophleba*	320	No	Yes	Branch	6x6	Chimney	4	No	Not suitable as a black cockatoo hollow.	-29.4328	116.2734
12	*Eucalyptus loxophleba*	530	No	No	-	-	-	-	-	Nest in tree	-29.4076	116.24
13	*Eucalyptus loxophleba*	360	No	Yes	Trunk	5x5	Side	2	No	Not suitable as a black cockatoo hollow.	-29.4077	116.2401
14	*Eucalyptus loxophleba*	400	No	Yes	Branch	5x5	Chimney	5	No	Not suitable as a black cockatoo hollow.	-29.4078	116.2401
15	*Eucalyptus loxophleba*	1040	No	Yes	Branch	5x5	Chimney	3	No	Not suitable as a black cockatoo hollow.	-29.4079	116.2402
16	*Eucalyptus loxophleba* subsp. *supralaevis*	480	No	Yes	Trunk	10x10	Chimney	2	No	Suitable hollow for Carnaby's Cockatoo. Height above ground likely a limiting factor for use.	-29.408	116.2404

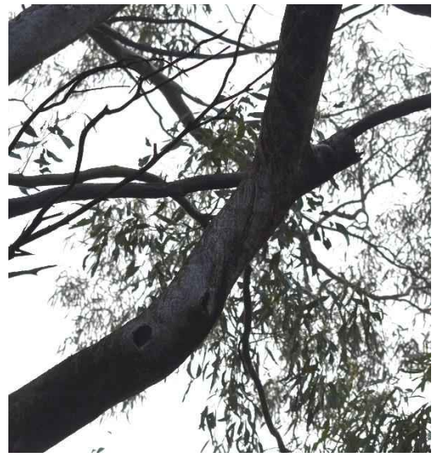
No photo of tree hollow.

Tree ID: 1

Tree ID: 2

Tree ID: 2 cont.





Tree ID: 3

No photo of tree hollow.

Tree ID: 4

Tree ID: 5

Figure 20: Significant trees and hollow images identified during the survey period.


Tree ID: 6


Tree ID: 7

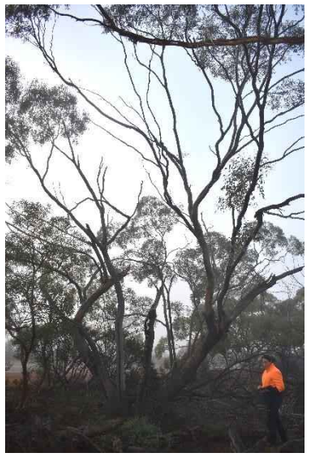


Tree ID: 8


Tree ID: 9

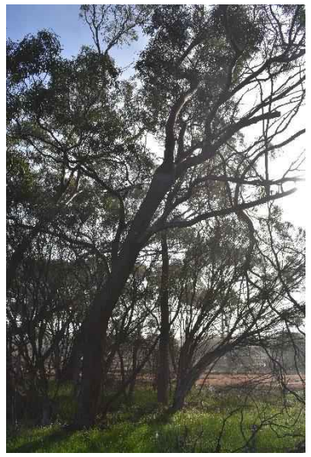

Tree ID: 10

Figure 20 cont.



No photo of tree hollow.

Tree ID: 11



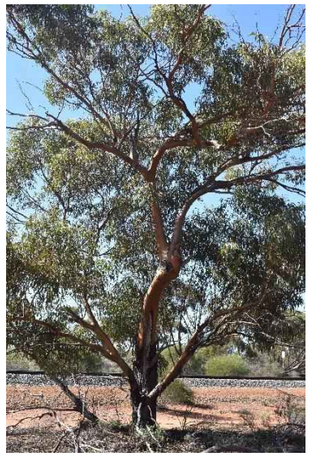
No photo of tree hollow.

Tree ID: 13

Tree ID: 14

No photo of tree hollows.

Tree ID: 15



No photo of tree hollow.

Tree ID 16:

Figure 20 cont.

7. Discussion

7.1. Vegetation, Threatened and Priority Flora and Ecological Communities

The scope for this survey was to provide the client with information on any Threatened or Priority flora species that are potentially present within the survey area, as well as Threatened/Priority ecological communities, and to provide an assessment on vegetation units and their general condition. Three vegetation units were recorded during the survey, namely *Eucalyptus loxophleba* Open Woodland [ElOW], Tecticornia Shrubland [TS] and Mixed Native Shrubland [MNS]. Some areas of the site consisted of a planted area of *Eucalyptus loxophleba* Open Woodland and cleared paddocks. The condition of the vegetation units ranged from 'Completely Degraded' through to 'Very Good'.

A total of 134 flora species were recorded, comprising 115 native species and 19 introduced species. Two Priority 3 species and one Priority 1 species were observed within the survey area. 60 individuals of the Priority 3 species *Grevillea granulosa* were recorded during the survey period. 15 individuals of the Priority 3 species *Leptospermum exsertum* were recorded and one individual of the Priority 1 species *Grevillea asparagoides* was recorded during the survey period. No other conservation significant species were identified during the survey period. Other species which could not be ruled out from occurring in the likelihood analysis were *Enekbatus longistylus* and *Baeckea sp.* Perenjori. These species could not be ruled out as they occur in the correct geographic region and bear similar characteristics to species which were unable to be identified during the out of season survey. It is recommended to conduct targeted spring surveys for these species.

The Threatened/Priority Ecological Community identified as possibly being present within the survey area was the '*Eucalypt Woodlands of the Western Australian Wheatbelt* (Wheatbelt Woodlands)*'* (PEC/TEC). Vegetation units present within the survey were analysed and compared to diagnostic criteria. Only Vegetation unit 1 *Eucalyptus loxophleba* Open Woodland (native) [ElOWn] was deemed as potentially consisting of the Wheatbelt Woodland PEC/TEC. Vegetation unit 1b *Eucalyptus loxophleba* Open Woodland (planted) [ElOWp] does not contain sufficient understorey species to meet the criteria. Should any works be planned in this location a detailed flora survey of this vegetation unit will be required to formally confirm the presence of this TEC/PEC before proceeding further. A detailed flora survey entailing quadrat sampling is beyond the scope of this survey, as the purpose of this survey was to determine the presence/distribution of vegetation communities and their condition, and presence of conservation flora taxa encountered at a reconnaissance level only.

During the survey, some environmental weed species were also recorded. Paterson's Curse is of concern and should be controlled to prevent further establishment in the area and subsequent degradation of remnant vegetation.

7.2. Basic Fauna Survey and Significant Tree Survey

The aim of the basic and targeted fauna survey was to assess and map the fauna habitat within the survey area, assess the likelihood of Threatened and Priority fauna being present within the survey area and/or particular vegetation units, record actual presence of Threatened and Priority listed species, and undertake opportunistic inventory of fauna species encountered whilst traversing the survey area on foot. The aim of the targeted black cockatoo habitat survey was to assess and map the potential breeding, foraging and roosting habitat within the survey area. No Threatened or Priority fauna were observed within the survey area during the survey period.

Three different fauna habitats were identified within the survey area, described as 'York Gum Woodland', 'Mixed Native Shrub' and 'Samphire Shrubland'. During the survey, 14 species of fauna were recorded, including 10 birds, three mammals and one amphibian.

Potential breeding, foraging and roosting habitat is present throughout the survey area within the 'York Gum Woodland' fauna habitat unit for Carnaby's cockatoo. Potential foraging habitat is also present in the 'Mixed Native Shrub' fauna habitat unit.

The survey area also provides some marginal habitat for the malleefowl (*Leipoa ocellata,* VU) and the Western spiny-tailed skink (*Egernia stokesii subsp. badia*; VU). A trapdoor like burrow was observed in 'York Gum Woodland' fauna habitat unit, however it was not disturbed and it is unknown what species is utilising the burrow. The habitat present is not marginally suitable for the shield-backed trapdoor spider (*Idiosoma nigrum*, EN). It was outside of the scope of survey (terrestrial vertebrate fauna only) to undertake a targeted survey for the trapdoor spider species. Further targeted fauna survey or assessment may be required for these species depending on final disturbance footprint.

A total of three suitable DBH trees (trees with a DBH >500 mm) were identified during the survey and, of these, two hollow-bearing trees were identified, however none contained hollows of a suitable size for breeding by Carnaby's Cockatoo. An

additional 13 trees were identified that had a DBH of <500 mm, but contained hollows. Of these, six contained hollows of a suitable size for Carnaby's Cockatoo, however four were deemed as unlikely to be utilised due to their height above ground (<3m). No scratching or chewing was observed at the entrance of any identified hollows, and one hollow was occupied by bees.

Given there is no confirmed site development plans for the proposed expansion, CBH Group should be aware that the EPBC Act 1999 referral guidelines for the three threatened black cockatoo species stipulates that a proposal should be referred for assessment if:

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

It cannot be determined if the proposal will need to be formally assessed until final plans are developed.

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9. Appendices

Appendix A – Survey Effort Map

Appendix B – Conservation Significant Values Likelihood of Occurrence Analysis & Cockatoo Foraging Habitat Scoring Tool

Appendix C – Conservation Status Definitions and Condition Scale

Appendix D – Species Lists and Relevé Data

Appendix E - Threatened and Priority reporting forms

Appendix F - NatureMap and EPBC Act PMST reports

Appendix A

Survey Effort Map

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

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

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

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:5,000,000

Legend

- Survey Area
- Cadastre
- Survey Effort

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

Scale
1:12,000 @ A3
GDA MGA 94 Zone 50

CLIENT
CBH Group
Perenjori Receival Site
Perenjori, WA 6620

Figure 21: Survey Effort.

	QA Check	*Drawn by*
	BMT	**CvdM**
STATUS	*FILE*	*DATE*
FINAL	**CBH0019**	**11/08/2021**

Appendix B

Conservation Significant Values Likelihood of Occurrence Analysis &
Cockatoo Foraging Habitat Scoring Tool

Table 12: Criteria for assessing the likelihood of occurrence of Threatened or Priority flora and fauna within a 10km radius of the survey area.

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

Table 13: Potential conservation significant flora located within 30 (NatureMap and PMST) to 10 (DBCA) km of the survey area and likelihood of occurrence analysis (post survey).
NB - Species are sorted by likelihood of presence. Numerous resources specific to Threatened and Priority flora listed below were used in the likelihood assessment (ANBG, n.d.; Archer, 2011; DAWE, 2008a; DAWE, 2008b; RBGV, n.d.; WANOSCG, 2016).

Family	Species	Vernacular	Status (WA)	NatureMap	PMST	DBCA	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - pre-survey assessment	Likelihood Analysis - Post survey outcomes
Proteaceae	*Grevillea asparagoides*		P3	x		x	Dense prickly shrub, 0.5-2 m high. Fl. red.	Gravelly loam, white or yellow sand.	Jul to Oct or Dec	Possible	Detected during survey
Proteaceae	*Grevillea granulosa*		P3	x		x	Compact shrub, 0.4-1.5(-4) m high. Fl. Red.	Gravelly sand, loam, clay. Sandplains.	Jul to Oct	Possible	Detected during survey
Myrtaceae	*Leptospermum exsertum*		P1	x		x	Shrub, 0.3-0.6 m high. Fl. white	Sandy soils. Sandplains.	Aug to Sep	Possible	Detected during survey
Fabaceae	*Acacia aprica*	Blunt Wattle	T - EN		x		Diffuse, open, spreading shrub, 0.3-2 m high. Fl. yellow.		Jun to Jul	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Acacia cochlocarpa* subsp. *cochlocarpa*	Spiral-fruited Wattle	T - EN		x		Glabrous, sprawling shrub, 0.3-0.7(-1.5) m high. Fl. yellow.	Clayey, sandy, often gravelly soils.		Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Acacia graciliformis*		P1	x			Shrub, to 2 m high, bark grey, long fissures on main stems, smooth on branches; inflorescences of heads. Fl. Yellow.	Stony red-brown clay loams, laterite, banded ironstone, basalt. Rock outcrops, base of rocky hills, gentle slopes.	September	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Acacia isoneura* subsp. *nimia*		P1	x		x	Shrub, 1-4 m high. Fl. Yellow.	Yellow/brown or red sand, stony soils. Sandplains & sand ridges.	Jul to Aug	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Acacia muriculata*		P1	x			Much-branched, multi-stemmed, obconic shrub, to 2 m high.	Red-brown and yellow-brown soils, laterite, banded ironstone. Hill slopes and crests.	October	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Acacia nigripilosa* subsp. *latifolia*		P1	x			Shrub, 0.5-2 m high, phyllodes 5-8 mm wide. Fl. Yellow.	Yellow sand.	Aug to Sep	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Babingtonia minutifolia*		P1	x						Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey. Outside of recorded geographic range (Florabase).
Myrtaceae	*Baeckea* sp. Perenjori (J.W. Green 1516)		P2	x			Rounded shrub, ca 0.5 m high, 1 m wide. Fl. Pink.	Loam, clay.	August	Possible	Possible- Myrtaceae species within the site were present which were unable to be identify due to lack of diagnostic features. Further surveys required.
Proteaceae	*Banksia benthamiana*		P4	x		x	Non-lignotuberous shrub, 1.8-4 m high. Fl. yellow-orange/orange-brown.	Sandy loam, clay-loam, yellow sand, gravel.	Nov to Dec or Jan	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Hemerocallidaceae	*Caesia* sp. Koolanooka Hills (R. Meissner & Y. Caruso 78)		P1	x			Perennial, herb, to 0.3 m high.	Orange-red-brown soils on banded ironstone. Steep to slight hill slopes and crests.	November	Possible	Unlikely - considered unlikely due to outside of recorded geographic range (Florabase) Can you please check how far way the recorded sighting is on the DBCA dataset.
Myrtaceae	*Calytrix plumulosa*		P3	x			Shrub, 0.15-0.4 m high. Fl. pink-violet.	Yellow sand with lateritic gravel, red loam.	Oct to Nov	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.

Table 13 cont.

Family	Species	Vernacular	Status (WA)	NatureMap	PMST	DBCA	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - pre-survey assessment	Likelihood Analysis - Post survey outcomes
Myrtaceae	*Chamelaucium* sp. Bunjil (M.E. Ballingall 1970)		P1	x			Shrub to 0.8m high. Flowers white to pink.	Lower slope of granite, Dry brown loam, hillside, road verges, yellow-brown sand, ironstone gravel.	Aug to Oct	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Chorizema humile*		T - CR	x	x		Sprawling, prostrate or decumbent shrub. Fl. yellow & red/brown.	Sandy clay or loam. Plains.	July to September	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Darwinia polychroma*	Harlequin Bell	T - EN		x		Dwarf shrub to 1.2m high. Simple leaves. Bracts green, red and yellow and form a bell of 1-2cm long.	Road or railway reserve. Open low scrub or shrubland with Melaleuca sp., *Acacia ligulata*, Mallee and Exocarpos sp. On yellow loamy sand over laterite.	Jul to Sept	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey. Outside of recorded geographic range (Florabase).
Lamiaceae	*Dasymalla axillaris* - previously *Pityrodia axillaris*	Native Foxglove	T - CR	x	x	x	Low, diffuse shrub. 0.3 m high. Flowers red to yellowish-scarlet.	Sandy soils. Disturbance opportunist.	Jul to Dec	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Sapindaceae	*Dodonaea scurra*		P1	x			Dioecious, multi-stemmed shrub, 0.4-1 m high.	Fine to coarse gravel, brown sandy loam, banded ironstone. Upper slopes of hills and crests of rock outcrops.		Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Enekbatus longistylus*		P3	x		x	Shrub, 0.3-0.6 m high. Fl. pink-violet.	Yellow sand. Sandplains.	Sep to Oct	Possible	Possible- Myrtaceae species within the site were present which were unable to be identify due to lack of diagnostic features. Further surveys required.
Scrophulariaceae	*Eremophila nivea*	Silky Eremophila	T - CR	x	x	x	White/grey, tomentose shrub, 1-2 m high. Fl. blue-purple-violet.	Sandy clay, clay loam. Undulating plains, road verges.	Aug to Oct	Possible	Unlikely- outside of geographic range (FloraBase).
Scrophulariaceae	*Eremophila rostrata* subsp. *trifida*		T - CR	x	x	x	Shrub, to 3 m high, with a three-parted leaf apex.	Hard, light brown, sandy loams, granite.		Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Gastrolobium hamulosum*	Hook-point Poison	T - EN		x		Low shrub, 0.2-0.45 m high. Fl. Yellow, orange, red and purple.			Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey, outside of geographic range.
Goodeniaceae	*Goodenia perryi*		P3	x			Herb or shrub, 0.15-0.3 m high. Fl. Blue.	Yellow sand.	Oct to Nov	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Proteaceae	*Grevillea leptopoda*		P3	x			Spreading to erect shrub, 0.6-1.5 m high. Fl. white-cream.	Loam & lateritic gravel, sand, clay.	Aug to Sep.	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Proteaceae	*Grevillea pythara*	Pythara Grevillea	T - EN		x		Suckering shrub, 0.06-0.3 m high. Fl. orange & red & blue.	Sand or sandy loam with gravel.	May to Oct (possibly all year).	Possible	Unlikely- outside of geographic range (FloraBase).
Gyrostemonaceae	*Gyrostemon reticulatus*		T - CR	x	x		Shrub, ca 1 m high.			Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Lamiaceae	*Hemiandra gardneri*	Red Snakebush	T - EN		x		Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Fl. red/pink-red.	Grey or yellow sand, clayey sand. Sandplains.	Aug to Oct	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey, outside of geographic range.

Table 13 cont.

Family	Species	Vernacular	Status (WA)	NatureMap	PMST	DBCA	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - pre-survey assessment	Likelihood Analysis - Post survey outcomes
Goodeniaceae	*Lechenaultia galactites*		P3	x			Erect, robust shrub (sub-shrub), to 0.6 m high. Fl. blue-white.	Yellow sand, clay, gravel, laterite. Sandplains.	Jun to Oct.	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Cyperaceae	*Lepidosperma* sp. Koolanooka (K.R. Newbey 9336)		P1	x			Perennial sedge to 40cm. Brown flowers.	Eucalyptus woodland over mixed shrubland with Allocasuarina and Acacia. Sloped or granite, red loam/clay/grave over laterite.	Jan, Jun, Sep	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Melaleuca barlowii*		P3	x		x	Shrub, 1.5-1.8 m high.	Yellow-brown sand or red-brown clay loam. Roadside reserves, shrubland.	April	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Asteraceae	*Millotia dimorpha*		P1	x			Erect or ascending annual, herb, ca 0.11 m high. Fl. yellow-white.	Red loamy soils.	September	Possible	Unlikely - considered unlikely due to outside of recorded geographic range (Florabase).
Asteraceae	*Rhodanthe collina*		P3	x			Erect, bushy annual, herb, 0.1-0.25 m high. Fl. white & yellow.	Loam. Rocky hills.	Aug to Oct.	Possible	Unlikely- outside of geographic range (FloraBase).
Chenopodiaceae	*Sclerolaena* sp. Koolanooka Hills (R. Meissner & Y. Caruso 437)		P1	x			Shrub, to 0.1 m high.	Red-brown soils, banded ironstone. Lower slopes, mallee woodland.		Possible	Unlikely- outside of geographic range (FloraBase).
Rhamnaceae	*Stenanthemum poicilum*		P3	x			Erect or decumbent shrub, 0.15-0.5 m high. Fl. White.	Red clay or sandy clay, loam.	May to Jun or Sep to Nov.	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Chenopodiaceae	*Tecticornia bulbosa*		T - VU	x	x		Sprawling shrub, ca 1 m high, 2-3 m wide.	Saline sandy clay or red/brown loam.		Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Urodon capitatus*		P3	x		x	Low spreading or upright shrub, (0.12-)0.3-1.2 m high, to 1 m wide. Fl. yellow-orange-red.	Sandy gravelly soils. Plains.	Sep to Oct	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Verticordia venusta*		P3	x		x	Erect, spreading shrub, 0.2-2 m high. Fl. pink-purple/red-brown.	Yellow sand, sandy gravel. Sandplains.	Sep to Dec or Jan.	Possible	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Lamiaceae	*Hemigenia* sp. major (C.A. Gardner 2677)		P1	x			Shrub, 0.3-0.9 m high. Fl. violet-blue.		Jul or Sep	Unable to assess	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey, outside of geographic range.
Fabaceae	*Acacia recurvata*		T - EN		x		Dense, domed, viscid shrub, 0.6-2.5 m high. Fl. Yellow.	Sandy clay, granitic clay-loam. Creeklines, plains, breakaways, low hills.	Jul	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Asteraceae	*Angianthus micropodioides*		P3	x			Erect or decumbent annual, herb, 0.03-0.15 m high. Fl. yellow-white.	Saline sandy soils. River edges, saline depressions, claypans.	Nov to Dec or Jan to Feb	Unlikely	Unlikely - considered unlikely due to outside of recorded geographic range (Florabase).
Poaceae	*Austrostipa blackii*		P1	x			Tufted perennial, grass-like or herb, 1 m high.		Fl. Sep to Nov.	Unlikely	Unlikely - considered unlikely due to outside of recorded geographic range (Florabase).

Table 13 cont.

Family	Species	Vernacular	Status (WA)	NatureMap	PMST	DBCA	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - pre-survey assessment	Likelihood Analysis - Post survey outcomes
Rutaceae	*Drummondita rubriviridis*		P1	x			Shrub, 1.5m high. Branching and straggly. Flowers red with green lobes, shortly ciliate.	Slopes and crests of banded ironstone. Sandy loam soil, open Mallee forests of *Eucalyptus ebbanoensis, Allocasuarina acutivalvis*, *Melaleuca* sp., over shrublands of *Acacia nigripilosa* subsp. *nigripilosa*, *Hibbertia* aff *exasperata*, *Dodonaea scurra* and *Aluta aspera* subsp. *hesperia*.	Sept to Oct	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Asteraceae	*Epitriche demissus*		P2	x			Prostrate annual, herb, to 0.05 m high. Fl. White.	Sandy & clayey soils. Saline depressions, lake edges.	Jul to Sep	Unlikely	Unlikely- outside of geographic range (FloraBase).
Scrophulariaceae	*Eremophila glabra* subsp. Morawa (C.A. Gardner 7521)		P1	x			Prostrate, spreading shrub 6 to 10cm high. Bright green, glabrous leaves. Yellow corolla.	Sandy soils around salt lakes and saline flats with *Eremophila decipiens* and *Eremophila miniata*. Disturbance opportunist, fire responder.	Aug to Sept	Unlikely	Unlikely- outside of geographic range (FloraBase).
Scrophulariaceae	*Eremophila resinosa*	Resinous Eremophila	T - EN		x		Spreading shrub, 0.4-0.8 m high, to 1 m wide. Fl. blue-purple-white.	Clay loam, gravelly sandy clay. Road verges.	Apr or Oct to Nov.	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Scrophulariaceae	*Eremophila sericea*		P1	x		x	Small branched shrub to 1.2 m high. Branches, leaves and sepals with dense indumentum of grey-white branched hairs. Corolla purple to pale lilac.	Red brown clay loam on the lower slopes of rocky hills. Associated species of *Acacia andrewsii, Eucalyptus loxophleba* subsp. *supralaevis, Eucalyptus salubris.*	Sept to Nov	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Scrophulariaceae	*Eremophila viscida*		T - EN	x	x		Shrub, 1.2-4 m high. Fl. green-white-yellow.	Granitic soils, sandy loam. Stony gullies, sandplains.	Sep to Nov	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Eucalyptus arachnaea* subsp. *arrecta*	Black-stemmed Mallet	P3	x			Tree, 5-10(-15) m high, bark rough. Fl. white-cream.	Clay loam on granite, gravelly loam. Breakaway slopes, gullies.		Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Eucalyptus beardiana*	Beard's Mallee	T - VU		x		(Mallee), 3-5 m high, bark smooth. Fl. cream-white.	Red or yellow sand. Sand dunes & ridges.	Aug to Sep	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Eucalyptus synandra*	Jingymia Mallee	T - VU	x	x		(Mallee), 3.5-10 m high, bark smooth. Fl. cream & pink.	Sandy & lateritic soils.	Aug or Dec or Jan to Mar.	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Asteraceae	*Fitzwillia axilliflora*		P2	x			Ascending to erect annual, herb, 0.03-0.135 m high. Fl. White.	Sand, clay loam. Margins of salt lakes, saline flats.	Sep to Nov.	Unlikely	Unlikely- outside of geographic range (FloraBase).
Asteraceae	*Gnephosis setifera*		P1	x			Small annual, herb. Fl. Yellow.	Sand. Saline flats.	Sep	Unlikely	Unlikely- outside of geographic range (FloraBase).
Proteaceae	*Grevillea christineae*	Christine's Grevillea	T - EN		x		Erect, wiry shrub, 0.5-0.6 m high. Fl. white-cream.	Clay loam, sandy clay, often moist.	Aug to Sep	Unlikely	Unlikely- outside of geographic range (FloraBase).
Cyperaceae	*Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468)		P1	x			Sedge 0.4-0.7m high. Erect.	Tall shrubland of Melaleuca, Acacia and Allocasuarina sp. Base of granite hill or water course adjacent to granite hill. brown sand-loam. Disturbance opportunist.	Jul, Sept to Nov	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Myrtaceae	*Melaleuca sclerophylla*		P3	x			Erect-spreading to prostrate shrub, 0.15-0.9 m high. Fl. purple-pink.	Gravelly sand, clayey sand. Granite outcrops, rises.	Jun to Sep	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.

Table 13 cont.

Family	Species	Vernacular	Status (WA)	NatureMap	PMST	DBCA	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - pre-survey assessment	Likelihood Analysis - Post survey outcomes
Fabaceae	*Mirbelia ferricola*		P3	x		x	Erect shrub to 3m tall. Fl yellow and red.	Banded Iron Formation in semi-arid Yilgarn region of WA. Shallow and lateritic soils on lower to upper slopes and crests of iron formations. Open Woodland and/or tall shrubland with low diverse understorey.	Jun to Nov	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Fabaceae	*Mirbelia* sp. Ternata (M.D. Crisp & L.G. Cook MDC 9267)		P1	x			Shrub to 0.5 m high.	Mallee Woodland over Melaleuca open tall to mid shrubs. Undulating plain to rocky slope to edge of plateau. Yellow, loamy sand to grey brown sandy loam, sandstone, laterite.	Aug to Oct	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey.
Proteaceae	*Persoonia pentasticha*		P3	x		x	Erect, spreading shrub, 0.4-1.8 m high. Fl. Yellow.	Sand, loam. Base of granite outcrops.	Aug to Nov	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey. Habitat not present in survey area.
Proteaceae	*Petrophile pauciflora*		P3	x			Shrub, ca 1 m high. Fl. Yellow.	Decaying & dissected granite breakaways.	September	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey. Habitat not present in survey area.
Asteraceae	*Podotheca uniseta*		P3	x			Ascending to erect, succulent annual, herb, 0.05-0.25 m high. Fl. Yellow.	White/grey sand, sandy loam. Samphire flats.	Sep to Dec	Unlikely	Unlikely- outside of geographic range (FloraBase).
Chenopodiaceae	*Roycea pycnophylloides*	Saltmat	T - EN		x		Perennial, herb, forming densely branched, silvery mats to 1 m wide.	Sandy soils, clay. Saline flats.	September	Unlikely	Unlikely- outside of geographic range (FloraBase).
Chenopodiaceae	*Tecticornia fimbriata*		P3	x			Erect shrub, 0.25-1 m high.	Clay, loam. Margins of salt & gypsum lakes.		Unlikely	Unlikely- outside of geographic range (FloraBase).
Myrtaceae	*Verticordia chrysostachys* var. *pallida*		P3	x			Erect to spreading shrub, 0.6-2 m high. Fl. yellow/cream.	Yellow sand. Sandplains, sand dunes.	Sep to Dec or Jan.	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey, outside of geographic range.
Myrtaceae	*Verticordia comosa*		P1	x			Erect, spindly shrub, 1-2.4 m high. Fl. Yellow.	Yellow or grey sand.	Oct to Dec	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey, outside of geographic range.
Myrtaceae	*Verticordia dasystylis* subsp. *oestopoia*		P1	x			Spreading shrub, 0.1-0.4 m high. Fl. cream-yellow.	Gritty soils over granite. Outcrops.	Oct	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey. Habitat not present in survey area.
Frankeniaceae	*Frankenia conferta*	Silky Frankenia	T - EN		x		Small shrub.	Sandy, often gravelly soils or clay. Flats, slopes, ridges.	Aug to Oct.	Unlikely	Not detected- Unlikely due to growth habit would have resulted in the plant being visible at the time of survey, outside of geographic range.

Table 14: Conservation Code definitions for Threatened and Priority Ecological Communities located within 10km of the survey area.

Community Name	Status	Description	Survey Outcome
Eucalypt woodlands of the Western Australian Wheatbelt	Priority 3 (WA) CR (EPBC Act)	The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10%. The key dominant or co-dominant species of the tree canopy are species of Eucalyptus trees that typically have a single trunk. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs.	Potentially present in the survey area. *Eucalyptus loxophleba* Open Woodland (native) [EloWn] Vegetation unit.
Koolanooka System as originally described in Beard (1976)	VU (WA)	Located within Archaean metamorphic rocks of the Koolanooka Hills, the surrounding footslopes and the fork shaped range to the south-east, containing Perenjori Hills. The plan assemblage comprises of *Eucalyptus ebbanoensis* subsp. *ebbanoensis* Mallee and *Acacia* sp. scrub with scattered *Allocasuarina huegeliana* over red loam and ironstone on the upper slopes and summits. *Allocasuarina campestris* scrub over red loam on hill slops. Shrubs and emergent Mallees on shallow red loam over massive ironstone on steep rocky slopes. *Eucalyptus loxophleba* woodland over scrub on the footslopes and mixed *Acacia* sp. scrub on granite (Hamilton-Brown, 2000)	Not present in the survey area.

Table 15: Potential conservation significant fauna located within 20km of the survey area and likelihood of occurrence analysis (post survey).
Note: Species are presented based on likelihood of occurrence. Habitat information taken from publicly available resources such as: DSEWPaC (2011) Survey guidelines for Australia's threatened mammals; DEWHA (2010) Survey guidelines for Australia's threatened birds; SPRAT profiles and species-specific recovery plans

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of occurrence (pre-survey)	Likelihood of occurrence (post-survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Cacatuidae	*Calyptorhynchus latirostris*	Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo	EN / EN	Eucalypt woodlands, especially those that contain salmon gum and wandoo, and in shrubland or kwongan heathland dominated by hakea, dryandra, banksia and grevillea species. It also occurs in remnant patches of native vegetation on land otherwise cleared for agriculture. It also forages in forests containing marri, jarrah or karri.	Possible	Possible	Y - *Eucalyptus loxophleba* Open Woodland.	MEDIUM	N	
Cacatuidae	*Calyptorhynchus* sp.	White-tailed Black Cockatoo	EN / EN	Same as above.	Possible	Possible	Y - *Eucalyptus loxophleba* Open Woodland.	MEDIUM	N	
Scinidae	*Egernia stokesii badia*	Western spiny-tailed skink	VU / EN	Most records of the brown form Western Spiny-tailed Skink are in York Gum (*Eucalyptus loxophleba*) woodland with some records in Gimlet (*E. salubris*) and Salmon Gum (*E. salmonophloia*) woodland. Populations persist in woodland patches as small as one hectare and completely surrounded by wheatfields. Sites with the greatest number of individuals contain numerous fallen logs and were subjected to low-intensity grazing by domestic stock. Hollow logs are used as refuge sites in woodland habitat. Preferred refuges consist of piles of several, overlapping, hollow logs providing a combination of basking and shelter sites. An increasing number of skinks are being located in altered habitat under piles of wood, scrap metal or under buildings on private property.	Possible	Possible	Y-habitat present in the form of the York Gum woodland.	LOW	N	
Falconidae	*Falco hypoleucos*	Grey Falcon	VU / -	Usually in lightly timbered country, especially stony plains and lightly timbered acacia shrublands.	Possible	Possible	N - habitat not present within survey area.	MEDIUM	N	
Falconidae	*Falco peregrinus*	Peregrine Falcon	OS / -	It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water.	Possible	Possible	N - habitat not present within survey area.	MEDIUM	N	
Idiopidae	*Idiosoma nigrum*	Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider	EN / VU	Typically inhabits clay soils whereas the arid Midwest populations are associated with rocky habitats, primarily in positions with increased moisture retention properties like gullies and drainage lines on southern facing slopes. In the Wheatbelt, populations are associated with eucalypt woodland and acacia shrubland, and in the arid Midwest they are associated with acacia shrubland. Leaf litter and twigs are extremely important to the species as it provides material for the burrows, reduced soil moisture loss and increased prey availability. The species avoids areas of dense leaf litter as juveniles are unable to dig their initial hole in such areas.	Possible	Possible	Y- Habitat considered marginally suitable as rocky habitats not present.	LOW	N	Small trapdoor like burrow was observed within the survey area. Burrow was not disturbed, unsure of species occupancy.
Megapodiidae	*Leipoa ocellata*	Malleefowl	VU / VU	Arid and semi-arid areas dominated by mallee eucalypts on sandy soils. They are known to also occur in Mulga (*Acacia aneura*), Broombush (*Melaleuca uncinata*), Scrub Pine (*Callitris verrucosa*), Eucalyptus woodlands and coastal heathlands. Malleefowl require abundant leaf litter and a sandy substrate for the successful construction of nest mounds.	Possible	Possible	Y - *Eucalyptus loxophleba* Open Woodland and Mixed Native Shrubland.	HIGH	N	
Apodidae	*Apus pacificus*	Fork-tailed Swift	MI / MI	Dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground over inland plains but sometimes above foothills or in coastal areas.	Possible	Highly Unlikely	N-habitat not present within the survey area.	LOW	N	Although no suitable habitat on site, species detectability during the survey is low as the species is migratory and does not appear in Australia until around October.
Scinidae	*Cyclodomorphus branchialis*	gilled slender blue-tongue	VU /	Shelters by day in hammock grass, leaf-litter, including Acacia, and under fallen logs and stumps. This species prefers the deep leaf litter on sandy beaches vegetated mainly with coastal Spinifex.	Possible	Highly Unlikely	N-habitat not present within the survey area.	LOW	N	
Cacatuidae	*Calyptorhynchus banksii* subsp. *naso*	Forest Red-tailed Black Cockatoo	VU / VU	Foraging habitat includes vegetation containing proteaceous heath/woodland, eucalypt woodlands or forest (particularly Marri and Jarrah forest) and Pinus spp. Breeding habitat includes large, mature trees containing suitable sized hollows, proximate to high quality feeding habitat.	Unlikely - outside of current known distribution (record from 1966)	Unlikely	N - outside of current distribution.	MEDIUM	N	

Table 15 cont.

Family	Scientific Name	Vernacular	Status (WA) / EPBC Act	Habitat Description	Likelihood of occurrence (pre-survey)	Likelihood of occurrence (post-survey)	Habitat Present (Y/N)	Likelihood of Detection if Present	Species Present (Y/N)	Comment
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	CR / CR & MI	Intertidal mudflats in sheltered coastal areas, non-tidal swamps, lakes and lagoons near the coast, and occasionally around ephemeral and permanent lakes and dams with bare edges of mud or sand.	Unlikely	Highly Unlikely	N-habitat not present within the survey area.	MEDIUM	N	Although no suitable habitat on site, species detectability during the survey is low as the species is migratory and does not appear in WA until August-November.
Dasyuridae	*Dasyurus geoffroii*	Chuditch, Western Quoll	VU / VU	Woodland or forest. Logs must have a diameter > 30 cm and a hollow with 7–20 cm diameter and 1 m length (Dunlop and Morris 2012). Burrows are constructed beneath habitat features such as stumps, logs, trees or rock outcrops.	Unlikely	Highly Unlikely	N-habitat not present within the survey area, outside of natural distribution.	MEDIUM	N	No hollow logs present to provide for the species.
Megadermatidae	*Macroderma gigas*	Ghost Bat	VU	During the daytime they roost in caves, rock crevices and old mines. Roost sites used permanently are generally deep natural caves or disused mines with a relatively stable temperature of 23°−28°C and a moderate to high relative humidity of 50−100 percent.	Unlikely	Highly Unlikely	N-habitat not present within the survey area.	LOW	N	
Psittacidae	*Pezoporus occidentalis*	Night Parrot	CR / EN	Usually inhabit arid or semi-arid grasslands that are dominated by spinifex, though they have also been recorded in shrublands dominated by samphire, bluebush and saltbush.	Unlikely	Highly Unlikely	N-habitat not present within the survey area.	LOW	N	
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	EN	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca).	Unlikely	Highly Unlikely	N-habitat not present within the survey area.	LOW	N	

Table 16: Foraging quality scoring tool template (DAWE, 2022b).

Starting score		Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red-tailed Black-Cockatoo
10		**Start at a score of 10** if your site is native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly Marri, within the range of the species, including along roadsides and parkland cleared areas. Can include planted vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	**Start at a score of 10** if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. **This tool only applies to sites equal to or larger than 1 hectare in size.**	**Start at a score of 10** if your site is Jarrah or Marri woodland and/or forest, or if it is on the edge of Karri forest, or if Wandoo and Blackbutt occur on the site, within the range of the subspecies, including along roadsides and parkland cleared areas. **This tool only applies to sites equal to or larger than 1 hectare in size.**
Attribute	**Sub-tractions**	**Context adjustor (attributes reducing functionality of foraging habitat)**		
Foraging potential	**-2**	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	**Subtract 2** from your score if there is no evidence of feeding debris on your site.
Connectivity	**-2**	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.
Proximity to breeding	**-2**	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.
Proximity to roosting	**-1**	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.
Impact from significant plant disease	**-1**	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.
Total score		*N/A*	*5*	*N/A*

Appendix C

Conservation Status Definitions and Condition Scale

Table 17: Conservation code definitions for flora and fauna as listed as Threatened or specially protected.
Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

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

Table 18: Conservation code definitions for flora and fauna as listed as Priority.
Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3.

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

Table 19: Conservation code definitions for ecological communities listed as Threatened (TEC).

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

Table 20: Conservation code definitions for ecological communities listed as Priority (PEC).

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

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

Table 21: Condition Rating Scale (adapted from Keighery 1994) outlined in EPA (2016a).

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

Appendix D

Species Lists and Relevé Data

Table 22: Flora Species List recorded within survey area.

Family	Genus	Species	Subspecies	Common Name	Cons code
Aizoaceae	*Mesembryanthemum*	*nodiflorum*			*
Aizoaceae	*Mesembryanthemum*	*crystallinum*		Iceplant	*
Amaranthaceae	*Ptilotus*	*exaltatus*		Tall Mulla	
Asparagaceae	*Dichopogon*	*capillipes*			
Asparagaceae	*Lomandra*	*effusa*		Scented Matrush	
Asteraceae	*Arctotheca*	*calendula*		Cape Weed	*
Asteraceae	*Brachyscome*	*pusilla*			
Asteraceae	*Lawrencella*	*sp.*			
Asteraceae	*Monoculus*	*monstrosus*			*
Asteraceae	*Podotheca*	*gnaphalioides*		Golden Long-heads	
Asteraceae	*Schoenia*	*cassiniana*		Schoenia	
Asteraceae	*Senecio*	*multicaulis*	multicaulis		
Asteraceae	*Senecio*	*pinnatifolius*			
Asteraceae	*Sonchus*	*asper*		Rough Sowthistle	*
Asteraceae	*Sonchus*	*oleraceus*		Common Sowthistle	*
Boraginaceae	*Echium*	*plantagineum*		Paterson's Curse	* Declared Pest
Boryaceae	*Borya*	*sphaerocephala*			
Brassicaceae	*Brassica*	*tournefortii*		Mediterranean Turnip	*
Brassicaceae	*Cakile*	*maritima*		Sea Rocket	
Brassicaceae	*Sisymbrium*	*irio*		London Rocket	*
Casuarinaceae	*Allocasuarina*	*acutivalvis*			
Casuarinaceae	*Allocasuarina*	*campestris*			
Casuarinaceae	*Allocasuarina*	*corniculata*			
Celastraceae	*Psammomoya*	*choretroides*			
Chenopodiaceae	*Atriplex*	*vesicaria*		Bladder Saltbush	
Chenopodiaceae	*Chenopodium*	*gaudichaudianum*		Cottony Saltbush	
Chenopodiaceae	*Didymanthus*	*roei*			
Chenopodiaceae	*Enchylaena*	*lanata*			
Chenopodiaceae	*Enchylaena*	*tomentosa*		Barrier Saltbush	
Chenopodiaceae	*Maireana*	*tomentosa*		Felty Bluebush	
Chenopodiaceae	*Rhagodia*	*drummondii*			
Chenopodiaceae	*Sclerolaena*	*diacantha*		Grey Copperburr	
Chenopodiaceae	*Tecticornia*	*indica*	bidens		
Cyperaceae	*Chrysitrix*	*distigmatosa*			
Cyperaceae	*Gahnia*	*drummondii*			
Cyperaceae	*Lepidosperma*	*costale*			
Cyperaceae	*Lepidosperma*	*longitudinale*			
Cyperaceae	*Lepidosperma*	*rigidulum*			
Cyperaceae	*Schoenus*	*subaphyllus*			
Dilleniaceae	*Hibbertia*	*glomerosa*			
Droseraceae	*Drosera*	*menziesii*			
Ecdeiocoleaceae	*Ecdeiocolea*	*monostachya*			
Fabaceae	*Acacia*	*acuaria*			

Table 22 cont.

Family	Genus	Species	Subspecies	Common Name	Cons code
Fabaceae	*Acacia*	*acuminata*			
Fabaceae	*Acacia*	*anthochaera*			
Fabaceae	*Acacia*	*dielsii*			
Fabaceae	*Acacia*	*microbotrya*		Manna Wattle	
Fabaceae	*Acacia*	*multispicata*			
Fabaceae	*Acacia*	*restiacea*			
Fabaceae	*Daviesia*	*hakeoides*			
Fabaceae	*Daviesia*	*hakeoides*	hakeoides		
Fabaceae	*Jacksonia*	*acicularis*			
Fabaceae	*Leptosema*	*daviesioides*			
Fabaceae	*Mirbelia*	*depressa*			
Fabaceae	*Mirbelia*	*spinosa*			
Fabaceae	*Senna*	*pleurocarpa*			
Geraniaceae	*Erodium*	*botrys*		Long Storkbill	*
Geraniaceae	*Erodium*	*cygnorum*		Blue Heronsbill	
Goodeniaceae	*Dampiera*	*lavandulacea*			
Goodeniaceae	*Dampiera*	*tomentosa*		Felted Dampiera	
Goodeniaceae	*Dampiera*	*wellsiana*		Wells' Dampiera	
Goodeniaceae	*Scaevola*	*restiacea*			
Goodeniaceae	*Scaevola*	*spinescens*		Current Bush	
Haemodoraceae	*Haemodorum*	*venosum*			
Haloragaceae	*Glischrocaryon*	*aureum*		Common Popflower	
Hemerocallidaceae	*Dianella*	*revoluta*			
Lamiaceae	*Dicrastylis*	*soliparma*			
Lamiaceae	*Hemigenia*	*westringioides*		Open Hemigenia	
Lauraceae	*Cassytha*	*nodiflora*			
Malvaceae	*Brachychiton*	*gregorii*		Desert Kurrajong	
Malvaceae	*Seringia*	*hermanniifolia*		Crinkle-leaved firebush	
Malvaceae	*Seringia*	*velutina*		Velvet firebush	
Malvaceae	*Thomasia*	*tremandroides*			
Myrtaceae	*Aluta*	*aspera*			
Myrtaceae	*Baeckea*	*muricata*			
Myrtaceae	*Callistemon*	*phoeniceus*		Lesser Bottlebrush	
Myrtaceae	*Calothamnus*	*gilesii*			
Myrtaceae	*Chamelaucium*	*sp.*			
Myrtaceae	*Darwinia*	*purpurea*		Rose Darwinia	
Myrtaceae	*Enekbatus*	*sessilis*			
Myrtaceae	*Eucalyptus*	*camaldulensis*		River Gum	
Myrtaceae	*Eucalyptus*	*camaldulensis#*		River Gum	
Myrtaceae	*Eucalyptus*	*horistes*		Pointed-Bud Mallee	
Myrtaceae	*Eucalyptus*	*loxophleba*		York Gum	
Myrtaceae	*Eucalyptus*	*loxophleba*	supralaevis		
Myrtaceae	*Eucalyptus*	*oldfieldii*		Oldfield's Mallee	
Myrtaceae	*Eucalyptus*	*subangusta*	subangusta		

Table 22 cont.

Family	Genus	Species	Subspecies	Common Name	Cons code
Myrtaceae	*Grevillea*	*obliquistigma*			
Myrtaceae	*Leptospermum*	*exsertum*			P1
Myrtaceae	*Malleostemon*	*tuberculatus*			
Myrtaceae	*Melaleuca*	*adnata*			
Myrtaceae	*Melaleuca*	*concreta*			
Myrtaceae	*Melaleuca*	*conothamnoides*			
Myrtaceae	*Melaleuca*	*cordata*			
Myrtaceae	*Melaleuca*	*hamata*			
Myrtaceae	*Melaleuca*	*leiocarpa*			
Myrtaceae	*Melaleuca*	*stereophloia*			
Myrtaceae	*Verticordia*	*chrysantha*			
Myrtaceae	*Verticordia*	*rennieana*			
Poaceae	*Aira*	*cupaniana*		Silvery Hairgrass	*
Poaceae	*Aristida*	*contorta*			
Poaceae	*Austrostipa*	*elegantissima*			
Poaceae	*Avena*	*barbata*		Bearded Oat	*
Poaceae	*Briza*	*maxima*		Blowfly Grass	*
Poaceae	*Ehrharta*	*longiflora*		Annual Veldt Grass	*
Poaceae	*Eragrostis*	*curvula*		African Lovegrass	*
Poaceae	*Lolium*	*rigidum*		Wimmera Ryegrass	*
Poaceae	*Monachather*	*paradoxus*			
Poaceae	*Rytidosperma*	*caespitosum*			
Poaceae	*Thyridolepis*	*multiculmis*		Soft Wanderrie	
Poaceae	*Triticum*	*aestivum*		Wheat	*
Polygalaceae	*Comesperma*	*scoparium*		Broom Milkwort	
Polygalaceae	*Comesperma*	*volubile*		Love Creeper	
Polygalaceae	*Rumex*	*crispus*		Curled Dock	*
Proteaceae	*Grevillea*	*asparagoides*			P3
Proteaceae	*Grevillea*	*granulosa*			P3
Proteaceae	*Grevillea*	*paradoxa*		Bottlebrush Grevillea	
Proteaceae	*Grevillea*	*pterosperma*			
Proteaceae	*Grevillea*	*teretifolia*		Round Leaf Grevillea	
Proteaceae	*Hakea*	*francisiana*		Emu Tree	
Proteaceae	*Hakea*	*invaginata*			
Proteaceae	*Hakea*	*recurva*			
Proteaceae	*Persoonia*	*sp.*			
Proteaceae	*Petrophile*	*incurvata*			
Pteridaceae	*Adiantum*	*aethiopicum*		Common Maidenhair	*
Restionaceae	*Desmocladus*	*asper*			
Restionaceae	*Lepidobolus*	*preissianus*			
Rhamnaceae	*Cryptandra*	*myriantha*			

Table 22 cont.

Family	Genus	Species	Subspecies	Common Name	Cons code
Rhamnaceae	*Stenanthemum*	*pomaderroides*			
Santalaceae	*Leptomeria*	*preissiana*			
Santalaceae	*Santalum*	*acuminatum*		Quandong	
Solanaceae	*Solanum*	*lasiophyllum*		Flannel Bush	

R1

Relevé	R1	**Veg Code**	*Eucalyptus loxophleba* Open Woodland [ElOWn]	**Date Surveyed**	23/06/2022
Location	Northwest of existing CBH bins, on south side of Mullewa-Wubin Road reserve.				
GPS (Lat, Long)	-29.416045, 116.246454				
Landform and Slope	Plain, Flat				
Soils	Clay Loam, Orange/Brown				
Hydrology	Poor drainage				
Vegetation description	(NVIS): U ^*Eucalyptus loxophleba*\^Tree\6\r;M ^^ *Acacia acuaria, Acacia acuminata, Enchylaena lanata* \^^scrub,forb\3\bc;G ^ Austrostipa elegantissima\^grass\1\bc. *(*Muirs*): Eucalyptus loxophleba* Open Woodland, over *Acacia acuaria, Acacia acuminata* and *Enchylaena lanata* over *Austrostipa elegantissima.*				
Condition	Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees <10m	*Eucalyptus loxophleba*		2-10%
Shrub >2m		*Melaleuca adnata, Melaleuca stereophloia*	
Shrub 1-2m	*Acacia acuaria, Acacia acuminata*	*Hakea recurva, Persoonia sp.*	2-10%
Shrub 0.5-1m		*Solanum lasiophyllum*	
Shrub <0.5m		*Atriplex vesicaria*	
Herb	*Enchylaena lanata*	**Adiantum aethiopicum, *Aira cupaniana, *Arctotheca calendula, *Eragrostis curvula, *Erodium botrys, Comesperma volubile, Dianella revoluta, Dichopogon capillipes, Lomandra effusa, Stylidium sp.*	10-30%
Grass	*Austrostipa elegantissima*		2-10%

R2

Relevé	R2	**Veg Code**	Tecticornia Shrubland [TS]	**Date Surveyed**	23/06/2022
Location	South in the CBH paddock.				
GPS (Lat, Long)	-29.431868, 116.252208				
Landform and Slope	Tidal Flat, Flat				
Soils	Clay Loam, Dark Brown				
Hydrology	Seasonal Wet				
Vegetation description	(NVIS): U ^^ *Tecticornia indica* subsp. *bidens, Atriplex vesicaria* \^^shrub\3\i; H **Mesembryanthemum nodiflorum*\1\bc. *(*Muirs*): Tecticornia indica* subsp. *bidens* and *Atriplex vesicaria* open shrubland over a mixed understorey of native and introduced species.				
Condition	Degraded				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Shrub 1-2m	*Atriplex vesicaria*		2-10%
Shrub 0.5-1m	*Tecticornia indica* subsp. *bidens*	*Solanum lasiophyllum*	10-30%
Shrub <0.5m		*Maireana tomentosa*	
Herb	*Mesembryanthemum nodiflorum*	**Lolium rigidum, Didymanthus roei, Senecio multicaulis* subsp. *multicaulis, Senecio pinnatifolius*	10-30%

R3

Relevé	R3	**Veg Code**	Mixed Native Shrub [MNS]	**Date Surveyed**	23/06/2022
Location	Southeast of CBH bins, on north side railway line, south in Mullewa-Wubin Road reserve.				
GPS (Lat, Long)	-29.428621, 116.266755				
Landform and Slope	Plain, Flat				
Soils	Sandy Loam, Orange/Brown				
Hydrology	Good drainage				
Vegetation description	(NVIS): M ^^*Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma*\^^shrub\3\r;F *Ecdeiocolea monostachya*, *Arctotheca calendula, Cassytha nodiflora*\^^forb\2\r. *(*Muirs*):* Mixed Native Shrub mainly consisting of *Melaleuca concreta*, *Melaleuca cordata, Grevillea obliquistigma* over *Ecdeiocolea monostachya*, *Arctotheca calendula, Cassytha nodiflora.*				
Condition	Very Good				
Comments	-				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees <10m		*Brachychiton gregorii, Eucalyptus camaldulensis, Eucalyptus horistes, Eucalyptus loxophleba, Eucalyptus loxophleba* subsp. *supralaevis, Eucalyptus oldfieldii, Eucalyptus subangusta* subsp. *subangusta,*	
Shrub >2m	*Melaleuca concreta*	*Acacia acuminata, Acacia anthochaera, Acacia microbotrya, Allocasuarina acutivalvis, Allocasuarina corniculata, Callistemon phoeniceus, Grevillea pterosperma, Hakea francisiana, Hakea invaginata, Leptomeria preissiana, Melaleuca adnata, Melaleuca hamata, Melaleuca leiocarpa, Santalum acuminatum,*	2-10%
Shrub 1-2m	*Melaleuca cordata, Grevillea obliquistigma*	*Acacia acuaria, Acacia dielsii, Acacia multispicata, Allocasuarina campestris, Aluta aspera, Calothamnus gilesii, Chamelaucium sp., Chenopodium gaudichaudianum, Dicrastylis soliparma, Grevillea asparagoides, Grevillea granulosa, Grevillea paradoxa, Grevillea teretifolia, Hemigenia westringioides, Jacksonia acicularis, Malleostemon tuberculatus, Melaleuca conothamnoides, Petrophile incurvata, Scaevola spinescens, Senna pleurocarpa, Verticordia rennieana*	2-10%
Shrub 0.5-1m		*Acacia restiacea, Baeckea muricata, Comesperma scoparium, Dampiera lavandulacea, Dampiera tomentosa, Daviesia hakeoides, Daviesia hakeoides* subsp. *hakeoides, Hibbertia glomerata, Leptosema daviesioides, Mirbelia depressa, Mirbelia spinosa, Seringia velutina, Seringia hermanniifolia, Solanum lasiophyllum, Stenanthemum pomaderroides, Verticordia chrysantha,*	
Shrub <0.5m		*Cryptandra myriantha, Darwinia purpurea, Enchylaena tomentosa, Enekbatus sessilis, Leptospermum exsertum, Maireana tomentosa, Psammomoya choretroides, Scaevola restiacea, Thomasia tremandroides,*	
Sedge	*Ecdeiocolea monostachya*	*Chrysitrix distigmatosa, Lepidosperma rigidulum, Lepidobolus preissianus, Lepidosperma costale, Lepidosperma longitudinale, Gahnia drummondii, Schoenus subaphyllus,*	2-10%

R3 cont.

Life Form	Dominant Species	Other Species	Cover (%)
Herb	**Arctotheca calendula, Cassytha nodiflora*	**Brassica tournefortii, *Monoculus monstrosus, *Rumex crispus, *Sonchus oleraceus, Borya sphaerocephala, Cakile maritima, Comesperma volubile, Dampiera wellsiana, Desmocladus asper, Dianella revoluta, Drosera menziesii, Erodium cygnorum, Glischrocaryon aureum, Haemodorum venosum, Lawrencella sp., Lomandra effusa, Ptilotus exaltatus, Schoenia cassiniana, Senecio multicaulis* subsp. *multicaulis,*	2-10%
Grass		**Avena barbata, *Briza maxima, *Ehrharta longiflora, *Eragrostis curvula, *Triticum aestivum, Aristida contorta, Austrostipa elegantissima, Monachather paradoxus, Rytidosperma caespitosum, Thyridolepis multiculmis,*	

Table 23: Fauna species recorded within survey area.

Species	Common Name	Conservation Code	Comments
Birds			
Barnardius zonarius	Australian ringneck		
Corvus coronoides	Australian raven		
Cracticus nigrogularis	Pied butcherbird		
Eolophus roseicapillus	Galah		
Glossopsitta porphyrocephala	Purple-crowned lorikeet		
Grallina cyanoleuca	Magpie-lark		
Hirundo neoxena	Welcome swallow		
Lichenostomus virescens	Singing honeyeater		
Manorina flavigula	Yellow-throated miner		
Ocyphaps lophotes	Crested pigeon		
Mammals			
Macropus fuliginosus	Western Grey Kangaroo		
Oryctolagus cuniculus	European Rabbit		
Vulpes	Red Fox		
Amphibians			
Pseudophryne guentheri	Crawling Toadlet		

Appendix E

Threatened and Priority Reporting Forms

Department of **Biodiversity, Conservation and Attractions**

Threatened and Priority Flora Report Form

Version 1.4 March 2021

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

TAXON: Grevillea asparagoides **TPFL Pop. No:**

OBSERVATION DATE: 23/06/2022 **CONSERVATION STATUS:** Priority 3 **New population** ☐

OBSERVER/S: Kylie Sadgrove, Taryn Brebner **PHONE** 9249 7634

ROLE: Environmental Scientist **ORGANISATION:** Natural Area Consulting Management Services

EMAIL: Kylie.sadgrove@naturalarea.com.au

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

Approximately 3.1 km north of the Perenjori townsite, western side of the Wubin-Mullewa Road between the main road and the CBH rail line

Reserve No:

DBCA DISTRICT: **LGA:** Shire of Perenjori Land manager present: ☐

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

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐
Lat / Northing: -29.4269689
Long / Easting: 116.263677
ZONE: 50

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

LAND TENURE:

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

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

EFFORT: Time spent surveying (minutes): 960 No. of minutes spent / 100 m²:

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

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

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

Area of pop (m²):

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

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

Summary Quad. Totals: Alive				

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

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

COMMENT:

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

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

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

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

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

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Version 1.4 March 2021

HABITAT INFORMATION:

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

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

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

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

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

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

Specific **Landform** Element: _____
(Refer to field manual for additional values)

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

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

1. Mixed Native Shrubland (*Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma over Ecdeiocolea monostachya, *Arctotheca calendula* and *Cassytha nodiflora*)
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

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

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

COMMENT:

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

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

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

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

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

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

LODGEMENT: WA Herb Lodgement No: _____

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

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

Submitter of Record: _____ Role: _____ Signed: _____ Date: / /

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TAXON: Grevillea granulosa **TPFL Pop. No:**

OBSERVATION DATE: 23/06/2022 **CONSERVATION STATUS:** Priority 3 **New population** ☐

OBSERVER/S: Kylie Sadgrove, Taryn Brebner **PHONE** 9249 7634

ROLE: Environmental Scientist **ORGANISATION:** Natural Area Consulting Management Services

EMAIL: Kylie.sadgrove@naturalarea.com.au

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

Approximately 3.1 km north of the Perenjori townsite, western side of the Wubin-Mullewa Road between the main road and the CBH rail line

Reserve No:

DBCA DISTRICT: **LGA:** Shire of Perenjori Land manager present: ☐

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

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐
Lat / Northing: -29.4269689
Long / Easting: 116.263677
ZONE: 50

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

LAND TENURE:

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

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

EFFORT: Time spent surveying (minutes): 960 No. of minutes spent / 100 m²: _____

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

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	287			287
Dead				

Area of pop (m²): _____

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

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

Summary Quad. Totals: Alive				

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

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

COMMENT:

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

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HABITAT INFORMATION:

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

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

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

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

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

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

Specific **Landform** Element: _____
(Refer to field manual for additional values)

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

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

1. Mixed Native Shrubland (*Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma over Ecdeiocolea monostachya, *Arctotheca calendula* and *Cassytha nodiflora*)
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

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

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

COMMENT:

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

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

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

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

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

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

LODGEMENT: WA Herb Lodgement No: _____

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

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

Submitter of Record: _____ Role: _____ Signed: _____ Date: / /

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TAXON: Leptospermum exsertum **TPFL Pop. No:**

OBSERVATION DATE: 23/06/2022 **CONSERVATION STATUS:** Priority 1 **New population** ☐

OBSERVER/S: Kylie Sadgrove, Taryn Brebner **PHONE** 9249 7634

ROLE: Environmental Scientist **ORGANISATION:** Natural Area Consulting Management Services

EMAIL: Kylie.sadgrove@naturalarea.com.au

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

Approximately 3.1 km north of the Perenjori townsite, western side of the Wubin-Mullewa Road between the main road and the CBH rail line

Reserve No:

DBCA DISTRICT: **LGA:** Shire of Perenjori Land manager present: ☐

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

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

Lat / Northing: -29.4269689

Long / Easting: 116.263677

ZONE: 50

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☒

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

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

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

EFFORT: Time spent surveying (minutes): 960 No. of minutes spent / 100 m²:

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

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	1			1
Dead				

Area of pop (m²):

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

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

Summary Quad. Totals: Alive				

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

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

COMMENT:

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

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

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

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

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

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

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

Specific **Landform** Element: _____
(Refer to field manual for additional values)

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

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

1. Mixed Native Shrubland (*Melaleuca concreta, Melaleuca cordata, Grevillea obliquistigma over Ecdeiocolea monostachya, *Arctotheca calendula* and *Cassytha nodiflora*)
2.
3.
4.

ASSOCIATED SPECIES:

Other (non-dominant) spp

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

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

COMMENT:

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

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

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

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

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

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

LODGEMENT: WA Herb Lodgement No: _____

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

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

Submitter of Record: _____ Role: _____ Signed: _____ Date: / /

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Appendix F

EPBC Act PMST Reports

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 08-Jun-2022

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	30
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	11
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:	9
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	10
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may 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
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In feature area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only
PLANT			
Acacia aprica Blunt Wattle [64821]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Acacia cochlocarpa subsp. cochlocarpa Spiral-fruited Wattle [23877]	Endangered	Species or species habitat may occur within area	In buffer area only
Acacia recurvata Recurved Wattle [64825]	Endangered	Species or species habitat known to occur within area	In buffer area only
Chorizema humile Prostrate Flame Pea [32573]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Darwinia polychroma Harlequin Bell [83192]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Eremophila nivea Silky Eremophila [14431]	Endangered	Species or species habitat known to occur within area	In feature area
Eremophila resinosa Resinous Eremophila [11735]	Endangered	Species or species habitat may occur within area	In feature area
Eremophila rostrata Beaked Eremophila [65124]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat likely to occur within area	In feature area
Eucalyptus beardiana Beard's Mallee [18933]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus synandra Jingymia Mallee [3753]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Frankenia conferta Silky Frankenia [6074]	Endangered	Species or species habitat known to occur within area	In buffer area only
Gastrolobium hamulosum Hook-point Poison [9212]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea pythara Pythara Grevillea [64525]	Endangered	Species or species habitat may occur within area	In buffer area only
Gyrostemon reticulatus Net-veined Gyrostemon [8491]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat may occur within area	In buffer area only
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area	In feature area
Tecticornia bulbosa Large-articled Samphire [82741]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
REPTILE			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Egernia stokesii badia](#)			
Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area	In feature area
SPIDER			
[Idiosoma nigrum](#)			
Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area	In feature area

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
Migratory Terrestrial Species			
[Motacilla cinerea](#)			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#)			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
[Calidris acuminata](#)			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
[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

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52014]	WA	In buffer area only
Commonwealth Land - [52021]	WA	In buffer area only
Commonwealth Land - [51930]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may 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
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
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
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
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
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
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Bowgada	Nature Reserve	WA	In buffer area only
Bowgarder	Nature Reserve	WA	In buffer area only
Caron	Nature Reserve	WA	In buffer area only
Kadji Kadji	NRS Addition - Gazettal in Progress	WA	In buffer area only
Koolanooka	Nature Reserve	WA	In buffer area only
Koolanooka Dam	Nature Reserve	WA	In buffer area only
Lochada	NRS Addition - Gazettal in Progress	WA	In buffer area only
Weelhamby Lake	Nature Reserve	WA	In buffer area only
West Perenjori	Nature Reserve	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Construct and operate 79km rail spur	2009/5040	Controlled Action	Post-Approval	In buffer area only
Hematite (iron ore) Mine and Beneficiation Plant	2001/542	Controlled Action	Completed	In feature area
Karara Magnetite Project	2006/3017	Controlled Action	Post-Approval	In buffer area only
Koolanooka/Blue Hills Iron Ore Mining Project	2007/3809	Controlled Action	Post-Approval	In buffer area only
Mount Gibson Iron Ore Pellet Project	2000/95	Controlled Action	Completed	In buffer area only
open cut mine & assoc infrastructure	2005/2381	Controlled Action	Post-Approval	In feature area
Not controlled action				
Feral Prospect, magnatite iron ore exploration drilling, Perejori Hills, WA	2014/7333	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
Koolanooka Direct Shipping Iron Ore Project	2004/1886	Not Controlled Action	Completed	In buffer area only
Munckton Road upgrade	2005/2277	Not Controlled Action	Completed	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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