RECONNAISSANCE FLORA, VEGETATION AND BASIC FAUNA SURVEY REPORT

Line 4 (47.4 – 47.9km) Wyening East Road

Wyening / Bolgart, WA 6568

Final

14/04/2022

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

Title: Reconnaissance flora and vegetation and basic fauna survey report – Line 4 (47.4-47.9km) Wyening East Road, Wyening / Bolgart
Author (s): S. Hynes, C. van der Mescht
Reviewer (s): K. White, K. Kinnear, B. Theyer
Job No.: AI007-002
Client: Arc Infrastructure

REVISION RECORD

Revision	Summary	Prepared By	Reviewed By	Date
Draft v.1	Internal QA review	S. Hynes & C. vd Mescht	M. Holt	06/04/2022
Draft v.2	Internal Technical Review – Flora	S. Hynes & C. vd Mescht	K. White	07/04/2022
Draft v.2	Internal Technical Review – Fauna	S. Hynes & C. vd Mescht	B. Theyer	11/04/2022
Final	Issued to client	S. Hynes & C. vd Mescht		14/04/2022

Bio Diverse Solutions Australia Pty Ltd

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

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

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

www.biodiversesolutions.com.au
ABN 46 643 954 929

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1. Introduction, scope and background information

Arc Infrastructure ("the client") commissioned Bio Diverse Solutions as Environmental Consultants to conduct a Spring reconnaissance flora and vegetation survey and a basic (previously reconnaissance) fauna assessment of a total of 2.90ha Line of Site (LOS) areas along Line 4 (47.4-47.9km) near Wyening East Road, Wyening / Bolgart in the Shire of Victoria Plains. The total 2.90ha consists of two separate LOS areas stretching over a total distance of 0.41km along an existing service road for the railway line. The proposed clearing is for LOS safety for public crossing the rail line along Wyening East Road. The scope of works included:

- Desktop assessment of publicly available databases (including DBCA Threatened and priority flora, fauna and ecological communities' data) pertaining to the site for threatened flora, vegetation and fauna;
- A reconnaissance Spring flora and vegetation survey across the survey area including targeted threatened flora survey, field GPS vegetation and flora, and mapping of boundaries of vegetation community types and threatened and priority flora (if present):
    - 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 of flora species, including herbarium identification as required;
- Identification and mapping of the vegetation condition within the survey area, including the location of any Weeds of National Significance or Declared Weeds, using the EPA (2016) condition scale;
- A reconnaissance fauna (including targeted threatened fauna) survey across the survey area, field GPS fauna habitat and threatened and priority fauna (if present):
    - This shall include a likelihood of occurrence assessment for all conservation significant fauna species (including black cockatoo) identified in desktop searches.
- Preparation of IBSA data package as per EPA guidelines, and provide to client at completion of survey (as required to be submitted via the IBSA website by the client); and
- Preparation of reconnaissance flora, vegetation, and basic fauna survey report, which is aligned with the appropriate government agency legislation and guidelines.

1.1. Site location and Development Proposal

The 'survey area' is defined as the total area being surveyed, consisting of two LOS areas located along Line 4 (47.4-47.9km), north and south of Wyening East Road, Wyening / Bolgart, in the Shire of Victoria Plains. The areas surveyed are 1.80ha and 1.10ha, the total length of the Survey Area is approximately 0.41km (Figure 1). These areas are being cleared as part of the LOS works to improve safety and visibility for the public crossing railway line at Wyening East Road. The "study area" consists of the 10 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. This reconnaissance flora and vegetation and basic fauna survey provides base-line data for determining what further surveys and environmental approvals are required for the clearing involved in the LOS safety works. Some areas within the survey area are already cleared for the purpose of a maintenance access track or part of existing lay down areas. The surrounding area is surrounded by broad acre cropping on private land with small patches of remnant vegetation.

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

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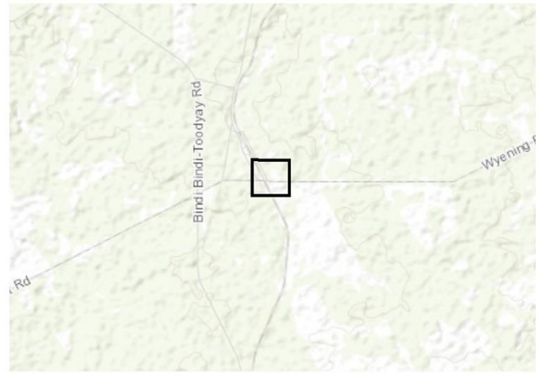

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Scale
1:1,750 @ 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.

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FINAL	**AI007-002**	**07/02/2022**

1.2. Alignment to Legislation, Guidelines and Policies

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

- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016);
- Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020);
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Environmental Protection Act 1986* (EP Act)*;*
- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007;* and
- Environmental Weed Strategy (CALM, 1999).

2. Desktop Assessment

2.1. Geology and soils

Database searches shows the survey area lies within the Jelcobine System (256Jc). The Jelcobine System is described as *"Isolated steep low hills with undulating low granite hills and isolated lateritic remnants in the Zone of Rejuvenated Drainage. Gravels, and grey shallow to deep sandy duplexes. Wandoo, york gum, Jam and Casuarina woodland predominate."* (DPIRD, 2021).

Database searches shows the survey area lies within the Northern Zone of Rejuvenated Drainage. The Northern Zone of Rejuvenated Drainage is described as "*Erosional surface of gently undulating rises to low hills. Continuous stream channels that flow in most years. Colluvial processes are active. Soils formed in colluvium or in-situ weathered rock. Mainly from Jimperding Metamorphic Rocks."* (DPIRD, 2018a). The soil type within the application area is mapped as the Mortlock Subsystem (Jelcobine; 256JcMO) and Jelcobine York Subsystem (256JcYO). The Mortlock Subsystem (Jelcobine) is described as "*Hillslopes containing sand and loamy sand over yellowish clay soils, with some gravel ridges, and some heavier soils that often occur immediately below a breakaway"* and the Jelcobine York Subsystem is described as "*Areas of soils derived from freshly exposed rock. This unit is typified by the red soils of the Avon Valley but also includes areas of similar, but often greyer and lighter textured soils to the east of the valley*" (DPIRD, 2019a).

2.2. Climate

The closest Bureau of Meteorology (BoM) site is Goomalling (010058). The average annual temperature ranges from 6.3 – 34.8°C. The average summer temperature ranges between 14.9-34.8°C, whilst average winter temperatures range between 6.3-18.6°C. The annual mean rainfall is 363.8mm (BoM, 2021). 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 February, March, May, July, September and October 2021, and higher than average rain recorded in November 2020 (Figure 2). The total rainfall in the year previous to the survey (November 2020 – October 2021) was 496.3mm which is 132.5mm above average and equates to 36.4% increase in average rainfall.

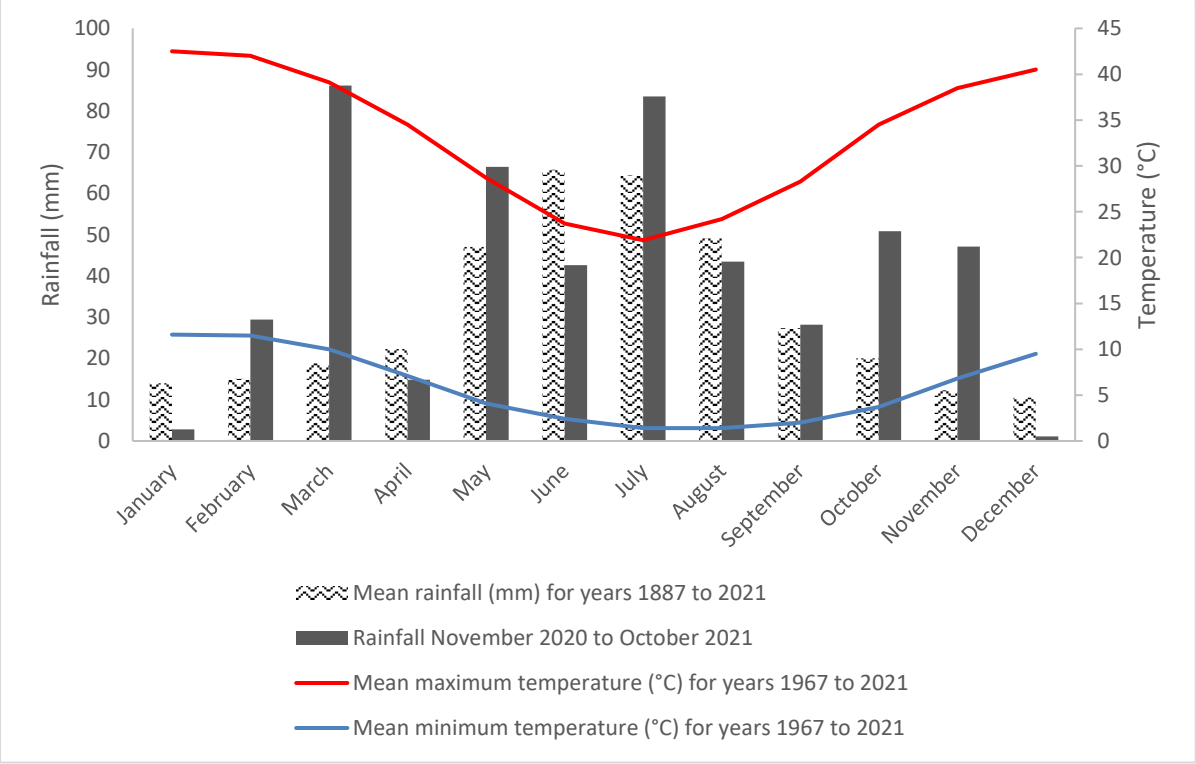

Figure 2: Temperature and Rainfall Data for Goomalling BoM Weather Station No. 010058 (BoM, 2021).

2.3. Habitat Connectivity

There are small areas of intact remnant vegetation located within private agricultural property and along the rail corridor itself which extends out into the broader Wyening/Bolgart area. In a regional context the larger areas of remnant vegetation are connected through smaller interconnecting patches within the surrounding agricultural landscape. These areas ultimately connect to the Julimar State Forest approximately 14km to the southwest of the survey area.

2.4. Waterways 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 Rejuvenated Drainage (HZ08_NZRD; DPIRD, 2018b). The Northern Zone of Rejuvenated Drainage is described as "*Erosional surface of gently undulating rises to low hills. Continuous stream channels that flow in most years. Colluvial processes are active. Soils formed in colluvium or in-situ weathered rock. Mainly from Jimperding Metamorphic Rocks.*" (DPIRD, 2018b).

No RAMSAR wetlands, or significant wetlands are located within or near the survey area. No creek lines or rivers are present within the site boundary.

2.5. Environmentally Sensitive Areas

The survey area contains an EPA listed Environmentally Sensitive Area (ESA) to the north of Wyening East Road because of a conservation significant species being present (Figure 3; DWER, 2020b).

2.6. Remnant Vegetation

The survey area lies within the Avon Wheatbelt (AVW) Bioregion and Katanning (AVW02) 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. Within this, AW2 is the erosional surface of gently undulating rises to low hills with abrupt breakaways. Continuous stream channels that flow in most years. Colluvial processes are active. Soil formed in colluvium or in-situ weathered rock. Includes woodland of Wandoo, York Gum and Salmon Gum with Jam and Casuarina.*"

The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd *et al.* 2002) in the 1970's, 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 one System and Vegetation Association (DPIRD, 2019b) Refer to Figure 3.

- **System Association Name**: Walebing
- **Vegetation Association Number:** 7.
- **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:** 11.54% remaining (GoWA, 2019).
- **Remnant Vegetation by Beard Association Rarity in IBRA Region:** 10.60% remaining (GoWA, 2019).

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

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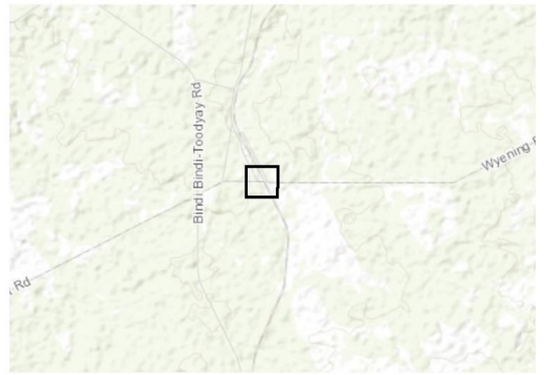

Overview Map Scale 1:100,000

Legend

Survey Area

Environmentally Sensitive Areas (DWER_046)

Pre European Vegetation (DPIRD_006)

Walebing, 7

Scale
1:1,500 @ 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 3: Desktop Data Map.

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3. Methodology – Desktop Assessment

3.1. Flora and Vegetation

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

- DBCA TPFL database, covering only direct records of threatened or priority flora directly within the survey area (i.e. not 10km radius) as provided to BDS prior to undertaking the survey;
- 10km Protected matters search tool (DAWE 2021); and
- 10km Atlas of Living Australia Database Search (ALA, 2021).

Please note: At the time of this survey NatureMap had been disabled by DBCA and records could not be accessed (Table 1). Desktop inventory of potential conservation significant ecological communities likely to occur within 10km of the survey area was undertaken using a 10km search of the Protected Matters Search Tool (DAWE, 2021), which only identifies threatened ecological communities. No DBCA ecological community's database search was conducted. As such, the entire DBCA priority and threatened ecological community list (DBCA, 2021) was reviewed in detail across the entirety of the region. Communities described as having a distribution in relative proximity to the survey area and potentially meeting the Remnant Vegetation descriptions (Section 2.6) were included in the desktop assessment.

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.

3.2. Fauna

A desktop inventory of conservation significant fauna species known to occur within 10km of the survey area was undertaken using the following databases:

- Protected matters search tool (DAWE, 2021); and
- 10km Atlas of Living Australia Database Search (ALA, 2021).

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).
- Black Cockatoo Breeding Sites - Buffered DBCA_063 (DBCA, 2019a).
- Black Cockatoo Roosting Sites – Buffered DBCA_064 (DBCA, 2019b).

4. Methodology – Field Survey

4.1. 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.

Field survey work was carried out by Sharon Hynes (Botanist) of Natural Area Consulting Management Services and Charlize van der Mescht (Environmental Consultant) of Bio Diverse Solutions on the 23rd November 2021. 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, one relevé was 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.

The flora was systematically recorded within the relevé and collections of plant specimens were made where further identification was required, using Sharon Hynes Regulation 62 Flora Taking Licence FB2000155. 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.

4.2. 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. Although the survey was completed during the optimal time (Spring) to undertake flora surveys in the Wheatbelt region some limitations are still present.

Table 1: Assessment of potential survey limitations.

Limitation	Significance of limitation	Comment
Experience of personnel	Nil	Sharon Hynes has over 13 years' experience conducting targeted, reconnaissance and detailed flora surveys within the Avon Wheatbelt bioregion and is competent in taxonomic identification and assessment of vegetation in the area. Additionally, she has conducted targeted flora surveys and worked alongside the DBCA Flora Conservation Officer for a large number of flora species listed on the 10km desktop analysis. Charlize van der Mescht has been with Bio Diverse Solutions since 2019 and has undertaken the role of Technical Assistant since 2020. Charlize has assisted Dr. Ellen Hickman and Katie White (Bio Diverse Solutions' Botanists) on multiple flora surveys during this time.

Table 1 cont.

Limitation	Significance of limitation	Comment
Survey timing	Minor	The client requested a Spring flora and vegetation survey, consistent with peak flowering times for the majority of species in the area. Timing of survey occurred towards the end of peak flowering period in this locale, on the 23rd November 2021. Two species identified as 'Likely' or 'Possible' to occur were not flowering at the time of the survey (Table 10, Appendix B). However, all these species were deemed as detectable without flowering and was not a significant limitation.
Access restrictions	Nil	No access restrictions that would affect the conclusiveness of this survey were encountered.
Availability of contextual information	Minor	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. Although requested, DBCA database searches were not supplied by Arc Infrastructure. Given the survey area is highly disturbed, this is not considered a limiting factor for this survey. At the time of this survey NatureMap had been disabled by DBCA and records could not be accessed. This limited the contextual information available for this survey, but was not considered to be a significant limiting factor for this survey. Due to no desktop survey occurring within the study area for DBCA's TEC/PEC databases, all known TECs and PECs within the Wheatbelt region were considered during the survey through comparison of DBCA's priority ecological community listing (DBCA, 2021).
Survey effort and extent	Nil	The area was systematically and lengthily surveyed. A wandering traverse "sufficiently" covered the area, within 5-10 m of each track. 61 species were identified during the survey, and one relevé data set collected to gain as complete a picture as possible of flora species present at the site.
Disturbances that may affect results	Minor	Disturbance has the potential to affect the biological representation of species and therefore ecological communities present, for example through the presence of disturbance opportunists, loss of sensitive species from direct impact, increased nutrient loading from runoff or novel ecosystems created through microclimate creation. This was observed across the subject site through disturbance from the railway track.
Identification issues	Minor	The vast majority of species present contained sufficient taxonomic information for identification (such as nuts, fruit, leaf structure or flowers). It is estimated that 40-45% of species present were flowering. However, annuals that occur at other times of the year would not have been presenting, reducing the likely total biodiversity of the area. This is particularly relevant for species in the Orchidaceae, Asteraceae, Stylidiaceae and Droseraceae family.

4.3. Basic Fauna Survey Methodology

The aim of the basic fauna survey was to assess and map the fauna habitat within the survey area, assess the likelihood of Threatened and Priority fauna utilising the general area and/or particular vegetation units, recording actual presence of Threatened and Priority fauna taxa, and undertake an opportunistic inventory of vertebrate fauna species encountered whilst traversing the survey area on foot.

Field survey work was carried out by Sharon Hynes (Botanist) of Natural Area Consulting Management Services and Charlize van der Mescht (Environmental Consultant) of Bio Diverse Solutions on the 23rd November 2021, in accordance with Guidance Statement 56: *Terrestrial Fauna Surveys* (EPA 2020).

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

4.4. Targeted Black Cockatoo Habitat Assessment

The aim of the Black Cockatoo habitat assessment was to identify all trees that have a diameter, measured at 1.5 metres from the base of the tree, of 300 millimetres DBH or greater for Eucalypt trees on site and contain a hollow(s) of potential suitability for breeding by Carnaby's (*Calyptorhynchus latirostris*), referred to hereafter as significant trees. In addition, signs of feeding and roosting were also searched for and recorded if present.

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

The hollows were classified in accordance with their entry type:

- Chimney: the hollow entry faces upwards in the end of the main trunk or branch;
- Side: the hollow entry is into the side of the trunk or branch; or
- Elbow: the hollow entry is in the bend / elbow of the trunk and branch.

Foraging habitat was identified and mapped based on vegetation units described during the flora and vegetation survey (refer to Section 5.2). The *EPBC Guidelines for Black Cockatoos* (DSEWPaC, 2012) outline general criteria for identifying foraging habitat (Table 5) but do not provide detailed criteria for assessing quality. In this instance, the quantity of feeding evidence, overall health of trees (dead, presence of disease), presence of fruiting material, and diversity of known foraging species was taken into account when assessing the quality of foraging habitat. Vegetation units that do not contain known foraging species were not considered to contain foraging habitat.

Given the absence of criteria within the EPBC Guidelines (DSEWPaC, 2012) for assessing roosting habitat, the presence of cockatoo feathers and faecal material were used.

The results presented are based upon field data collected over a limited period of time and are indicative of the environmental condition of the survey area at the time. This was a ground-based survey and actual depth of hollows were not determined.

Hollows were visually inspected from the ground and where necessary, binoculars were used to inspect the entrance. Survey limitations are outlined below, none are deemed to have significantly impacted the survey (Table 2).

4.5. 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 2.

Table 2: Fauna survey limitations and constraints.

Limitation	Constraint	Comment
Scope	Nil	The scope was a basic fauna survey to generally assess the presence / evidence of fauna species within the survey area, map the fauna habitat, undertake opportunistic inventory of species including priority conservation species. Additional targeted assessment of significant trees was undertaken to identify breeding, roosting or foraging habitat for Black Cockatoos.
Disturbances that may affect results	Nil	No recent disturbances which may affect results of the survey were identified, e.g., recent fire or grazing. Historical and ongoing disturbances from the existing operational activities at the train line may impact the presence of fauna within the survey area. However, given these disturbances are long-term and continuous, they are unlikely to have resulted in a significant limitation on detection probability or species occurrence during the survey period (i.e. activities would result in some fauna moving away / not utilising the survey area at all times).
Intensity of survey	Nil	The basic fauna survey and targeted components of the survey were deemed appropriate given the scope was to identify the general presence of fauna species and fauna habitat in the survey area.
Sources of information (recent or historic) and availability of contextual information	Minor	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. Although requested, DBCA database searches were not supplied by Arc Infrastructure. Given the survey area is highly disturbed, this is not considered a limiting factor for this survey. At the time of this survey NatureMap had been disabled by DBCA and records could not be accessed. This limited the contextual information available for this survey, but was not considered to be a significant limiting factor for this survey.
Remoteness or access issues	Nil	No access restrictions were encountered.
Seasonality of activity and fauna movement patterns	Nil	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.
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.

Table 2 cont.

Limitation	Constraint	Comment
Experience of personnel	Nil	Sharon Hynes has over 13 years' experience conducting basic and targeted fauna surveys and is competent in identification and assessment of fauna species. 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.

5. Results – Desktop Assessment

5.1. Threatened and Priority Flora

The full species list compiled from all available data (Table 10, 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. The number of species listed as part of the desktop assessments are limited due to DBCA and NatureMap searches not being available at the time of writing this report., see Table 1. Conservation categories for Threatened and Priority flora and ecological communities are presented in Tables 13-16 in Appendix C. Protected Matters Search Tool (PMST) database searches are provided in Appendix F.

As a result of the above-mentioned database searches three Threatened and seven Priority species were identified within the study area (10km buffer). Of these, one was assessed to be "possible" to occur, namely P1 *Hakea chromatropa.* Additionally, EN *Acacia chapmanii* subsp. *australis* had previously been recorded directly within the survey area, and so was considered 'likely' to occur prior to the survey occurring. Refer to Table 10 in Appendix B for likelihood of occurrence (LOO) analysis.

5.2. Threatened and Priority Ecological Communities

Database analysis relied entirely on the PMST (DAWE, 2021) which only identifies ecological communities with a threatened status. The PMST (DAWE, 2021) results indicate that one ecological community '*Eucalypt Woodlands of the Western Australian Wheatbelt'* may be present within the survey area, which is further described below.

Due to no desktop survey occurring within the study area for DBCA's TEC/PEC databases, all known TECs and PECs within the Wheatbelt region were considered during the survey through comparison of DBCA's priority ecological community listing (DBCA, 2021).

Eucalypt Woodlands of the Western Australian Wheatbelt

'*Eucalypt Woodlands of the Western Australian Wheatbelt'* is listed as a Priority Ecological Community (PEC), P3 within WA under the *Biodiversity Conservation Act 2016* (BC Act). '*Eucalypt Woodlands of the Western Australian Wheatbelt'* is listed as a Critically Endangered Threatened Ecological Community (TEC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The ecological community defined and assessed as TEC/PEC *'Eucalyptus Woodland of the Western Australian Wheatbelt*' 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). Refer to Table A3 in Appendix B.

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 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 11 of Appendix B (DoEE, 2015).

Condition thresholds for the ecological community are described in Table 3. General notes on the condition thresholds of the ecological community are outlined in the Approved Conservation Guidelines for Wheatbelt Woodlands (DoEE, 2015).

Table 3: 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

5.3 Fauna

As a result of the above-mentioned database searches, 11 Threatened fauna species were identified as potentially being present within the survey area (with a 10km buffer). Conservation categories for Threatened and Priority fauna are presented in Tables 13 and 14 in Appendix C. The PMST database search is provided in Appendix F.

The full species list compiled from all available data (Table 12, 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.

5.3.1 Potential Breeding, Foraging and Roosting Habitat for Black Cockatoos

Carnaby's Cockatoo

Carnaby's Cockatoo have 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). The survey and study area lie within the known breeding and foraging range of the Carnaby's Cockatoo (DSEWPaC, 2012).

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). The survey area lies within a known Carnaby's Cockatoo breeding area of the southwest (DBCA, 2019a).

Publicly available DBCA database records indicate there are no confirmed or unconfirmed roosting areas within the 10km study or survey area (DBCA, 2018a-d). The lack of confirmed roosting sites within the survey and study area may be due to the criterion that roosting sites are located near an "important" water source, and high-quality feeding areas. It should be noted that there is no definition of what an important water source for black cockatoos is within the EPBC Guidelines (2020). Potential roosting habitat may be present within the survey area.

Carnaby's Cockatoo prefers 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 4). The vegetation present within the survey area is considered likely to contain potential foraging habitat for this species.

Table 4: Habitats used by Carnaby's Cockatoo (DSEWPaC 2012).

Habitat	Carnaby's Cockatoo
Breeding	Generally, in woodland or forest, but also breeds in former woodland or forest now present as isolated trees. Nest in hollows in live or dead trees of salmon gum (*E. salmonophloia*), wandoo, tuart, jarrah (*E. marginata*), flooded gum (*E. rudis*), york gum (*E. loxophleba* subsp. *loxophleba*), powder bark (*E. accedens*), karri and marri.
Roosting	Generally, in or near riparian environments or natural and artificial permanent water sources. Flat-topped yate (*E. occidentalis*), salmon gum, wandoo, marri, karri, blackbutt, tuart, introduced eucalypts (for example blue gum) and introduced Pines.
Foraging	Native shrubland, Kwongkan heathland and woodland dominated by Proteaceous plant species such as *Banksia* spp. (including *Dryandra* spp.), *Hakea* spp. and *Grevillea* spp. Forages in Pine plantations (*Pinus* spp.), eucalypt woodland and forest that contains foraging species. Also, individual trees and small stands of these species.
Foraging: common food items	Seeds, flowers and nectar of native Proteaceous plant species (for example, *Banksia* spp., *Hakea* spp., *Dryandra* spp., and *Grevillea* spp.), eucalypts and Callistemon. Also seeds of introduced species including *Pinus* spp., *Erodium* spp., wild radish, canola, almonds and pecan nuts; insects and insect larvae; occasionally flesh and juice of apples and persimmons.

6 Results – Field Survey

6.1 Flora Diversity

During the survey, 61 flora species, consisting of 25 families and 53 genera, were found. The most commonly occurring families were Poaceae (grasses) and Fabaceae (peas). The list includes 56 native species (refer to Table 18, Appendix D), and five introduced / alien species. A single vegetation unit was identified across the survey area, and is described in Section 6.2. Refer to Figure 5 for vegetation mapping, and Table 18, Appendix D for full species list.

Plant identification was undertaken through the most relevant, current and available taxonomic literature, keys and herbarium reference specimens available. 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.

6.2 Vegetation Units

One vegetation unit was identified during the survey period, vegetation descriptions can be found in the following sections, with relevé data presented in Appendix D. Refer to Figure 4 for photographs of vegetation units and Figure 5 for extent. Please note only areas of intact native vegetation are described and mapped. Areas that have been cleared or contain predominantly weed / introduced species (i.e. Completely Degraded or Degraded areas) have not been described.

1. Vegetation unit: *Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland [AhEwW]

AhEwW is characterised by a Woodland community, with mixed dominance of *Allocasuarina huegeliana* (Rock Sheoak) and *Eucalyptus wandoo* (Wandoo). A dense grassland was present, dominated by Austrostipa species, namely *Austrostipa hemipogon* and *Austrostipa variabilis.* A scattered and sparse shrubland was present. Invasive species dominance varied throughout the vegetation unit, correlating with the presence of disturbance.

Vegetation Description (NVIS): U ^^*Allocasuarina huegeliana*, *Eucalyptus wandoo* \^^Tree\8\c; M ^^*Hypocalymma angustifolium, Ericomyrtus serpyllifolia* \^^low shrub\<0.5\r; G ^^*Austrostipa hemipogon, Austrostipa variabilis* \^^grass\1\c.

Vegetation Description (Muirs): *Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland, over *Hypocalymma angustifolium* and *Ericomyrtus serpyllifolia* sparse Low Shrubs, over *Austrostipa hemipogon* and *Austrostipa variabilis* Dense Grass.

Area: 2.25 ha.

Site description: Flat site with light brown loamy soil which is well drained.

Condition: Degraded to Very Good.

Represented in R1 (refer to Appendix D).

Figure 4: *Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland [AhEwW] vegetation unit present within the survey area.

6.3 Vegetation Condition

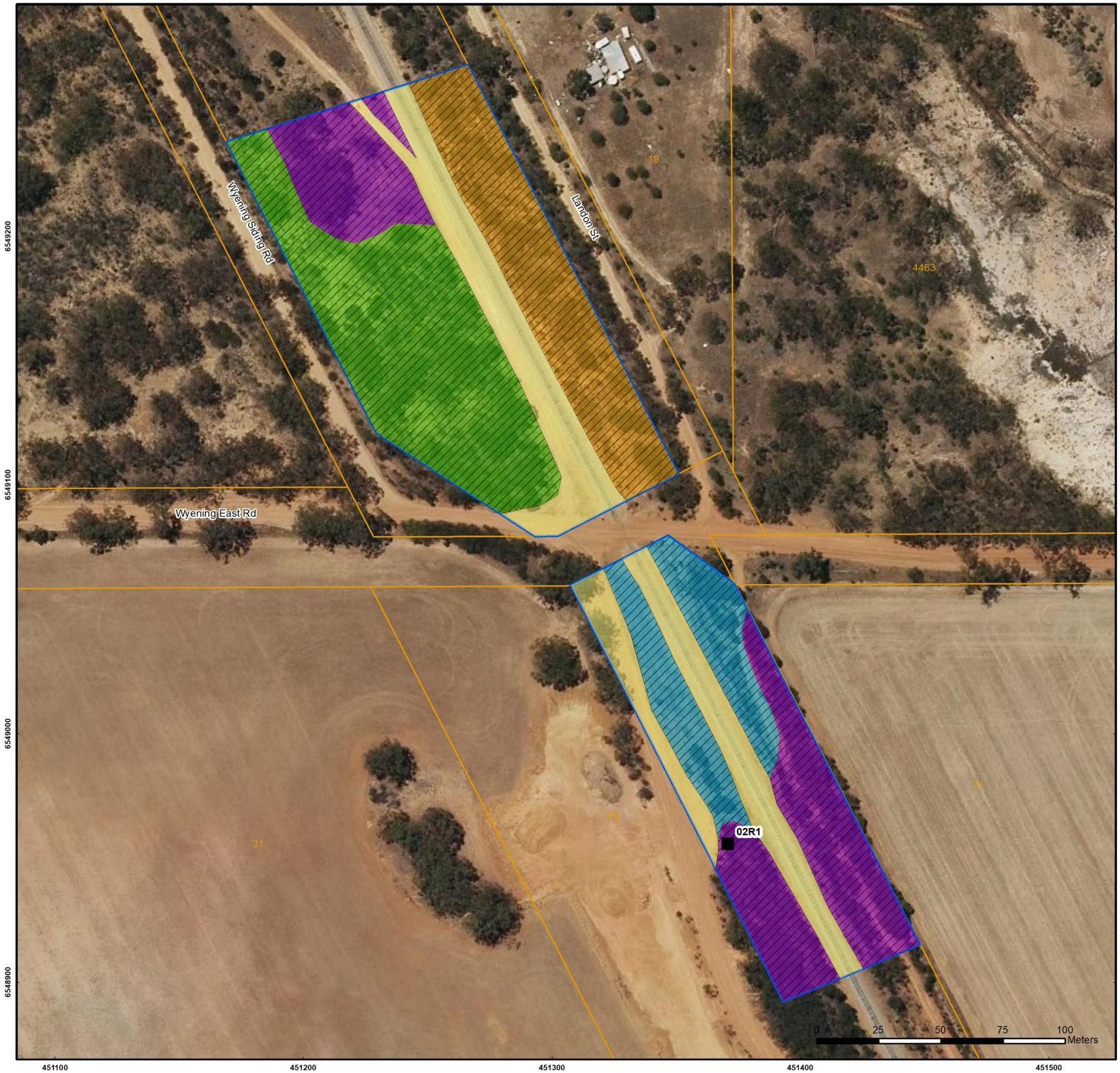
The vegetation condition for the survey area (Table 4) has been mapped using the condition rating scale (adapted from Keighery 1994) outlined in *EPA Flora and Vegetation Survey Technical Guidance* (2016).

The vegetation ranged from Completely Degraded to Very Good condition throughout the survey area. Areas along the existing railway line or crossing areas included within the survey area were not assessed as native vegetation, being previously and historically cleared. 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. Table 5 demonstrates the condition rating for the vegetation unit identified in the survey area. Condition had primarily been reduced from previous, historical disturbance related to being directly adjacent to the railway line and the servicing infrastructure. This included four-wheel drive vehicle tracks for servicing the rail line running parallel to the rail line on either side of the track, which intersected or was immediately adjacent the survey area. These areas had been effectively cleared in the past. Additionally, numerous lay down areas or areas where it is believed to have been historically cleared once and regenerated were present.

Where historical clearing disturbance occurred to the south of the rail crossing on Wyening East Road the *Allocasuarina huegeliana* had regenerated as the more dominant species in this area, creating almost a monoculture with fewer mature Eucalypt trees in this area. This has also led to a reduction of understorey diversity in this area and reduced the vegetation condition to Completely Degraded and Degraded within this section. The area north of the crossing had more intact structural layers and understorey and contained more mature Eucalypt trees, with these areas retaining higher vegetation condition of Good to Very Good. This area therefore, had a higher conservation value, due to the presence of EN *Acacia chapmanii* subsp. *australis* and meeting criteria for the Eucalyptus Woodlands TEC/PEC.

Table 5: Vegetation condition rating.

Vegetation unit	Condition rating	Area (ha)
1. *Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland [AhEwW]	Completely Degraded	0.33
	Degraded	0.68
	Good	0.48
	Very Good	0.77
Total		**2.25ha**



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

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

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2A/113 Dempster Street
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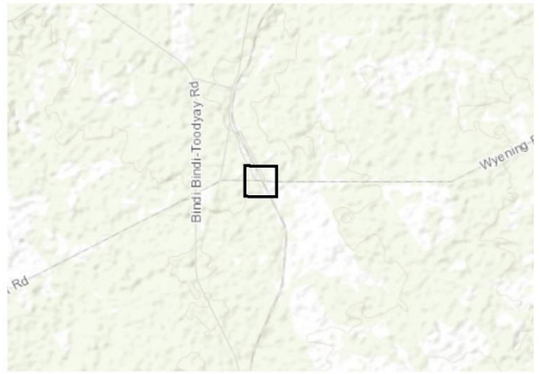

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre
- Releve

Vegetation Condition

- Cleared
- Completely Degraded
- Degraded
- Good
- Very Good

Vegetation Units

- Vegetation Unit 1

Scale
1:1,500 @ 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 5: Vegetation Units & Condition.

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STATUS **FINAL**	*FILE* **AI007-002**	*DATE* **20/12/2021**

6.4 Weeds and Disturbance

Of the 61 flora species recorded within the survey area, five species are considered introduced and non-native species. This is significantly lower than expected, indicating the high conservation value of the survey area despite the degradation from the access track and other incidental clearing related to the railway line from the past. Typically, these areas would be filled with a variety of significant weed infestations especially being next to agricultural paddocks, which are not present here. 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).

It is strongly recommended that all machinery entering the survey area (if clearing is approved in the future) has rigorous and thorough biosecurity hygiene applied to limit the introduction of invasive species infestation and the potential to significantly degrade the surrounding reserve, incidentally, observed to be in Very Good condition.

Table 6: Weed species recorded from the survey area.

Family	Species	Common Name	WA Weed Strategy rating (CALM 1999) / BAM Act (2007)
Poaceae	*Avena barbata*	Bearded Oat	High / Permitted (s11)
Poaceae	*Briza maxima*	Blowfly Grass	Moderate / Permitted (s11)
Poaceae	*Bromus rubens*	Red Brome	Low / Permitted (s11)
Iridaceae	*Romulea rosea*	Guildford Grass	High / Permitted (s11)
Asteraceae	*Ursinia anthemoides*	Ursinia	Moderate / Permitted (s11)

6.5 Presence of conservation significant flora

In total, one species of threatened conservation status was identified within the survey area directly (Table 7 and Figure 7). This species had previously been recorded directly within the survey area or immediate surrounds (<100 m) and is considered to be a part of the existing population. As this was not a new population, no voucher specimens were taken and no specimens were submitted to the WA Herbarium. GPS locations were recorded and counts of individual plants within and immediately adjacent to the survey area undertaken. This is discussed in further detail below.

All other species present were able to be identified to species level with all other being non-threatened species that are known to occur in the local area. None of the species identified on site had close similarities to any of the conservation listed species that were identified in the 10 km radius survey.

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

Family	Species	Cons Code	Population status	Vegetation Units Present	Areas Present	Abundance
Fabaceae	*Acacia chapmanii* subsp. *australis*	T – EN	Existing	1 (AhEwW)	1	46 (10 within survey boundary)

***Acacia chapmanii subsp. australis*, T - EN**

Acacia chapmanii subsp. *australis* (T - EN) has previously been recorded directly within the survey area or in the immediate vicinity (<100m). The population of *A. chapmanii* subsp. *australis* was detected at 26m and 163m north of the train line crossing within the eastern patch of vegetation, with the population extending a further 106m north of the survey area boundary, on both sides of the railway line (Figure 7). Specifically, it was only located in Vegetation Unit 1 where the Good vegetation condition occurred (Table 5; Map 7). A total of 44 plants were recorded, with 10 occurring within the survey area, and 36 north, outside of the survey area. As the population had previously been recorded, no specimen was collected for formal verification. A number of plants recorded were producing seed at the time of the survey (Figure 6).

The known distribution and records of *A. chapmanii* subsp. *australis* within the Australasian Virtual Herbarium (AVH, n.d.) and FloraBase (WAH, 1998-) indicate that *A. chapmanii* subsp. *australis* is known from four remnant populations near the town of Bolgart, occupying an area of 0.075 km^2. One population is within a reserve while the other three are in unsecured road, rail and gravel reserves (DAWE, 2008).

Proposed impact to threatened flora is listed as a 'Matter of National Significance' under the *EPBC Act 1999* and *BC Act 2016.* Therefore, an 'Authorisation under Section 40 of the *BC Act 2016* to Take Threatened Flora in a Management Operation (Permit to Take)' is required for impact to these plants. This covers inadvertent or accidental damage, and unknown damage to the soil seed bank. Generally, proposed works and activities of any form within a 50m buffer of threatened flora requires a 'Permit to Take'.

A Threatened and Priority Report Form (TPFL) was submitted to DBCA Species and Communities Branch on the 01/04/2022 under Flora taking Licence FB2000155 held by Botanist Sharon Hynes (Appendix E).

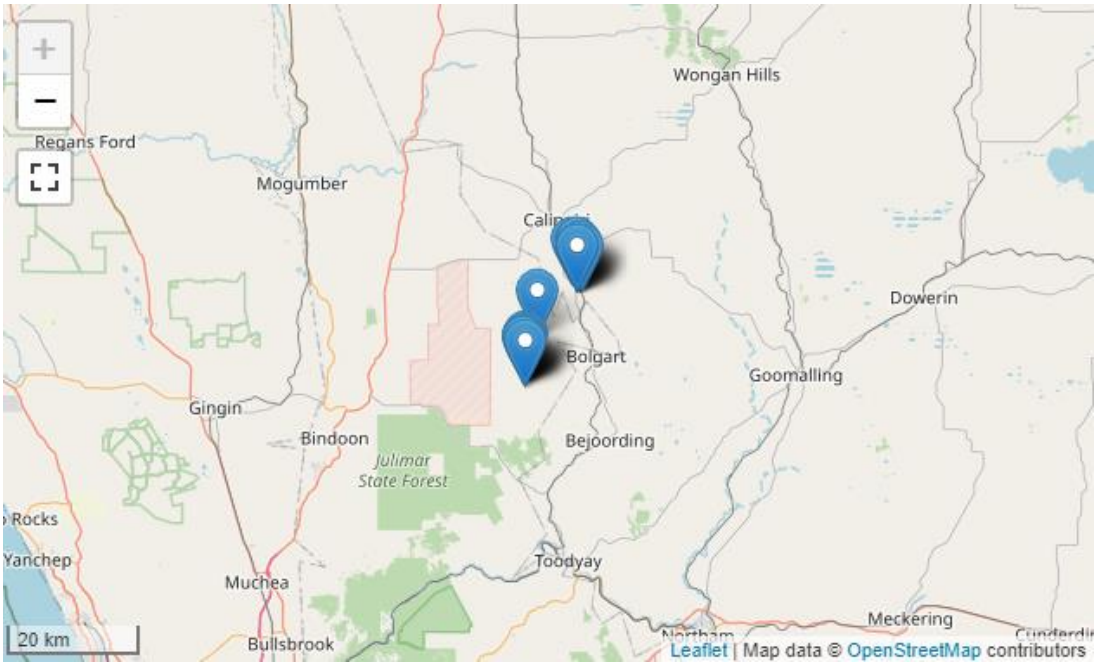

Figure 6: Photos and distribution of *Acacia vassalii* seeding within the survey area (WAH, 1998-).

6.6 Threatened and Priority Ecological Communities

One threatened (TEC) and priority (PEC) ecological community was identified in the 10km desktop analysis, Eucalypt Woodlands of the Western Australian Wheatbelt (Section 5.2; Table 11, Appendix B). Due to the reconnaissance nature of the survey, recommendations have been made on where the TEC is likely to occur, specifically relating to the areas present within the survey area, but requires formal quadrat sampling to be undertaken, this can occur out of Spring flora season for confirmation of presence of the TEC.

Within the site the areas to the north of the crossing are likely to be considered TEC as they meet the condition and patch size criteria and are connected to larger woodland patches and have at least 5 mature Eucalypts per hectare. The areas to the south are in poorer condition and do not have the required patch size or number of mature Eucalypts to meet the TEC criteria, and they are not connected to adjacent patches of woodland that meet these criteria. It is recommended that a detailed quadrat analysis be conducted to confirm the presence of the Eucalyptus Woodlands TEC.

Table 8: Vegetation patches identified within the survey area that may meet the threatened ecological community Wheatbelt Woodlands criteria.

Vegetation Unit	Code	Description	Condition	Meet Patch Size criteria	Meet criteria for TEC survey
1 - patches north of the crossing	AhEwW	*Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland	Degraded – 0.24 ha Good – 0.48 ha Very Good – 0.77 ha	Possible	Possible
1 - patches south of the crossing	AhEwW	*Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland	Degraded – 0.4 ha Completely Degraded – 0.33	No	No

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

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
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2A/113 Dempster Street
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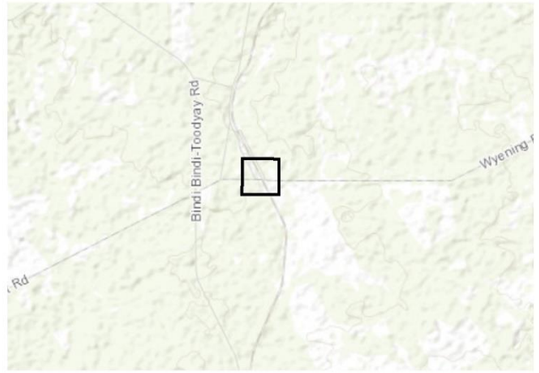

Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Threatened Flora

- *Acacia chapmanii* subsp. *australis*

Vegetation Units

- Vegetation Unit 1

Scale
1:1,750 @ 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 7: Conservation Significant Flora.

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STATUS **FINAL**	*FILE* **AI007-002**	*DATE* **20/12/2021**

7 Fauna Survey Results

7.1 Basic Fauna Survey

A description of the one vegetation unit identified during the survey is given in Section 6.2, which broadly correspond to one fauna habitat type. The locations of the vegetation unit and significant trees recorded during the survey can be seen in Figure 8, as well as a full list of fauna species (Table 19 in Appendix D).

Fauna were observed either directly (observed), or indirectly from calls or from indicators of activity such as tracks, runnels, scats, diggings, feeding remains or scratching on trees. During the survey, four species of fauna were recorded, including three birds and one mammal, this included the Australian Ringneck, Sacred Kingfisher, Rufous Whistler and the Western Grey Kangaroo (Table 19 in Appendix D). One habitat type was determined on site within Vegetation Unit 1, which consisted of woodland over low shrubland, suitable for fauna groups such as mammals, birds and reptiles.

No conservation significant fauna taxa were recorded during the basic fauna survey. No sign of feeding by the Carnaby's Cockatoo (*Calyptorhynchus latirostris*) was recorded within the survey site. A total of nine habitat trees with a DBH of >300mm were recorded, including two York Gums and seven Wandoo, these trees could potentially provide roosting habitat for threatened black cockatoos although no signs of feeding or roosting (scats or feathers) were recorded (Figure 8). Six of these did not contain hollows, three contained small hollows with an entrance of 3 to 5 cm in diameter, which is not of a suitable size for Carnaby's Cockatoo to utilise for nesting. These hollows do provide habitat for other native fauna species. The foraging species at site were not observed to have a high quantity of seed or fruit present and the site is therefore considered to have a low foraging value.

Macropod scats were observed within the survey area, which based on size and shape were identified likely to be *Macropus fuliginosus* (Western Grey Kangaroo). The hard surface of the ground made it difficult for fauna tracks to imprint. Therefore, it is possible that other fauna are using the survey area that were not detected during the survey period.

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

Denmark Office:
7/40 South Coast Highway
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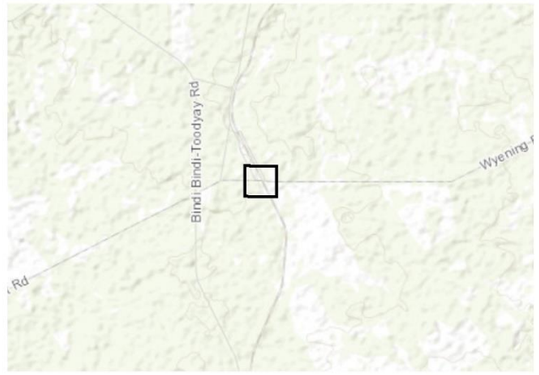

Overview Map Scale 1:100,000

Legend

Survey Area

Cadastre

Significant Trees

Eucalyptus loxophleba subsp. *loxophleba*

Eucalyptus wandoo subsp. *wandoo*

Vegetation Units

Vegetation Unit 1

Scale
1:1,500 @ 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 8: Significant Trees

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	BT	CV
STATUS	FILE	DATE
FINAL	AI007-002	20/12/2021

8 Discussion and Recommendations

8.1 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. One vegetation unit was recorded during the survey, namely *Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland (AhEwW). These vegetation units align with one habitat type, at a landscape level of woodland on a plain. The condition of the vegetation units ranged from 'Degraded' through to 'Very Good', the majority of the vegetation unit being in 'Very Good' or 'Degraded' condition.

A total of 61 species of flora were recorded, consisting of 56 native species and five introduced/non-native species. This indicates a moderately high level of biodiversity recorded within the area, which varies greatly throughout the wheatbelt region due to historic clearing within the area and the high variation of understorey species. One threatened flora species EN *Acacia chapmanii* subsp*. australis* was recorded across the survey area. This species had been previously recorded in the area and is therefore not considered a new population. The threatened species had plants counted within the survey area and immediately adjacent (<100 m) to the boundary. Suitable habitat is likely to continue further to the north of the survey area with additional plants likely to be present in the area. One other species identified in the 10 km desktop survey that was assessed to be 'possible' to occur was not found on site and is unlikely to be present as it is a larger distinctive shrub and would have been identifiable if present. Further surveys will not be required to ascertain presence of this species, with all species present identified to species level.

One Threatened/Priority Ecological Community was identified as possibly being present within the survey area, the *'Eucalypt Woodlands of the Western Australian Wheatbelt'* which was detected within Vegetation Unit 1 in the portions north of the railway crossing on Wyening East Road. The areas to the south of the crossing were too degraded and lacked the mature Eucalypts to meet the patch and condition criteria within the listing advice for this community. However, formal quadrat analysis is required to formally determine its presence. A targeted vegetation 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, with targeted significant flora. Prior to clearing being conducted, it is recommended that a detailed quadrat analysis be conducted to confirm the presence of the Eucalyptus Woodlands TEC.

During the survey, some environmental weed species were recorded. None of these were listed as a declared pest under the *Biosecurity and Agriculture Management Act* 2007 (WA). However, 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 degrade the surrounding woodland areas in good and very good condition.

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8.2 Basic Fauna Survey

The aim of the basic fauna survey was to assess and map the fauna habitat within the survey area, assess the likelihood of Threatened and Priority fauna taxa utilising the general area and/or particular vegetation types, recording actual presence of fauna, and undertaking opportunistic inventory of vertebrate species encountered whilst traversing the survey area on foot. Four species were recorded including three birds and one mammal, all of which are common species to the Wheatbelt area. These were the Australian Ringneck, Sacred Kingfisher, Rufous Whistler and the Western Grey Kangaroo.

One habitat type (Vegetation Unit 1) provides woodland and low shrub habitat to mammals, birds and reptiles. No Threatened or Priority fauna species were recorded during the basic fauna survey. Nine black cockatoo habitat trees were recorded that could potentially provide roosting habitat. Three of these trees contained small hollows that would provide habitat for other native species but are too small to provide nesting habitat for the threatened Carnaby's Cockatoo. No individuals were observed landing within the survey area, and no signs of foraging or roosting were noted in the site. Foraging species including Eucalypts and proteaceous species are present although were considered low value foraging due to lack of fruit presenting on plants present. However, the area may still be used for transient feeding, with the area providing an ecological corridor to larger nearby bushland areas. It is unlikely this proposal would need to be referred for assessment under the EPBC Act. It is recommended that the nine habitat trees identified are retained where possible.

The vegetation present within the survey area runs parallel to the railway line, and thus does provide an ecological linkage within the broader landscape. However, the relatively small areas that are proposed to be cleared as part of this proposal would not significantly impact the ability for fauna to disperse between vegetated areas.

8.3 Referral and Approvals

The scope for this survey was to provide the client with base information on vegetation units and condition, threatened or priority flora and fauna species and ecological communities that are potentially present within the survey area. The survey and subsequent report provide Arc Infrastructure with information to guide the future LOS safety works on the site. If native vegetation is proposed to be cleared for the safety works, it is recommended that a native vegetation clearing referral or permit application as regulated under the WA *EP Act 1986* and administered by DWER is undertaken prior to disturbance.

It is noted that the majority of the proposed Arc Infrastructure redevelopment site is located within system association "Victoria Plains (142)". Under the WA government Department of Environmental Regulation guidelines (DoER, 2014), this system is noted to be less than the 30% threshold of the system remaining in the state.

It is recommended that the significant habitat trees identified are retained where possible.

Proposed impact to threatened, *Acacia chapmanii* subsp. *australis* flora is listed as a 'Matter of National Significance' under the *EPBC Act 1999* and *BC Act 2016.* Therefore, an 'Authorisation under Section 40 of the *BC Act 2016* to Take Threatened Flora in a Management Operation (Permit to Take)' is required. This covers inadvertent or accidental damage, and unknown damage to the soil seed bank. Generally, proposed works and activities of any form within a 50m buffer of threatened flora requires a Permit to Take. It is recommended that *A. chapmanii subsp. australis* plants be flagged and marked out prior to line-of-sight maintenance works occurring, and proposed to be avoided.

It is also recommended that a detailed quadrat analysis be conducted to confirm the presence of the Eucalyptus Woodlands TEC.

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10 Appendices

Appendix A – Survey Effort Map

Appendix B – Conservation Significant Values Likelihood of Occurrence Analysis

Appendix C – Conservation Status Definitions and Condition Scale

Appendix D – Species Lists and Relevé Data

Appendix E - DBCA Threatened and Priority Reporting Forms (TPFL)

Appendix F - EPBC Act PMST reports

Appendix A

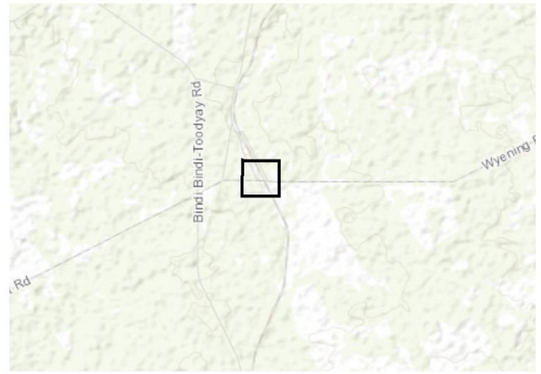
Survey Effort Map

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 1:100,000

Legend

- Survey Area
- Survey Effort

Scale
1:1,750 @ 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

CLIENT
Arc Infrastructure
Line 4 - Summers East & West Road
Bindi-Bindi/Gabalong, WA 6574

Figure 9: Survey Effort.

	QA Check	*Drawn by*
	BT	**CV**
STATUS	*FILE*	*DATE*
FINAL	**AI007-002**	**20/12/2021**

Appendix B

Conservation Significant Values Likelihood of Occurrence Analysis

Table 9: 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 10: Potential conservation significant flora located within 10km of the survey area and likelihood of occurrence analysis (post survey).
NB - Species are sorted by likelihood of occurrence (post-field).

Family	Species	Common Name	Status (WA)	Desktop Survey			Description - Species	Description - Habitat	Peak Flowering period	Likelihood of occurring – pre field survey	Likelihood of occurring – post field survey
				Arc Infra.	ALA	PMST					
Fabaceae	*Acacia chapmanii* subsp. *australis*		T - EN	X			Upright, compact, intricate shrub, 0.3-1 m high. Fl. Yellow.	Sandy clay or gravel, grey sand. Plains, swampy areas.	Aug to Sep	Likely – previously recorded within survey area.	Detected within survey area.
Proteaceae	*Hakea chromatropa*		P1		X		Non-lignotuberous, bushy shrub, to 2.5 m high.	Gravelly loam. In open shrubland.		Possible	Unlikely, not found on site is a large distinct shrub would have been readily identifiable if present.
Haemodoraceae	*Anigozanthos bicolor* subsp. *minor*	Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw	T - EN			X	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. Green & red.	Sand. Well-watered sites.	Aug to Oct	Unlikely	Unlikely
Myrtaceae	*Eucalyptus merrickiae*	Goblet Mallee	T - VU			X	(Mallee), 2-4(-6) m high, bark rough, flaky. Fl. pink/cream-white.	Sandy clay, grey sand. Near salt lakes.	Aug to Nov	Unlikely	Unlikely
Proteaceae	*Persoonia sulcata*		P4		X		Erect, spreading to decumbent shrub, 0.2-1 m high. Fl. Yellow.	Lateritic or granitic soils.	Sep to Nov	Unlikely	Unlikely
Stylidiaceae	*Stylidium periscelianthum*		P3		X		Bulb-forming perennial, herb, 0.07-0.15 m high. Fl. Pink.	Loamy clay, moist soils pockets. Wet flats, low granitic hills.	Sep to Oct	Unlikely	Unlikely
Stylidiaceae	*Stylidium sacculatum*		P3		X		Creeping perennial, herb, 0.05-0.15 m high, Leaves adpressed to stem, linear-lanceolate to lanceolate, 0.15-0.95 cm long, 0.5-1.2 mm wide, apex mucronate, margin hyaline, glabrous. Inflorescence uni-flowered, pedicels glandular. Fl. white-pink.	Clayey sand or sand. Lower slopes and flats. Open Wandoo or Marri woodland, Allocasuarina shrubland.	Oct to Nov	Unlikely	Unlikely
Stylidiaceae	*Stylidium pseudosacculatum*		P2		X		Creeping perennial, herb, 0.04-0.15 m high, Leaves adpressed to stem, linear-lanceolate to lanceolate, 0.2-0.55 cm long, 0.6-1.2 mm wide, apex mucronate, margin hyaline, glabrous. Inflorescence uni-flowered, pedicels glandular. Fl. White.	Sand over laterite. Gentle hillslopes. Allocasuarina heath.	Oct to Nov	Unlikely	Unlikely
Stylidiaceae	*Stylidium scabridum*		P4		X		Rosetted perennial, herb, 0.05-0.24 m high, Leaves tufted, linear, 2.5-9.5 cm long, 0.7-2 mm wide, apex acute to mucronate, margin involute, scabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout, pilose at base. Inflorescence racemose. Fl. Pink.	Sand. Open woodland or heath.	Sep to Nov	Unlikely	Unlikely
Stylidiaceae	*Stylidium cymiferum*		P3		X		Rosetted perennial, herb, 0.12-0.35 m high, Leaves oblanceolate to spathulate, 0.5-1.5 cm long, 1-2.7 mm wide, apex obtuse to subacute, margin entire, glandular. Scape glabrous, or sparsely glandular along inflorescence axis. Inflorescence paniculate. Fl. Yellow.	Brown loam over laterite. Uplands, Wandoo woodland.	Oct to Nov	Unlikely	Unlikely

Table 11: Potential Threatened and Priority Ecological Communities located within 10km of the survey area.

Community Name	Source	Status	Description	Survey Outcome
Eucalypt Woodlands of the Western Australian Wheatbelt	PMST	Priority 3 (WA) CR (EPBC Act)	The ecological community defined and assessed as TEC/PEC 'Eucalyptus Woodland of the Western Australian Wheatbelt' 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).	Possible north of the crossing. Further quadrat and targeted vegetation surveys required.

Table 12: Potential conservation significant fauna located within 10km 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	Habitat Present (Y/N)	Likelihood of occurrence	Likelihood of detection if present	Species Present	Comments
Cacatuidae	*Calyptorhynchus latirostris*	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	EN / EN	Uncleared or remnant native 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.	Y	Likely	HIGH	No	High likelihood of detection if present being large birds with a very loud and distinctive call, no signs of the birds foraging within the site were noted. No suitable nesting hollows present.
Anatidae	*Cereopsis novaehollandiae grisea*	Cape Barren Goose (south-western), Recherche Cape Barren Goose	VU / VU	Offshore islands and rocks, and at adjacent sites on the mainland. It inhabits grasslands and low fields of succulent herbs (comprised of Carpobrotus sp.), and occasionally occurs in open areas in taller and denser vegetation (although islands that are covered by woodlands or thickets support few birds).	N	Unlikely	HIGH	No	
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	EN / EN	Wetlands, permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over a muddy or peaty substrate.	N	Unlikely	HIGH	No	
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.	N	Unlikely	HIGH	No	
Falconidae	*Falco hypoleucos*	Grey Falcon	VU / -	Usually in lightly timbered country, especially stony plains and lightly timbered acacia shrublands.	N	Unlikely	HIGH	No	
Laridae	*Sternula nereis nereis*	Australian Fairy Tern	VU / VU	Coastal areas and embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline.	N	Unlikely	HIGH	No	
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.	N	Unlikely	HIGH	No	
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	CR / CR & MI	Intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.	N	Unlikely	HIGH	No	
Scolopacidae	*Limosa lapponica menzbieri*	Northern Siberian Bar-tailed Godwit	CR (& MI at sp. level) / CR (& MI at sp. level) /	Occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats.	N	Unlikely	HIGH	No	
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.	N	Unlikely	HIGH	No	
Scolopacidae	*Calidris canutus*	Red Knot, knot	EN / EN & MI	Intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs.	N	Unlikely	HIGH	No	

Appendix C

Conservation Status Definitions and Condition Scale

Table 13: 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 14: 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 15: 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 16: 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 17: 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 18: Flora Species List recorded within survey area.

Family	Species Name	Vernacular	Introduced Species	Cons Code WA/EPBC
Fabaceae	*Acacia acuminata*	Jam		
Fabaceae	*Acacia chapmanii subsp. australis*			T - EN
Fabaceae	*Acacia lasiocarpa var. bracteolata*			
Fabaceae	*Acacia saligna*			
Loranthaceae	*Amyema preissii*	Wireleaf Mistletoe		
Poaceae	*Aristida contorta*	Bunched Kerosene Grass		
Poaceae	*Austrostipa elegantissima*			
Poaceae	*Austrostipa hemipogon*			
Poaceae	*Avena barbata*	Bearded Oat	X	
Proteaceae	*Banksia fraseri*			
Fabaceae	*Bossiaea spinescens*			
Poaceae	*Brachypodium distachyon*	False Brome		
Poaceae	*Briza maxima*	Blowfly Grass	X	
Poaceae	*Bromus rubens*	Red Brome	X	
Polygalaceae	*Comesperma volubile*	Love Creeper		
Goodeniaceae	*Dampiera lavandulacea*			
Fabaceae	*Daviesia cardiophylla*			
Fabaceae	*Daviesia hakeoides*			
Hemerocallidaceae	*Dianella revoluta*	Blueberry Lily		
Hemerocallidaceae	*Dichopogon capillipes*			
Fabaceae	*Dillwynia laxiflora*			
Myrtaceae	*Ericomyrtus serpyllifolia*			
Myrtaceae	*Eucalyptus wandoo*	Wandoo		
Asteraceae	*Gnephosis tenuissima*			
Fabaceae	*Gompholobium shuttleworthii*			
Haloragaceae	*Gonocarpus nodulosus*			
Goodeniaceae	*Goodenia helmsii*			
Proteaceae	*Grevillea eriostachya*	Flame Grevillea		
Proteaceae	*Hakea incrassata*	Marble Hakea		
Proteaceae	*Hakea prostrata*	harsh Hakea		
Boraginaceae	*Halgania anagalloides*			
Myrtaceae	*Hypocalymma angustifolium*	White Myrtle		
Fabaceae	*Isotropis cuneifolia*	Granny Bonnets		
Fabaceae	*Kennedia prostrata*	Scarlet Runner		
Asparagaceae	*Laxmannia squarrosa*			
Restionaceae	*Lepidobolus preissianus*			
Cyperaceae	*Lepidosperma costale*			
Cyperaceae	*Lepidosperma tenue*			
Chenopodiaceae	*Maireana brevifolia*	Small Leaf Bluebush		
Cyperaceae	*Mesomelaena preissii*			
Fabaceae	*Mirbelia spinosa*			
Poaceae	*Neurachne alopecuroidea*	Foxtail Mulga Grass		

Table 18 cont.

Family	Species Name	Common Name	Introduced Species	Cons Code WA/EPBC
Rubiaceae	*Opercularia vaginata*	Dog Weed		
Thymelaeaceae	*Pimelea villifera*			
Asteraceae	*Podolepis aristata*			
Amaranthaceae	*Ptilotus drummondii*	Narrowleaf Mulla Mulla		
Amaranthaceae	*Ptilotus polystachyus*	Prince of Wales Feather		
Iridaceae	*Romulea rosea*	Guildford Grass	X	
Poaceae	*Rytidosperma caespitosum*			
Santalaceae	*Santalum spicatum*	Sandalwood		
Malvaceae	*Seringia hermanniifolia*	Crinkle-leaved firebush		
Cyperaceae	*Schoenus clandestinus*			
Asparagaceae	*Sowerbaea laxiflora*	Purple Tassels		
Celastraceae	*Stackhousia pubescens*	Downy Stackhousia		
Rhamnaceae	*Stenanthemum tridentatum*			
Ericaceae	*Styphelia serratifolia*			
Proteaceae	*Synaphea interioris*			
Asparagaceae	*Thysanotus manglesianus*	Fringed Lily		
Araliaceae	*Trachymene cyanopetala*			
Hemerocallidaceae	*Tricoryne elatior*	Yellow Autumn Lily		
Asteraceae	*Ursinia anthemoides*	Ursinia	X	

Table 19: Fauna species recorded within survey area.

Family	Taxon Name	Common Name	Cons Status WA/ EPBC
Alcedinidae	*Todiramorphis sanctus*	Sacred Kingfisher	
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo	
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler	
Psittaculidae	*Barnadius zonarius*	Australian Ringneck	

Relevé	R1	**Veg Code**	Veg Unit 1: *Allocasuarina huegeliana* and *Eucalyptus wandoo* Woodland (AhEwW)	**Date Surveyed**	23/11/2021
Location	Line 4 (344.9 – 346.485), Wyening East Road, Wyening				
GPS (Lat, Long)	-31.192466 S, 116.489592 E				
Landform and Slope	Gentle slope, with a western aspect on a plain				
Soils	Light brown loam				
Hydrology	Good drainage				
Vegetation description	(NVIS): U ^^Allocasuarina huegeliana, Eucalyptus wandoo \^^Tree\8\c;M ^^Hypocalymma angustifolium, *Ericomyrtus serpyllifolia* \^^low shrub\<0.5\r;G ^^Austrostipa hemipogon, Austrostipa variabilis \^^grass\1\c. (Muirs): Allocasuarina huegeliana and Eucalyptus wandoo Woodland, over Hypocalymma angustifolium and Ericomyrtus serpyllifolia sparse Low Shrubs, over Austrostipa hemipogon and Austrostipa variabilis Dense Grass.				
Condition	Degraded to Very Good				
Comments	No obvious signs of fire in the last 5 years				

Life Form	**Dominant Species**	**Other Species**	**Cover (%)**
Trees >30m			
Trees 10-30m	Eucalyptus wandoo	*Eucalyptus loxophleba* subsp. *loxophleba*	
Trees < 10 m	*Allocasuarina huegeliana*		
Shrub >2m		*Acacia acuminata, Santalum spicatum*	
Shrub 1-2m		*Acacia saligna, Maireana brevifolia, Hakea prostrata*	V 2-10%
Shrub 0.5-1m		*Daviesia cardiophylla, Acacia chapmanii* subsp. *australis, Hakea incrassata, Banksia fraseri*	M 30-70%
Shrub <0.5m	*Hypocalymma angustifolium, Ericomyrtus serpyllifolia*	*Synaphea interioris, Comesperma volubile, Goodenia helmsii, Gompholobium shuttleworthii, Hypocalymma angustifolium, Seringia integrifolia, Gonocarpus nodulosus, Styphelia serratifolia, Seringia hermanniifolia, Mirbelia spinosa, Bossiaea spinescens, Daviesia hakeoides, Acacia lasiocarpa* var. *bracteolata, Dillwynia laxiflora*	E <5%
Sedge		*Mesomelaena preissii, Sowerbaea laxiflora, Lepidobolus preissianus, Lepidosperma costale, Lepidosperma tenue*	V 2-10%
Herb		*Ptilotus polystachyus, Kennedia prostrata, Opercularia vaginata, Tricoryne elatior, Dampiera lavandulacea, Dianella revoluta, Thysanotus manglesianus, Isotropis cuneifolia, Stackhousia pubescens, Trachymene cyanopetala, Stenanthemum tridentatum, *Ursinia anthemoides, Schoenus clandestinus, Amyema preissii, Halgania anagalloides, *Romulea rosea, Podolepis aristata, Dichopogon capillipes, Laxmannia squarrosa, Ptilotus drummondii, Gnephosis tenuissima*	
Grass	*Austrostipa hemipogon, Austrostipa variabilis*	**Avena barbata, Neurachne alopecuroidea, *Bromus rubens, *Briza maxima, Rytidosperma setaceum, Aristida contorta, Austrostipa elegantissima, *Brachypodium distachyon*	

Appendix E

DBCA Threatened and Priority Reporting Forms (TPFL)

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

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: *Acacia chapmanii* subsp. *australis* **TPFL Pop. No:**

OBSERVATION DATE: 23/11/2021 **CONSERVATION STATUS:** T/EN **New population** ☐

OBSERVER/S: Sharon Hynes **PHONE**

ROLE: Botanist **ORGANISATION:** Natural Area Consulting Management Services

EMAIL: Sharon.hynes@naturalarea.com.au

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

North of Wyening East Road, Wyening WA, approximately 9.14 km north of town site of Bolgart

Reserve No:

DBCA DISTRICT: Wheatbelt Region **LGA:** Shire of Victoria Plain Land manager present: ☐

DATUM:

GDA94 / MGA94 ☐

AGD84 / AMG84 ☐

WGS84 ☒

Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)

DecDegrees ☒ DegMinSec ☐ UTMs ☐

Lat / Northing: -31.189831

Long / Easting: 116.488585

ZONE:

METHOD USED:

GPS ☒ Differential GPS ☐ Map ☐

No. satellites: ___ Map used: _____

Boundary polygon captured: ☐ Map scale: 1:1500

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): 22500

EFFORT: Time spent surveying (minutes): 87 No. of minutes spent / 100 m²: 0.4

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: ____

(Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:
Alive	46			
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: All plants were in a healthy mature condition and had dehised seed pods present.

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)**
• Clearing for maintenance of the adjacent train line	N	E	L
• Weed encroachment	N	M	L
• Too frequent fires	N	H	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

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. Woodland (Allocasuarina huegeliana,Eucalyptus wandoo)
2. Open Low Shrubland (Hypocalymma angustifolium, Ericomyrtus serpyllifolia)
3. Open Grassland (Austrostipa hemipogon, Austrostipa variabilis)
4.

ASSOCIATED SPECIES:
Eucalyptus loxophleba subsp. loxophleba

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: Majority of the vegetation was in Very Good condition with areas on periphery of maintenance tracks adjacent the rail line in Degraded condition.

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.)

This area is within 200 m north of the train line crossing of Wyening East Road, which is proposed to be cleared or have partial clearing for line of sight it is proposed that these plants are avoided. With the removal of larger shrubs considered adequate for the line of sight at the crossing. As the Acacias were all below 1 m tall they should not impact the line of sight in these areas.

FLORA AUTHORISATION / LICENCE No: FB2000155 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: Sharon Hynes Role: Botanist Signed: SHynes Date: 01/04/2022

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

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

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

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

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Version 1.4 March 2021

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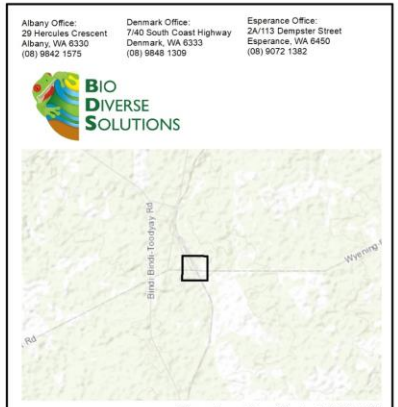
Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021



Overview Map Scale 1:100,000

Legend

Survey Area

Cadastre

Threatened Flora

Acacia chapmanii subsp. *australis*

Vegetation Units

Vegetation Unit 1

Scale
1:1,750 @ 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

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

CLIENT
Arc Infrastructure
Line 4 - Summers East & West Road
Bindi-Bindi/Gabalong, WA 6574

Threatened Flora

	QA Check	Drawn by
	BT	CV
STATUS	FILE	DATE
FINAL	AI007-002	20/12/2021

Please return completed form to **Species And Communities Program** DBCA,

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

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

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

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: 17-Dec-2021

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

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	15
Listed Migratory Species:	12

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:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	20
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:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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

Ramsar Site Name	Proximity	Buffer Status
Lake gore	20 - 30km upstream from Ramsar site	In buffer area only
Lake warden system	Within 10km of Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

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

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

Listed Threatened Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Falco hypoleucos](#) Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Leipoa ocellata](#) Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Limosa lapponica menzbieri](#) Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Sternula nereis nereis](#) Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Zanda latirostris listed as Calyptorhynchus latirostris](#) Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
MAMMAL			
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			
[Anigozanthos bicolor subsp. minor](#) Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw [21241]	Endangered	Species or species habitat likely to occur within area	In feature area
[Eucalyptus merrickiae](#) Goblet Mallee [13119]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Kennedia glabrata](#) Northcliffe Kennedia [16452]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Lambertia echinata subsp. echinata](#) Prickly Honeysuckle [56729]	Endangered	Species or species habitat may 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 known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area	In buffer area only
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [50339]	WA	In buffer area only
Commonwealth Land - [50338]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Bubulcus ibis as Ardea ibis](#) Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Cereopsis novaehollandiae grisea Cape Barren Goose (south-western), Recherche Cape Barren Goose [25978]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Thinornis cucullatus as Thinornis rubricollis Hooded Dotterel, Hooded Plover [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Helms Arboretum	5(1)(h) Reserve	WA	In buffer area only
Shark Lake	Nature Reserve	WA	In buffer area only
Woody Lake	Nature Reserve	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Shire of Esperance /Transport - land/Gibson Road, 26km north of Esperance/WA/Gibson Road Upgrade	2014/7199	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

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.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111