Konnongorring Rail Loading Site Flora and Fauna Survey

CBH Group

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Template 2.8.1

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Abbreviations

Abbreviation	Description
BAM Act	Biosecurity and Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BoM	Bureau of Meteorology
CBH	CBH Group
DAWE	Department of Agriculture, Water, and the Environment (now DCCEEW)
DBCA	Department of Biodiversity Conservation and Attractions
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DotEE	Department of the Environment and Energy (now DCCEEW)
ELA	Eco Logical Australia
EP Act	Environmental Protection Act 1986 (Western Australia)
EPA	Environmental Protection Authority (Western Australia)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESA	Environmentally Sensitive Area
IBRA	Interim Biogeographic Regionalisation for Australia
PEC	Priority Ecological Community
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
TEC	Threatened Ecological Community
WAH	Western Australian Herbarium
Wheatbelt Woodlands TEC	Eucalyptus Woodlands of the Western Australian Wheatbelt Threatened Ecological Community
WoNS	Weed of National Significance

Executive Summary

CBH Group (CBH) is planning an upgrade of the fixed rail loading facility at Konnongorring (the project) as part of ongoing upgrades to its grain storage facilities throughout the Wheatbelt. The project is located at Konnongorring, approximately 18 kilometres (km) south of Wongan Hills in the Wheatbelt region of Western Australia.

Eco Logical Australia (ELA) was engaged by CBH to conduct an ecological assessment within a 17.58 hectare (ha) area of land (the original survey area) to facilitate the development of the project. A reconnaissance flora and vegetation survey, a basic vertebrate fauna survey and a targeted black cockatoo habitat assessment were undertaken over half a day on 9 November 2021 by two ELA staff. An additional 5.86 ha area adjacent to the original survey area was later added to the project envelope (the additional area) for which an equivalent survey was undertaken on 1 June 2022. The combined 23.44 ha area is presented in this document as the survey area.

Flora

A total of 80 flora species, representing 29 families and 56 genera were recorded from a combination of eight relevés and opportunistic collections. Of those, 19 were introduced (weed) species, none of which were listed as Weeds of National Significance or Declared Pests.

No Threatened or Priority flora species listed under the EPBC Act or the BC Act or listed by DBCA were recorded during the field survey. The post field survey likelihood of flora occurrence assessment determined that one Priority three taxon, *Guichenotia impudica*, was likely to occur within the survey area and a further 32 species potentially occur.

Vegetation

A total of seven vegetation communities, covering 6.01 ha (25.65%) of the survey area and comprising three eucalypt woodland communities, two shrublands communities and two broad types of planted tree-lines were described and mapped within the survey area. These communities were found to range from Very Good to Completely Degraded condition, based on the Keighery (1994) vegetation condition scale provided in EPA (2016). The communities and conditions consisted of:

- EW1: Salmon gum – York gum Woodland (Degraded to Very Good condition);
- EW2: York gum – Jam Woodland (Degraded to Good Condition);
- EW3: Wandoo Woodland (Degraded Condition);
- S1: Mixed Shrubland (Degraded to Very Good Condition);
- S2: Jam Shrubland (Degraded Condition);
- PT1: Eucalypt Tree-lines (Degraded Condition); and
- PT2: Pine Tree-line (Completely Degraded Condition).

Primary disturbances within the survey area included historical clearing for infrastructure such as the rail corridor and rail access tracks, the presence of introduced (weed) species, vehicle tracks and bituminised parking or laydown areas and agriculture with cleared paddocks for cropping and grazing.

Vegetation communities S1, EW1 and EW2 were considered most likely to provide suitable habitat for conservation significant flora identified in the post-survey likelihood assessment as likely or potentially occurring, with communities EW3 and S2 also providing marginal habitat for these species.

Three vegetation communities described within the survey area are composed of eucalypt woodlands that have the potential to represent floristic and structural aspects of the *Eucalyptus Woodlands of the Western Australian Wheatbelt* (Wheatbelt Woodlands) Threatened Ecological Community (Wheatbelt Woodland TEC), listed as Critically Endangered (CR) under the Commonwealth EPBC Act and Priority 3 by DBCA. Portions of vegetation communities EW1, EW2 and EW3, totalling 2.45 ha of vegetation within the survey area were assessed as potentially representing the Wheatbelt Woodlands TEC; more specifically, 0.5 ha of Category A, 0.48 ha of Category B and 1.47 ha of Category D.

Fauna

A total of 22 vertebrate fauna species were recorded within the survey area, comprising 20 birds, one mammal and one reptile. No direct observations or indirect evidence (secondary signs) of Threatened or Migratory fauna species listed under the EPBC Act or the BC Act, or species listed as Priority by DBCA were recorded within the survey area.

Whilst the majority of the survey area was found to be cleared (17.43 ha; 74.36%), seven broad fauna habitats covering approximately 6.01 ha (25.64%) were mapped during the survey. Fauna habitats included Salmon Gum woodland, York Gum Woodland, Wandoo Woodland, Mixed Shrubland, Scattered trees and shrubs, Isolated trees, and Planted tree lines. All fauna habitats were somewhat degraded due to historical clearing, the presence of weeds and vehicle tracks; however, the woodland and shrubland habitats provide at least moderate value to fauna, as they provide refuge and shelter in an otherwise cleared and fragmented landscape and provide some habitat values for conservation significant fauna species such as Carnaby's Cockatoo.

During the black cockatoo habitat assessment, a total of 6.01 ha of suitable foraging habitat, 30 potential breeding trees and approximately 1.3 ha of potential roosting habitat for Carnaby's Cockatoo was mapped within the survey area. Foraging habitat comprised of primary and secondary foraging species such as Salmon Gum, York Gum, Wandoo, *Pinus pinaster, Acacia saligna* and Grevillea sp., with a total of 0.09 ha (0.38%) mapped as low to moderate quality, 1.67 ha (7.12%) mapped as low quality, and 4.25 ha (18.13%) mapped as negligible to low quality foraging habitat. The remaining survey area comprised no suitable foraging habitat for Carnaby's Cockatoo and was mapped as Nil. A total of 30 potential breeding trees (0.2 ha) were recorded during the survey and included species such as Salmon Gum, York Gum, Wandoo and *Eucalyptus camaldulensis*; however, none of the potential breeding trees contained hollows suitable for nesting. No evidence of Carnaby's Cockatoos utilising the survey area for foraging, breeding, or roosting was observed within any of the vegetation during the survey; however, given the presence of suitable habitat and database records within 5 km, the species is considered to have the potential to occur and could potentially utilise these habitats in the future.

1. Introduction

1.1. Project Background

CBH Group (CBH) is planning an upgrade of the fixed rail loading facility at Konnongorring (the project) as part of ongoing upgrades to its grain storage facilities throughout the Wheatbelt. The project is located at Konnongorring, approximately 18 kilometres (km) south of Wongan Hills in the Wheatbelt region of Western Australia (Figure 1-1).

Eco Logical Australia (ELA) was engaged by CBH to conduct an ecological assessment within a 17.58 hectare (ha) area of land (the original survey area) to facilitate the development of the project (Figure 1-1). A 5.86 ha additional survey area (additional area) adjacent to the original survey area was added to the project in 2022 due to adjustments to the planned project footprint, displayed in Figure 1-1 as the additional area. Both surveys are incorporated into this report and are collectively referred to as the survey area.

The ecological assessment included a desktop assessment, reconnaissance level flora and vegetation survey, basic vertebrate fauna survey and targeted black cockatoo habitat assessment.

The scope of work for this assessment included the following tasks:

- Undertake a desktop assessment to identify the potential occurrence of any conservation listed communities and/or flora and fauna species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Western Australian *Biodiversity Conservation Act 2016* (BC Act) and by the Department of Biodiversity, Conservation and Attractions (DBCA);
- Undertake a Reconnaissance level flora and vegetation survey to describe dominant vegetation communities, with respect to dominant species, structure and overall condition and determine the presence of potential significant flora;
- Undertake a Basic vertebrate fauna survey and targeted black cockatoo habitat assessment;
- Preparation of a standalone summary report detailing the findings of the desktop assessment and field survey; and
- Provision of data, including relevant mapping at an appropriate scale and associated data files.

Figure 1-1: Survey area

Konnongorring original survey area
Additional Variation 1 survey area
Distributor road
Access road

N

0 100 200 400
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

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2. Existing Environment

2.1.1. Interim Biogeographic Regionalisation for Australia

Under the current version 7 of the Interim Biogeographic Regionalisation for Australia (IBRA), the survey area is situated within the Avon Wheatbelt IBRA Bioregion and AVW02- Katanning subregion (IBRA; Department of Agriculture, Water, and the Environment [DAWE] 2021a). The Avon Wheatbelt bioregion is described as a dissected plateau of Tertiary laterite in the Yilgarn Craton with a semi-arid (dry) warm Mediterranean climate (Beecham 2001a, 2001b). The AVW02 subregion is further described as comprised of gently undulating rises to low hills with abrupt breakaways; its drainage is rejuvenated and comprises continuous stream channels that flow in most years. Residual lateritic uplands and derived sandplains are covered by areas of proteaceous scrub-heaths (which are rich in endemic species) and quaternary surfaces of erosional slopes and valley floors support woodlands of Wandoo, York gum, Jam and Casuarina (Beecham 2001a).

2.1.2. Climate

The survey area is in the IBRA Avon Wheatbelt bioregion, which is described as having a semi-arid (dry) and warm Mediterranean Climate (Beecham 2001a, 2001b). Based on the Bureau of Meteorology (BoM) Konnongorring weather station (station number 10076, climate data 1913-present), the area receives, on average, a total of 352.8 millimetres (mm) of rainfall per year, with most rainfall occurring during the winter months of June and July (63 mm and 63.4 mm respectively; BoM 2022; Table 2-1).

In the 12 months preceding the field survey in November 2021, the area received a total of 417.8 mm which is above the long-term average (BoM 2022; Table 2-1). In the three months preceding the field survey, a total of 96 mm of rainfall was recorded from the survey area, which is slightly above the long-term average for the same time period (92.1 mm).

Table 2-1: Rainfall data recorded at the Konnongorring weather station (#10076)

Rainfall (mm)	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Average rainfall (mm) 1913-present	13.1	11	15.4	15.1	19	19.9	45.4	63	63.4	46.9	26.5	18.7	352.8
Rainfall (mm) 2020-2021	22.6	0.8	1.6	35.8	72	12.4	46.8	26.8	103	42	18.2	35.8	417.8

2.1.3. Beard's (1975) Vegetation Mapping

Vegetation type and extent have been mapped at a regional scale by Beard (1975) who categorised vegetation into broad vegetation associations. Based on this mapping at a scale of 1:1,000,000, the Department of Primary Industries and Regional Development (previously Department of Agriculture and Food Western Australia) has compiled a list of vegetation extent and types across WA (Shepherd et al. 2002).

Two vegetation associations occur within the survey area, namely GAUNGAN_1024 and GAUNGAN_1049. GAUNGAN_1024 covers the majority of the survey area, with GAUNGAN_1049 occurring in the northern portion of the survey area. Details of these vegetation associations are given in Table 2-2.

Table 2-2: Beard's (1975) vegetation associations of the survey area (Government of Western Australia 2019)

Vegetation Association	Description	Area within the survey area	Percentage (%) of the survey area
GUANGAN_1049	Wheatbelt; York gum, salmon gum etc. Eucalyptus loxophleba, E. salmonophloia.	2.21	12.57
GUANGAN_1024	Wattle, casuarina and teatree. Acacia - Allocasuarina - Melaleuca alliance	15.37	87.43

2.1.4. Areas of Conservation Significance

Environmentally Sensitive Areas (ESAs) are defined in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 under s 51B of the State *Environmental Protection Act 1986* (EP Act). ESAs include areas declared as World Heritage, included on the Register of the National Estate, defined wetlands, and vegetation containing rare (Threatened) flora and Threatened Ecological Communities (TECs).

The Commonwealth EPBC Act and the State's BC Act provide for the statutory listing of TECs, either by the Australian Government's Environmental Minister or the Environment Minister of WA. Priority Ecological Communities (PECs) are biological flora or fauna communities that are recognised by the WA Minister for Environment to be of significance, but which do not meet the criteria for a TEC. There are five categories of PECs, none of which are currently protected under State or Federal legislation.

The *Eucalyptus Woodlands of the Western Australian Wheatbelt* (Wheatbelt Woodlands) TEC, listed as Critically Endangered (CR) under the Commonwealth EPBC Act and Priority 3 by DBCA, occurs throughout the Avon-Wheatbelt region in southwestern Western Australia, where the survey area is located. Some components of the Wheatbelt Woodlands TEC are assigned a higher priority rating by DBCA, such as the Priority 1 *Red Morrel Woodland of the Wheatbelt* and the Priority 1 *Brown mallet Eucalyptus astringens communities in the western Wheatbelt on alluvial flats*.

3. Methods

3.1. Desktop Assessment

3.1.1. Database Searches

The following Commonwealth and State databases were searched for existing data and information relating to conservation significant flora, fauna, and ecological communities in order to inform the field survey. Database searches undertaken for the survey area are provided in Table 3-1 below. Applied search areas given below are considered suitable based on flora and fauna assemblages expected to occur within the survey area. It should be noted that DBCA database search results radii are selected by the DBCA Technical Officer supplying the information.

Table 3-1: Database searches undertaken for the survey area

Database	Reference	Radius of search area (km)
EPBC Act Protected Matters Search Tool for Threatened species and communities listed under the EPBC Act	DAWE 2021b	10
DBCA and Western Australian Museum (WAM) NatureMap online database for flora and fauna	DBCA 2007-	20
DBCA Threatened and Priority Flora database search	DBCA 2022a	20
DBCA Threatened and Priority Fauna database search	DBCA 2022b	40
DBCA Threatened and Priority Ecological Communities database searches	DBCA 2022c	30

3.1.2. Likelihood of Occurrence Assessment

A likelihood of occurrence assessment was undertaken to identify conservation significant flora and fauna species that may occur within the survey area, identified from a review of key datasets and literature outlined in the above section. Conservation codes, categories and criteria for flora and fauna protected under the EPBC Act and the BC Act are provided in Appendix A. Criteria used for this assessment are presented in Appendix B. The flora likelihood assessment is provided in Appendix C and that for fauna in Appendix D.

3.2. Field Survey

3.2.1. Survey Team and Timing

A reconnaissance flora and vegetation survey, a basic vertebrate fauna survey and a targeted black cockatoo habitat assessment were undertaken over half a day on the 9 November 2021. An additional reconnaissance flora and vegetation survey, a basic vertebrate fauna survey and a targeted black cockatoo habitat assessment was undertaken over half a day on the 1 June 2022 for the additional survey area shown in Figure 1-1. The survey team's relevant qualifications, experience and licences are provided in Table 3-2 below.

Table 3-2: Survey team

Name	Qualification	Relevant experience	Licences
Daniel Brassington	BSc. Hons. Environmental Science	Daniel has more than 10 years' experience in botanical surveys and environmental services throughout Western Australia. This includes baseline vegetation studies, threatened and priority flora surveys, weed surveys, rehabilitation, and vegetation monitoring.	Flora scientific collection licence: SL012503 DRF permit: TFL 15-1920
Nicki Thompson	BSc. Zoology (Marine & Fisheries Biology) Hons.	Nicki has over 15 years' experience in environmental consulting, including experience with terrestrial vertebrate fauna surveys, black cockatoo habitat assessments, and environmental management and approvals.	N/A

3.2.2. Reconnaissance Flora and Vegetation Survey

A Reconnaissance flora and vegetation survey was conducted in accordance with the Environmental Protection Authority (EPA) *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016).

A total of eight relevés were established across the survey area (Figure 3-1). Dominant vegetation communities were described with respect to dominant species, structure, and overall condition. The following data was recorded within each relevé:

- Site details (site name, number, observer/s, date, and location);
- Broad vegetation type survey based on an assessment of the dominant flora species for the three traditional strata (upper, mid and ground) and mapping extent; and
- Vegetation condition in accordance with the Keighery (1994) vegetation condition scale, as provided in the EPA Technical Guidance (EPA 2016).

Suitable habitat of the survey area was searched to identify any conservation significant flora or communities potentially occurring, including:

- Threatened flora or TECs listed under the EPBC Act;
- Threatened (Declared Rare) flora listed under the latest Western Australia Wildlife Conservation (Rare Flora) Notice under the BC Act;
- PECs endorsed by the Western Australian Minister for the Environment; and
- Priority flora listed by DBCA.

In addition, any encountered Declared Pests listed under the State *Biosecurity and Agriculture Management Act 2007* (BAM Act) or Weeds of National Significance (WoNS) were recorded and mapped.

Survey methodology involved personnel walking meandering traverses across the survey area, with all relevant vegetation communities visited and traverse spacing dependent on factors including suitable habitat, disturbance (e.g. cleared areas) and landform. Locations of survey traverses are presented in

Figure 3-1 below and shown as tracklogs. Flora species able to be identified in the field were recorded, and specimens of unfamiliar species were collected for later identification. All collections were assigned a unique collecting number. For conservation significant flora species identified in the field, the following was recorded:

- A colour photograph;
- GPS location;
- Population size estimate;
- Location of population boundaries;
- Associated habitat/landscape element;
- Time and date observed;
- Observer details; and
- A specimen suitable for use as a reference specimen (where appropriate).

3.2.2.1. Flora Identification and Nomenclature

Flora specimen identification was undertaken by ELA Botanist Daniel Brassington. Species identification utilised taxonomic literature and keys, and where required, specimens were confirmed using the Western Australian Herbarium (WAH) collection. Where considered appropriate, specimens that meet WAH specimen lodgement requirements (e.g. Threatened and Priority Flora, range extensions) may be submitted along with Threatened and Priority Report forms to DBCA. Nomenclature used for the flora species within this report follows the WA Plant Census as available on *FloraBase* (WAH 1998-).

3.2.3. Basic Vertebrate Fauna Survey

The basic vertebrate fauna survey was conducted in accordance the EPA *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020). An assessment of fauna habitat in terms of its ability to support and sustain populations of fauna, along with an assessment of the likelihood of occurrence of conservation significant fauna species, was undertaken during the survey. The habitat characteristics and fauna database records used in assessing likelihood of occurrence for fauna included:

- Vegetation community, structure, and condition;
- Soil and landform type;
- Extent and connectivity of bushland;
- Fauna species habitat preferences;
- Proximity of conservation significant fauna records; and
- Signs of species presence.

Opportunistic recordings of fauna species were made at all times during the field survey. These included visual sightings of active fauna such as reptiles and birds; records of bird calls; and signs of species presence such as tracks, diggings, burrows, scats, and any other signs of fauna activity.

Nomenclature used for the vertebrate fauna species within this report follows the Western Australian Museum (WAM) Checklist of the Vertebrates of Western Australia (WAM 2022). Where common names were not stated for certain species, the following references were consulted:

- Amphibians and reptiles: Bush *et al*. (2010);

- Reptiles: Wilson and Swan (2013);
- Birds: Morcombe (2007); and
- Mammals: Menkhorst and Knight (2011).

3.2.4. Black Cockatoo Habitat Assessment

An assessment of black cockatoo habitat was undertaken in accordance with the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) *EPBC Act referral guidelines for three threatened black cockatoo species* (SEWPaC 2012). The survey area occurs within the modelled distribution of Carnaby's Cockatoo only (SEWPaC 2012; DotEE 2017), and so this species was the focus of the assessment.

The black cockatoo habitat assessment involved personnel walking meandering traverses across the survey area, assessing and mapping vegetation for its potential to provide suitable foraging, breeding, and roosting habitat suitable for black cockatoos. Field methodology for assessing each component (i.e. foraging, breeding and roosting habitat) is described below.

Foraging habitat

All vegetation present within the survey area was assessed for its ability to provide suitable foraging resources for Carnaby' Cockatoo, based on a compiled list of known food items (Groom et. al 2011, Johnstone et. al. 2011, Lee et. al. 2013, SEWPaC 2012). Primary and secondary foraging species for Carnaby's Cockatoo present within the survey area were recorded and mapped, and all vegetation present was assigned a quality rating (i.e. low, low to moderate, moderate, moderate to high and/or high) based upon a number of factors including: the foraging plant species present, the extent and density of those foraging species and the overall structure and condition of the vegetation/foraging habitat present (Appendix J). Primary foraging species are defined as those species which are known to provide a regular foraging resource for the birds and have been designated as being 'high' priority for planting by the Department of Environment and Conservation (now known as DBCA), whereas secondary food items are defined as those species that are only occasionally foraged upon, and which have been assigned as being a moderate to low priority for planting by DBCA (Groom 2011). In addition, the general context of the site (i.e., surrounding landscape, proximity of species records, proximity of known breeding or roosting sites and any evidence of use) was also taken into consideration when assigning a quality rating.

Direct observations of birds or indirect evidence of black cockatoo foraging (i.e., branch clippings and/or chewed Eucalyptus fruit and/or chewed Banksia cones) were also searched for to identify if the vegetation within the survey area has previously been or is currently being used by Carnaby's Cockatoo for feeding.

Potential breeding habitat

Potential breeding habitat is defined as trees of suitable species with a diameter at breast height [DBH], equal to or greater than 500 millimetres [mm] for most tree species [i.e., York Gum, Jarrah, Marri], or >300 mm DBH for Salmon Gum and Wandoo) and/or the presence of suitable nest hollows (i.e., vertical or near vertical hollow with an entrance diameter greater than 10 centimetres [cm]; SEWPaC 2012).

All potential breeding trees and potentially suitable nesting hollows were recorded. Suitable nesting hollows were visually assessed from the ground with binoculars. All potential breeding trees were

recorded and assigned a ranking, based on the criteria provided in Table 3-3. Signs of breeding such as chew marks around hollows or observations of birds inspecting hollows were also searched for and recorded.

Table 3-3: Potential breeding trees nest and/or hollow ranking

Rank	Description of tree nest and/or hollows
1	Active nest observed (adult bird seen entering or emerging from hollow, their eggs, fledglings, or other evidence of recent nesting activity present); known active nest (as described by Birdlife 2021, DBCA 2022).
2	Hollow of suitable size[1] and angle (i.e. near-vertical) observed with chew marks around entrance.
3	Potentially suitable hollow observed but no chew marks present.
4	Tree lacking suitable hollows or broken branches that might have large hollows, a tree with mainly intact branches and a spreading crown.

[1]ELA takes a precautionary approach and identifies potentially suitable hollows vertical or near vertical hollows with an entrance diameter over 10 cm.

Potential roosting habitat

Potential roosting habitat is defined as 'tall trees or group of tall trees' of a suitable tree species, often within or near to riparian environments or other natural or artificial water sources, and usually within 6 km of foraging habitat' (SEWPaC 2012; DotEE 2017). Groups of tall trees (i.e. estimated height over 5 m) or emergent trees were recorded and mapped as potential roosting habitat.

3.3. Limitations

The EPA *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016) and *Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) recommends including a discussion of the constraints and limitations of the survey methods used. Constraints and limitations of the Reconnaissance and Targeted flora and vegetation survey, the Basic fauna survey and black cockatoo habitat assessment are summarised in Table 3-4 below.

Table 3-4: Survey Limitations

Potential survey limitation	Impact on survey
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	**Not a constraint**. Previous reports for the region were provided where applicable. Broad-scale vegetation mapping at a scale of 1:1,000,000 was available. Land system mapping at a scale of 1:2,000,000 and soil and landform mapping was also available. Available information was sufficient to provide context at varying scales and therefore were not considered a limitation.
Scope (i.e. what life forms, etc., were sampled).	**Not a constraint**. The survey requirement of a reconnaissance flora and vegetation survey, a basic vertebrate fauna survey and black cockatoo habitat assessment in accordance with relevant State and Federal legislation and EPA guidance documents was adequately met.
Proportion of flora collected and identified (based on sampling, timing, and intensity).	**Not a constraint**. A Reconnaissance level survey records the dominant and abundant species, with little requirement for a comprehensive account of species richness. Data recorded was sufficient for this level of survey.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	**Not a constraint**. The survey area was fully covered to meet requirements of a Reconnaissance level flora and vegetation survey, as outlined in the scope of work.

Potential survey limitation	Impact on survey
Mapping reliability.	**Not a constraint**. Coverage of the survey area was considered to be good. Due to the nature of vegetation and the small size of the survey area, mapping boundaries of individual communities were discrete, and thus are considered accurate.
Timing, weather, season, cycle.	**Not a constraint**. The field survey was undertaken late in the spring season, as specified by the EPA *Technical Guidance*: *Flora and Vegetation Surveys for Environmental Impact Assessment* (2016), with rainfall in the three months prior to the survey above the long-term average for the same time period, allowing for good flowering and fruiting of perennial species and with good remaining annual species presence. The additional area survey was undertaken out-of-season, but this did not limit the ability to identify perennial taxa present within the additional area.
Disturbances (fire, flood, accidental human intervention, etc.).	**Not a constraint**: Disturbances within the survey area included fragmentation as a result of agricultural and transport infrastructure, with historical clearing in portions of the survey area, and weeds dominating the understory. Disturbances did not impact the ability to undertake the level of survey required.
Intensity (in retrospect, was the intensity adequate).	**Not a constraint**. The survey effort was adequately met for a Reconnaissance and level flora and vegetation survey and a basic fauna survey and black cockatoo habitat assessment.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a constraint**. The number of personnel conducting this field survey in the given time were adequate to undertake the required level of survey. Additional resources, including equipment available, additional support and personnel were adequate.
Access problems (i.e. ability to access survey area).	**Not a constraint**. All relevant areas within the survey area were able to be accessed and surveyed.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	**Not a constraint**. The personnel conducting this field survey were both suitably qualified to identify specimens, having multiple years of field experience and previously undertaken flora and fauna surveys across Western Australia.

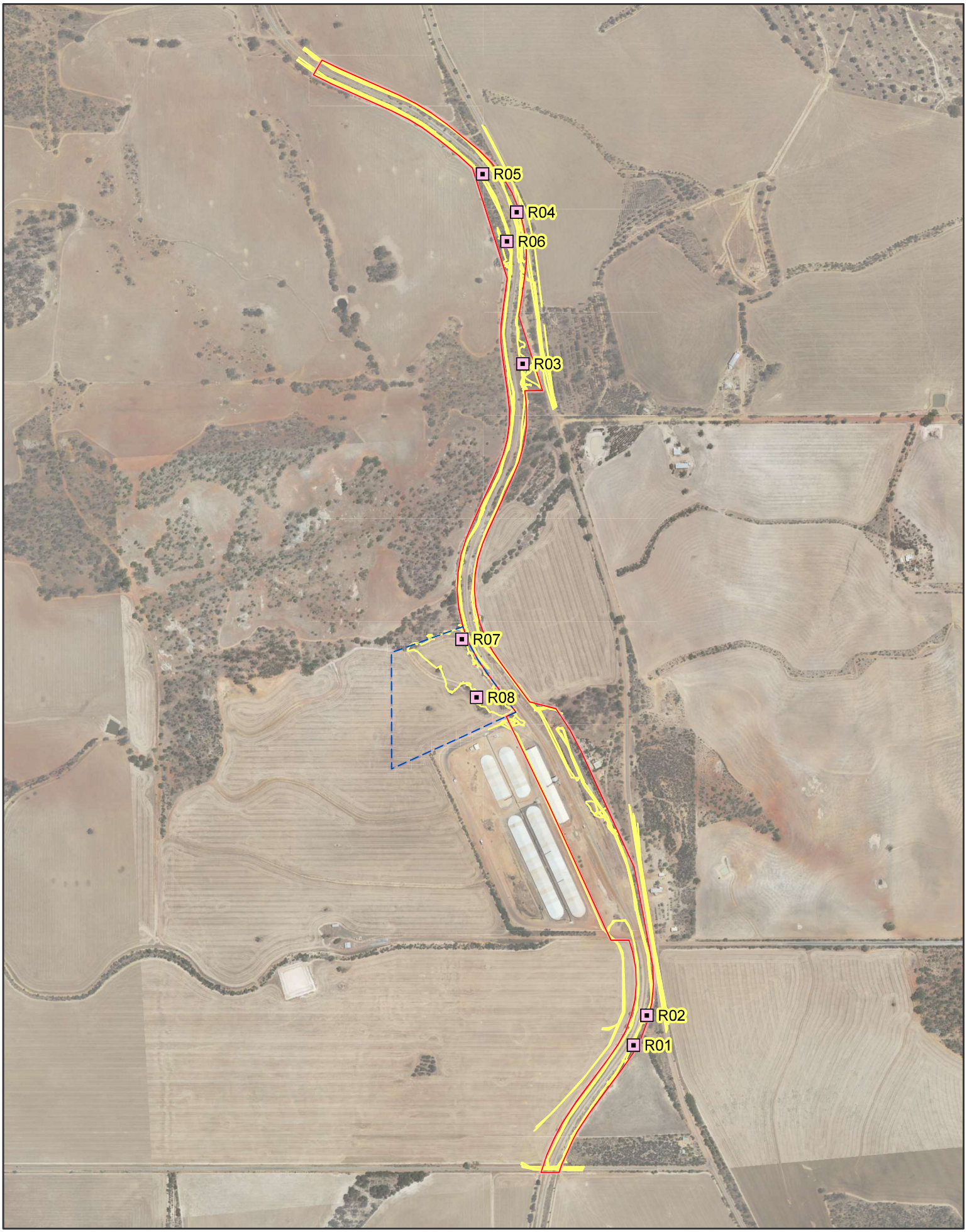

Figure 3-1: Survey effort

Konnongorring original survey area
Additional Variation 1 survey area
Relevé
GPS traverse

N

0 100 200 400
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

22PER2759-RD Date: 4/07/2022

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4. Results

4.1. Desktop Assessment

4.1.1. Conservation significant flora

An initial 88 conservation significant flora species were identified by the database searches undertaken in Section 3.1.1 as occurring or possibly occurring within the survey area and buffer. These 88 species comprise 31 taxa listed under the EPBC Act and/or BC Act as Threatened flora and the remaining 57 taxa listed as Priority flora by DBCA. Utilising the likelihood of occurrence criteria outlined in Appendix B prior to the field survey, no species were known to occur within the survey area, three species were assessed as likely to occur, 59 species as potentially occurring, 24 species as unlikely to occur and two species do not occur within the survey area (Appendix C).

4.1.2. Conservation significant fauna

Database searches identified 31 conservation significant fauna species as having the possibility of occurring within the survey area (Appendix D). These species consisted of 17 birds, eight mammals, two reptiles and four invertebrates, of which 22 are listed under the EPBC Act and/or BC Act as Threatened and/or Migratory fauna and eight species are listed as Priority fauna by DBCA (Appendix D).

One species has historically been recorded within the survey area in 2002: the Australian Painted Snipe (*Rostratula australis*) which is listed as Endangered under the EPBC Act and BC Act (DBCA 2022b; Appendix D).

4.1.3. Conservation significant communities

The database searches did not record any known conservation significant communities occurring within the survey area. One TEC, the *Eucalyptus Woodlands of the Western Australian Wheatbelt*, was identified by the database searches as occurring in two patches within 2 km west of the survey area (DBCA 2022c), with the survey area considered likely to contain the Wheatbelt Woodlands TEC (DAWE 2021b). Over 1000 patches of the Wheatbelt Woodlands TEC have been recorded within the 30 km search radius buffer.

A single instance of the *Perched Wetlands of the Wheatbelt region with extensive stands of living sheoak and paperbark across the lake floor (Toolibin Lake)* TEC, Listed Endangered under the EPBC Act and Critically Endangered by DBCA, was located between 27 km and 37 km to the south east of the survey area.

4.2. Flora and Vegetation

4.2.1. Flora overview

A total of 80 flora species, representing 29 families and 56 genera were recorded from a combination of eight relevés and opportunistic collections. Families with the highest number of species recorded were Fabaceae (ten species), Myrtaceae (nine species) and Poaceae (14 species). *Eucalyptus* and *Acacia* were the best represented genera with six species each. A high proportion (23.75%) of the flora taxa recorded during the field survey were introduced (weed) species (19 taxa). A full species list is provided in

Appendix E, details of the relevés are presented in Appendix F and the flora species matrix is presented in Appendix G.

4.2.2. Conservation significant flora

No Threatened flora species listed under the EPBC Act or the BC Act or listed by DBCA were recorded within the survey area during the field survey. No Priority species as listed by DBCA were recorded during the field survey within the survey area.

Utilising the likelihood of occurrence criteria outlined in Appendix B after the field survey was conducted, no Threatened or Priority flora species were known to occur within the survey area, one species was assessed as likely to occur (priority three taxon *Guichenotia impudica*), 32 species as potentially occurring, 53 species as unlikely to occur and two species as 'does not occur' within the survey area (Appendix C).

4.2.3. Introduced flora

A total of 19 introduced (weed) flora species were recorded in the survey area. All 19 are listed s11 (permitted) species and none of these species is a listed WoNS or Declared Pest (s22(2)) under the BAM Act (Western Australian Organism List [WAOL]). The s11 (permitted) species category on the WAOL database indicates that no specific management of these species is required. The full list of introduced species is included within Appendix E.

4.2.4. Vegetation communities

A total of seven vegetation communities, comprising three eucalypt woodland communities (EW1, EW2 and EW3), two shrublands communities (S1 and S2) and two broad types of planted tree-lines (PT1 and PT2), were described and mapped within the survey area (Table 4-2, Figure 4-1), covering a total of 6.01 ha or 25.65% of the survey area. The most widespread communities were York gum – Jam Woodland (EW2, 1.29 ha) and the two shrublands communities Mixed Shrubland (S1, 1.25 ha) and Jam Shrubland (S2, 1.27 ha), each of which covered approximately 5.33% to 5.54% of the survey area. Cleared areas, including roads, tracks, and pasture, covered the majority (17.43 ha, 74.35%) of the survey area. Lists of the species present in each community is available in Appendix G.

4.2.4.1. Conservation significant ecological communities

Three vegetation communities delineated within the survey area comprise eucalypt woodlands that have the potential to represent floristic and structural aspects of the Wheatbelt Woodlands TEC, as indicated in the Department of the Environment and Energy (DotEE; now Department of Climate Change, Energy, the Environment and Water [DCCEEW]) Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt (Approved Conservation Advice; DotEE 2015). This TEC is listed under the EPBC Act as Critically Endangered (CE) and categorised as a Priority 3 PEC by DBCA.

In summary, the Wheatbelt Woodlands TEC is composed of eucalypt-dominated woodlands in the Western Australian Wheatbelt region as defined by the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions, with the specific exceptions of woodlands and forests dominated by Jarrah (*Eucalyptus marginata*) or Marri (*Corymbia calophylla*) where they occur without York Gum (*Eucalyptus loxophleba*) present; and non-woodland communities dominated by eucalypts, specifically those dominated by eucalypts with a mallee growth form. The community is defined primarily by its structure

as a woodland. The presence in the canopy layer of eucalypt trees – most commonly Salmon Gum (*E. salmonophloia*), York Gum (*E. loxophleba*), Red Morrel (*E. longicornis*) or Gimlet (*E. salubris*) defines the Wheatbelt woodlands. Several of the other emergent eucalypt species which may be present as a defining species (e.g. Kondinin Blackbutt [*E. kondininensis*], *E. myriadena*, Salt River Gum [*E. sargentii*], Silver Mallet [*E. ornata*] and Mallet [*E. singularis*]) are found only in the Western Australian Wheatbelt.

An assessment, presented in Appendix H, has been undertaken utilising key diagnostic characteristics of the Wheatbelt Woodlands TEC (DoE 2015). This key diagnostic assessment concluded that 2.45 ha of vegetation (portions of vegetation communities EW1, EW2 and EW3) delineated within the survey area is characterised as representing the Wheatbelt Woodlands TEC (and subsequently, the associated State listed PEC) in three categories, as listed in Table 4-1 and mapped in Figure 4-2.

Table 4-1: Wheatbelt Woodlands TEC within the survey area.

TEC Category	EW1	EW2	EW3	Total Area
Category A	0.5 ha	Nil	Nil	0.5 ha
Category B	0.1 ha	0.38 ha	Nil	0.48 ha
Category D	0.11 ha	0.91 ha	0.45 ha	1.47 ha

It is noted that conclusions relating to the presence of this TEC within the survey area are based on results from a Reconnaissance level survey. Given the limitations of such a survey (e.g. relevé data etc.) further work may be required to determine presence/absence with a greater degree of certainty (e.g. single season detailed flora and vegetation survey utilising quadrat data).

4.2.5. Vegetation condition

Vegetation of the survey area ranged from Very Good to Completely Degraded condition, based on the Keighery (1994) vegetation condition scale provided in EPA (2016) (Figure 4-3).

The majority of the survey area was classed as Completely Degraded (17.52 ha; 74.74%), with the remaining condition categories being: Degraded (3.0 ha; 12.80%), Good (1.55 ha; 6.61%) and Very Good (1.37 ha; 5.84%).

Primary disturbances within the survey area included historical clearing for infrastructure such as the rail corridor and rail access tracks, the presence of introduced (weed) species, vehicle tracks and bituminised parking or laydown areas. In the additional area, the primary disturbance is from agricultural clearing, with the majority of the area cleared for cropping and grazing purposes.

Several vegetation communities were assessed as containing multiple condition categories. Shrublands community S1 (Table 4-2) was recorded in Good to Very Good condition in the north of the survey area, while it was recorded in Good to Degraded condition in the south of the survey area where it had either regrown over time in previously cleared areas or was remnant strips of shrubland in otherwise cleared areas (Figure 4-3). Similarly, the York gum – Jam Woodland EW2 (Table 4-2) was recorded in Good condition where components of the understory were present, or in Degraded condition where the community lacked native understory or existed as narrow strips of York gum trees and Jam shrubs over pasture grasses between parallel tracks, rail infrastructure and agricultural paddocks. One community,

the PT2 Pine Tree-line comprised entirely of introduced (weedy) species and a single planted native species and was therefore assessed as being in Completely Degraded condition.

Table 4-2: Vegetation communities recorded within the survey area

Photo	Vegetation community code	Description	Relevé/s	Total area (ha)	% of survey area
	EW1	Salmon gum – York gum Woodland *Eucalyptus salmonophloia* and *E. loxophleba* Woodland (25% PFC) over *Santalum acuminatum* very open tall shrubland, over *Scaevola spinescens*, *Rhagodia preissii*, *Austrostipa elegantissima* and *Melaleuca marginata* mid shrubland, over *Mesembryanthemum nodiflorum* and *Sclerolaena diacantha* very open low herb land. In degraded areas the understory component is lacking.	R06	0.73	3.11
	EW2	York gum – Jam Woodland *Eucalyptus loxophleba* open woodland (10% PFC) over *Acacia acuminata* shrubland over *Avena barbata* grassland. Other native species present include several *Ptilotus* species, *Austrostipa elegantissima, Dianella revoluta, Enchylaena tomentosa, Grevillea biternata, Rhagodia preissii* and *Stylobasium australe*.	R03	1.29	5.54
	EW3	Wandoo Woodland *Eucalyptus wandoo* open woodland over *Allocasuarina campestris*, *Acacia assimilis* and *Santalum acuminatum* isolated tall shrubs over *Rytidosperma caespitosum* and *Lepidosperma tenue* very open grass/sedgeland with weedy annual species *Arctotheca calendula* and assorted introduced grasses becoming dominant part of the year. Other species present include *Austrostipa elegantissima*, *Maireana brevifolia*, *Dianella revoluta*, *Lomandra effusa*, *Ptilotus exaltatus* and *Mesembryanthemum nodiflorum*.	R07, R08	0.73	3.11

Photo	Vegetation community code	Description	Relevé/s	Total area (ha)	% of survey area
	S1	Mixed Shrubland Very open tall shrubland with variable components including *Acacia acuminata, Grevillea petrophiloides, Allocasuarina campestris* and *Acacia assimilis*, over *Grevillea biternata*, *Gastrolobium obovatum* and *Austrostipa elegantissima* mid shrubland, over *Neurachne alopecuroidea*, *Dampiera lavandulacea, Opercularia vaginata* and *Monachather paradoxus* low open shrubland/ grassland. PFC is usually between 40% to 60% total foliar cover.	R02, R04, R05	1.25	5.33
	S2	Jam Shrubland *Acacia acuminata* (Jam) very open tall shrubland to tall shrubland over pasture grasses. In some areas a very open low to mid shrub stratum with *Grevillea biternata, Ericomyrtus serpyllifolia* and *Neurachne alopecuroidea* may be present. PFC of Jam is generally between 5% and 30% foliar cover	N/A	1.27	5.42
	PT1	Eucalypt Tree-lines *Eucalyptus torquata* and *E. loxophleba* planted lines of trees over *Acacia microbotrya* and *Acacia* species planted lines of shrubs. Other *Eucalyptus* species, including *E. camaldulensis* are present in some areas.	R01	0.65	2.77

Photo	Vegetation community code	Description	Relevé/s	Total area (ha)	% of survey area
	PT2	Pine Tree-line *Pinus pinaster* planted line of trees over *Chamaecytisus palmensis* and *Acacia microbotrya* tall shrubs.	N/A	0.09	0.38
Total vegetation communities				**6.01**	**25.65**
Cleared (roads, tracks, pasture)			NA	17.43	74.35
Total				**23.44**	**100**

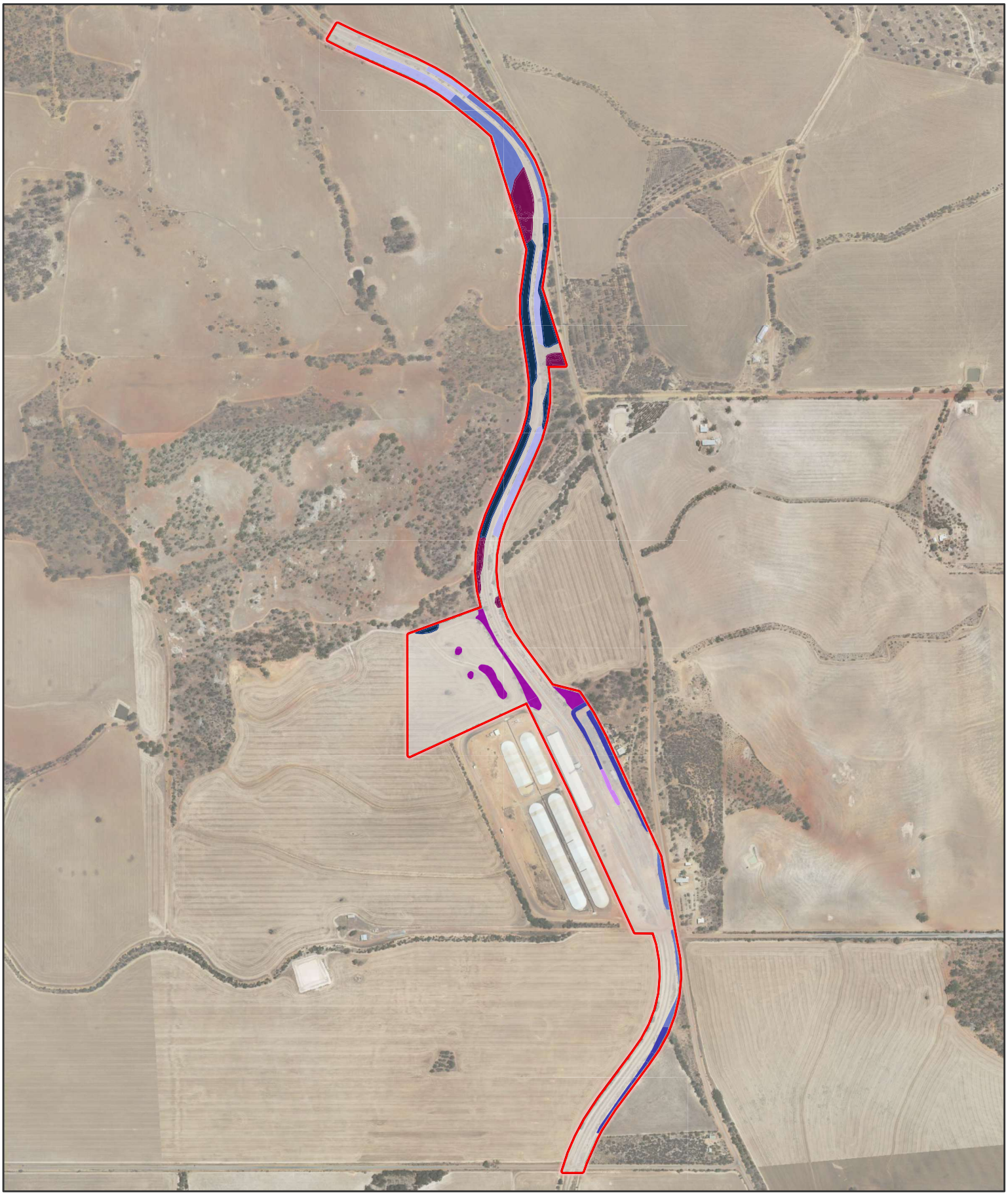

Figure 4-1: Vegetation communities within the survey area

Combined survey area
Cleared

Vegetation communities

- EW1: Salmon gum – York gum Woodland
- EW2: York gum – Jam Woodland
- EW3: Wandoo Woodland
- PT1: Eucalypt Tree-line
- PT2: Pine Tree-line
- S1: Mixed Shrubland
- S2: Jam Shrubland

0 100 200 400
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

22PER2759-RD Date: 4/07/2022

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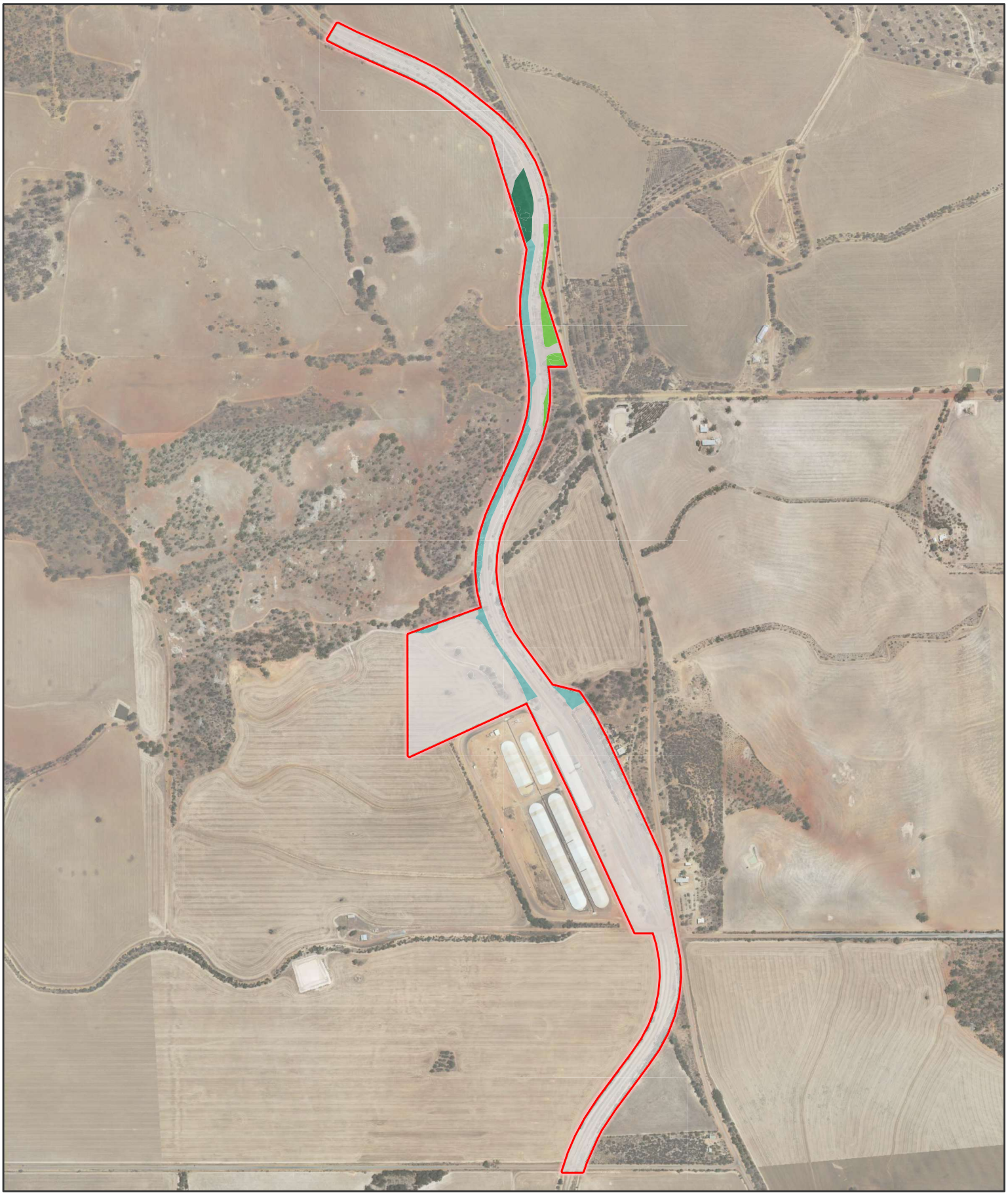

Figure 4-2: Conservation significant ecological communities mapped within the survey area

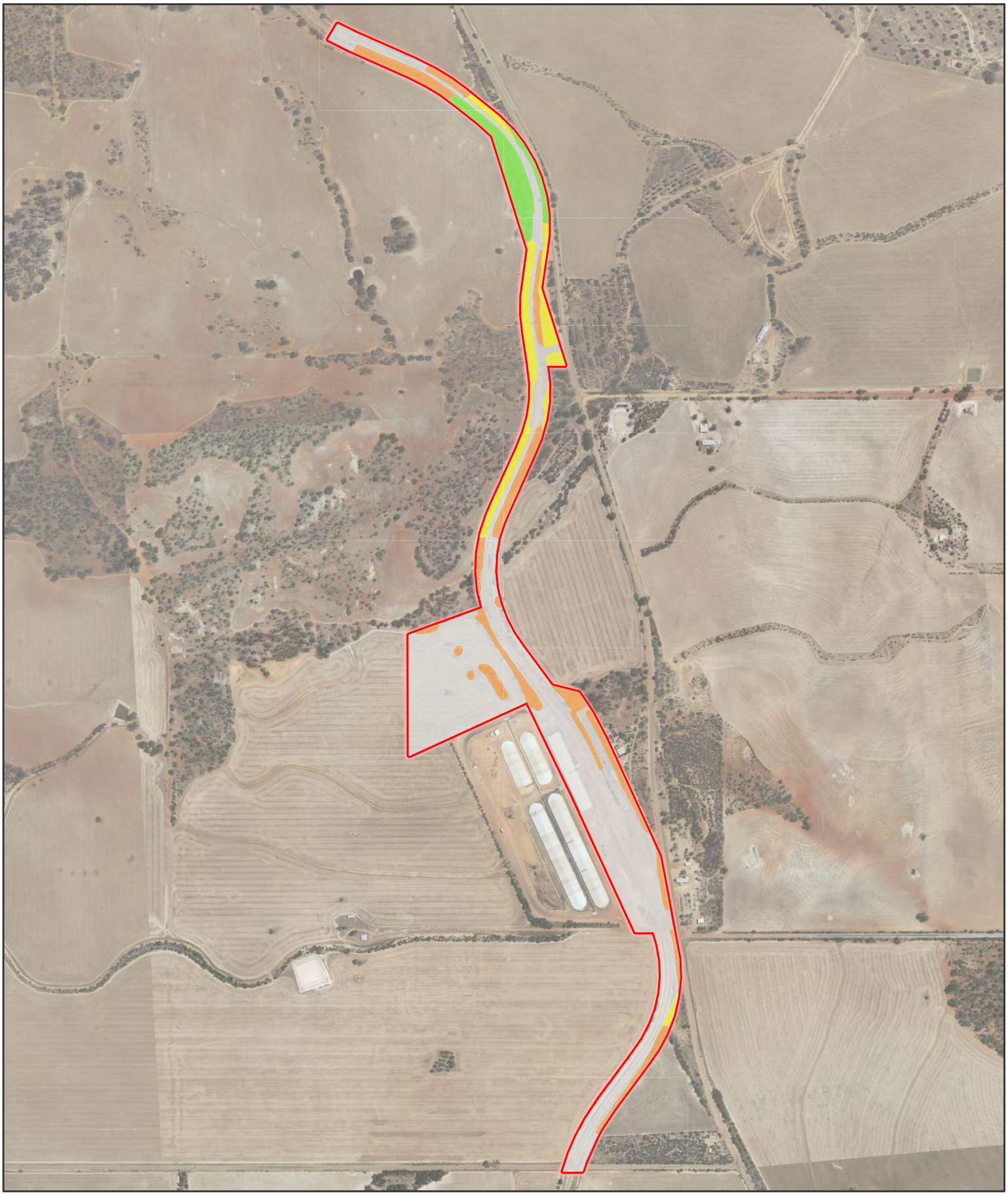

Figure 4-3: Vegetation condition within the survey area

Survey area

Vegetation condition

- Very Good
- Good
- Degraded
- Completely Degraded

0 100 200 400

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

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4.3. Fauna

4.3.1. Fauna overview

A total of 22 vertebrate fauna species were recorded within the survey area, comprising 20 birds, one mammal and one reptile (Appendix I). No direct observations or indirect evidence (secondary signs) of Threatened or Migratory fauna species listed under the EPBC Act or the BC Act, or species listed as Priority by DBCA were recorded within the survey area.

Of the 31 conservation significant fauna species identified as possibly occurring from the database searches (Appendix D), one species is considered to have the potential to occur: Carnaby's Cockatoo (*Calyptorhynchus latirostris*) which is listed as Endangered under the EPBC Act and BC Act (Appendix D; refer to Section 4.3.3)

The remaining 30 species are considered unlikely to occur or do not occur, based on a lack of suitable habitat and lack of nearby records or due to the species being locally extinct (Appendix D).

4.3.2. Fauna habitat

Seven fauna habitats were recorded within the survey area, covering a total of 6.01 ha (25.64%). The majority of the survey area is cleared (17.43 ha; 74.36%), comprising roads, tracks, rail alignments and pasture. The fauna habitats within the survey area are detailed in Table 4-3 and displayed in Figure 4-4.

Table 4-3: Fauna habitat within the survey area

Description	Total area (ha)	Proportion of the survey area (%)
Salmon Gum woodland Woodland comprising Salmon Gum and York Gum, with or without an understorey.	0.73	3.11
York Gum Woodland Open York Gum Woodland with Acacia, and a grassy understorey.	1.29	5.50
Wandoo Woodland Woodland comprised of Wandoo over isolated shrubs and a grassy understory.	0.47	2.01
Mixed Shrubland Tall open shrubland with a low to mid shrubland understorey.	1.25	5.33
Scattered trees and shrubs Scattered trees or shrubs mostly comprising *Acacia acuminata*, over grasses or with an open low to mid shrub stratum.	1.27	5.42
Isolated trees Isolated trees such as Salmon Gum, Wandoo or *E. camaldulensis*.	0.26	1.11
Planted tree lines Planted lines of Eucalyptus tree species or pines.	0.74	3.16

Description	Total area (ha)	Proportion of the survey area (%)
Total fauna habitats	**6.01**	**25.64**
Cleared areas (roads, tracks, rail, pasture)	17.43	74.36
Total	**23.44**	**100.0**

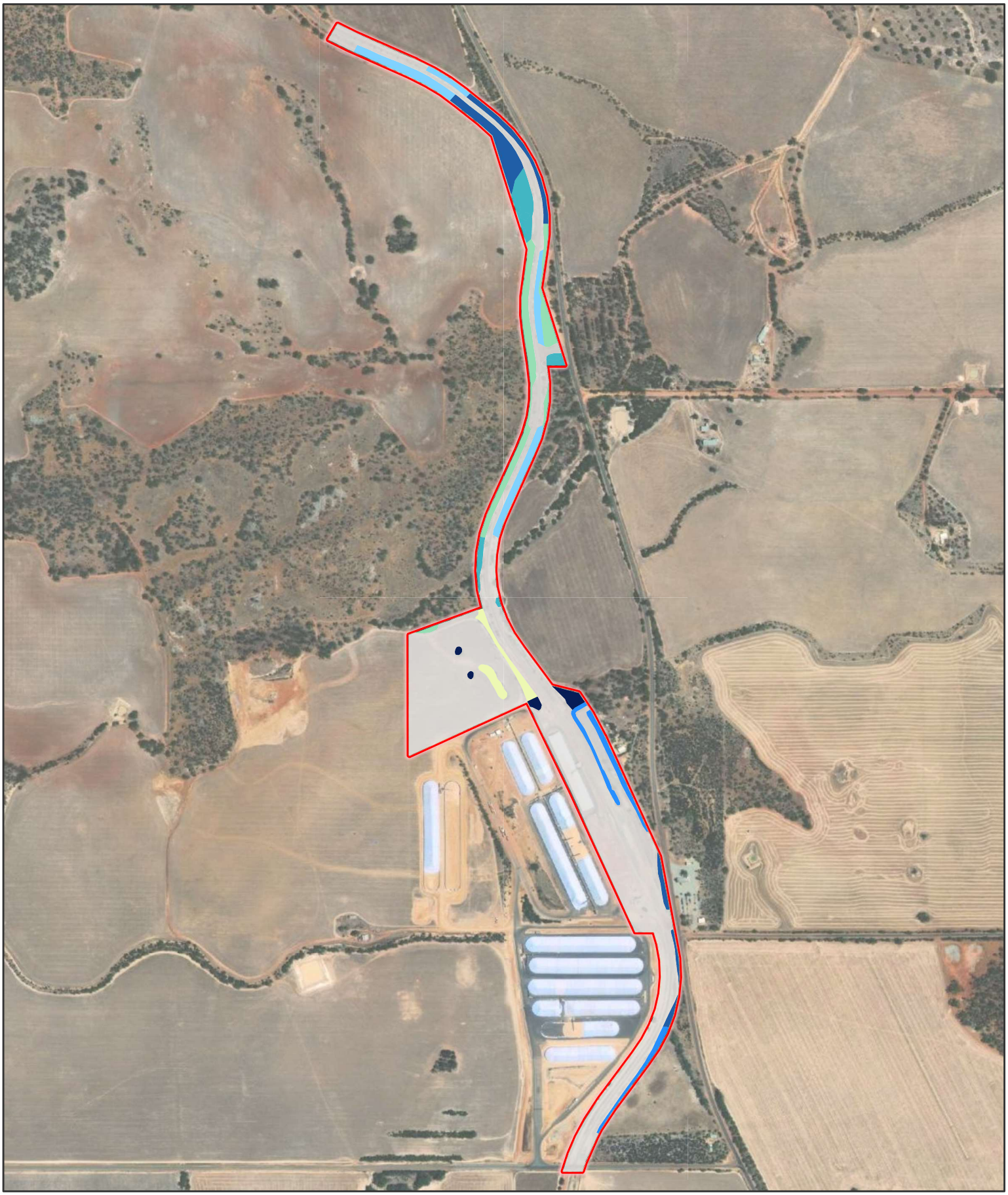

Figure 4-4: Fauna habitat recorded within the survey area

4.3.3. Black Cockatoo Habitat Assessment

4.3.3.1. Foraging Habitat

During the survey, a total of eight suitable foraging plant species for Carnaby's Cockatoo were recorded. This included primary food items such as Salmon Gum and Wandoo, and secondary food items such as York Gum and *Grevillea petrophiloides* (Table 4-4).

Table 4-4: Foraging plant species recorded in the survey area

Species name	Common name	Food item	Primary or secondary food source
Acacia saligna	Orange Wattle	Grubs	Secondary
Allocasuarina campestris	Shrubby She-oak	Seeds or grubs	Secondary
Eucalyptus loxophleba	York Gum	Seeds and flowers	Secondary
Eucalyptus salmonophloia	Salmon Gum	Seeds	Primary
Eucalyptus wandoo	Wandoo	Seeds and flowers	Primary
Grevillea petrophiloides	Pink Poker	Not specified	Secondary
Pinus pinaster	Maritime Pine	Seeds	Primary
Raphanus raphanistrum	Wild Radish	Seeds	Secondary

A total of 6.01 ha of suitable foraging habitat for Carnaby's Cockatoo was mapped within the survey area (Table 4-5; Figure 4-5). This includes a total of 0.09 ha (0.38%) of low to moderate quality foraging habitat, which comprises of planted lines of pine trees or patches of Salmon Gum Woodland with 10-20% PFC; a total of 1.67 ha (7.12%) of low quality foraging habitat, which comprises of Salmon Gum Woodland at 2-10% PFC, York Gum Woodland at 10-20% PFC and Wandoo Woodland; and a total of 4.25 ha (18.13%) of negligible to low quality foraging habitat which comprised of occasional or scattered foraging species such as *Grevillea* sp., *Acacia saligna* or York Gum, with <10% PFC (Table 4-5). The remaining survey area comprised no suitable foraging habitat for Carnaby's Cockatoo and has been mapped as Nil (Table 4-5 and Figure 4-5).

No evidence of foraging by Carnaby's Cockatoos was observed during the field survey.

Table 4-5: Definition and extent of black cockatoo foraging habitat within the survey area

Quality	Criteria	Extent (ha) within survey area	% of survey area
Low to moderate	Low to Moderate foraging value including: • Primary food sources (i.e. shrubby banksias, woodlands with banksias, marri or jarrah, Eucalypt Woodland/Mallee of small-fruited species) present at 5-20% projected foliage cover; • Secondary food sources (i.e. Woodlands with secondary food items such as Peppermint, Tuart, York gum, Wattles, being dominant) present at 20-40% projected foliage; and • Vegetation may be in Degraded or Good condition.	0.09	0.38
Low	Low foraging value including:	1.67	7.12

Quality	Criteria	Extent (ha) within survey area	% of survey area
	• Primary food sources (i.e. shrubby banksias, marri or jarrah trees or open woodland, open Eucalypt Woodland/Mallee of small-fruited species) present at 2-5%; • Secondary food sources (i.e. Woodlands with secondary food items such as Peppermint, Tuart, York gum, Wattles being dominant.) present at 10-20% projected foliage cover; • Vegetation in Degraded condition; • Short-term and/or seasonal food sources such as paddocks with melons or other known food-source weeds (e.g. Erodium spp.).		
Negligible to low	Negligible to low foraging value including: • Primary food sources at < 2% PFC, or secondary food sources at <10% PFC. This could include urban areas or cleared paddocks with scattered foraging trees; • Vegetation in Degraded or lower condition; • Short-term and/or seasonal food sources such as paddocks partly vegetated with melons or weeds (e.g. *Erodium* spp.).	4.25	18.13
Total foraging habitat		6.01	25.64
Nil	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g. salt lakes, dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes; • Grassy paddocks.	17.43	74.36
Total area		**23.44**	**100**

4.3.3.2. Breeding and roosting habitat

A total of 30 potential breeding trees (0.2 ha) were recorded during the survey (Figure 4-5; Appendix K). Potential breeding tree species included Salmon Gum (12 trees), York Gum (two trees), *Eucalyptus camaldulensis* (five trees) and Wandoo (11 trees) with a DBH equal to or greater than 500 mm (or 300 mm for Salmon Gum and Wandoo). None of the potential breeding trees contained hollows potentially suitable for nesting (i.e. vertical or near vertical, with a minimum 10 cm diameter opening), with all trees being classed as rank 4 (Table 4-6).

The majority of the potential breeding trees recorded also represent potential roosting habitat, as they generally comprised of groups of trees over 5 m in height, or emergent trees (Figure 4-5; SEWPaC 2012). A total of 1.3 ha of roosting habitat was mapped within the survey area, which includes Salmon Gum, *Eucalyptus camaldulensis,* York Gum, Wandoo, and the lines of planted pine trees (Figure 4-6).

Table 4-6: Potential breeding trees recorded

Tree species	Number	Rank
Salmon Gum	12	4
York Gum	2	4
Eucalyptus camaldulensis	5	4
Wandoo	11	4

Tree species	Number	Rank
Total	**30**	

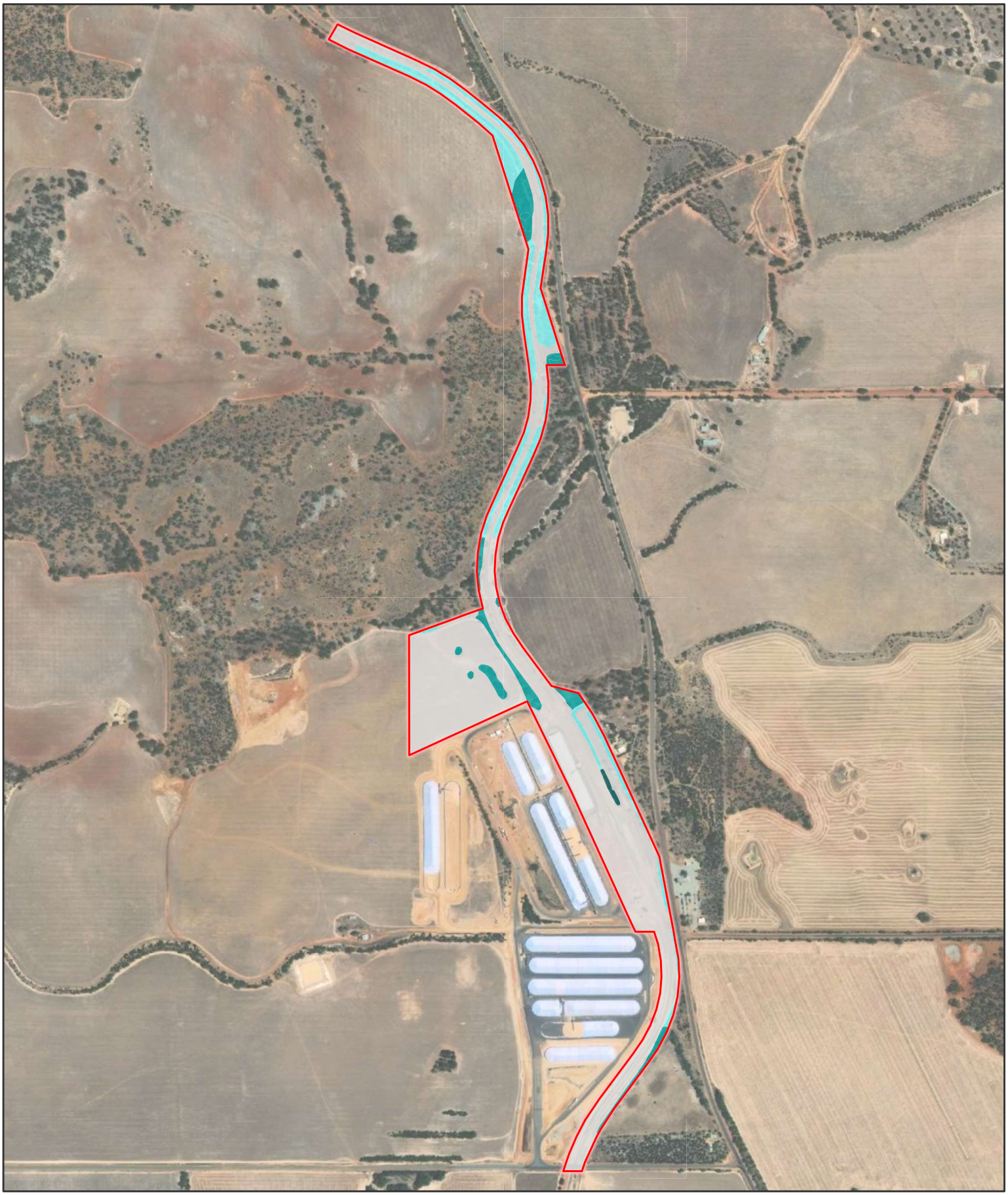

Figure 4-5: Carnaby's Cockatoo foraging habitat within the survey area

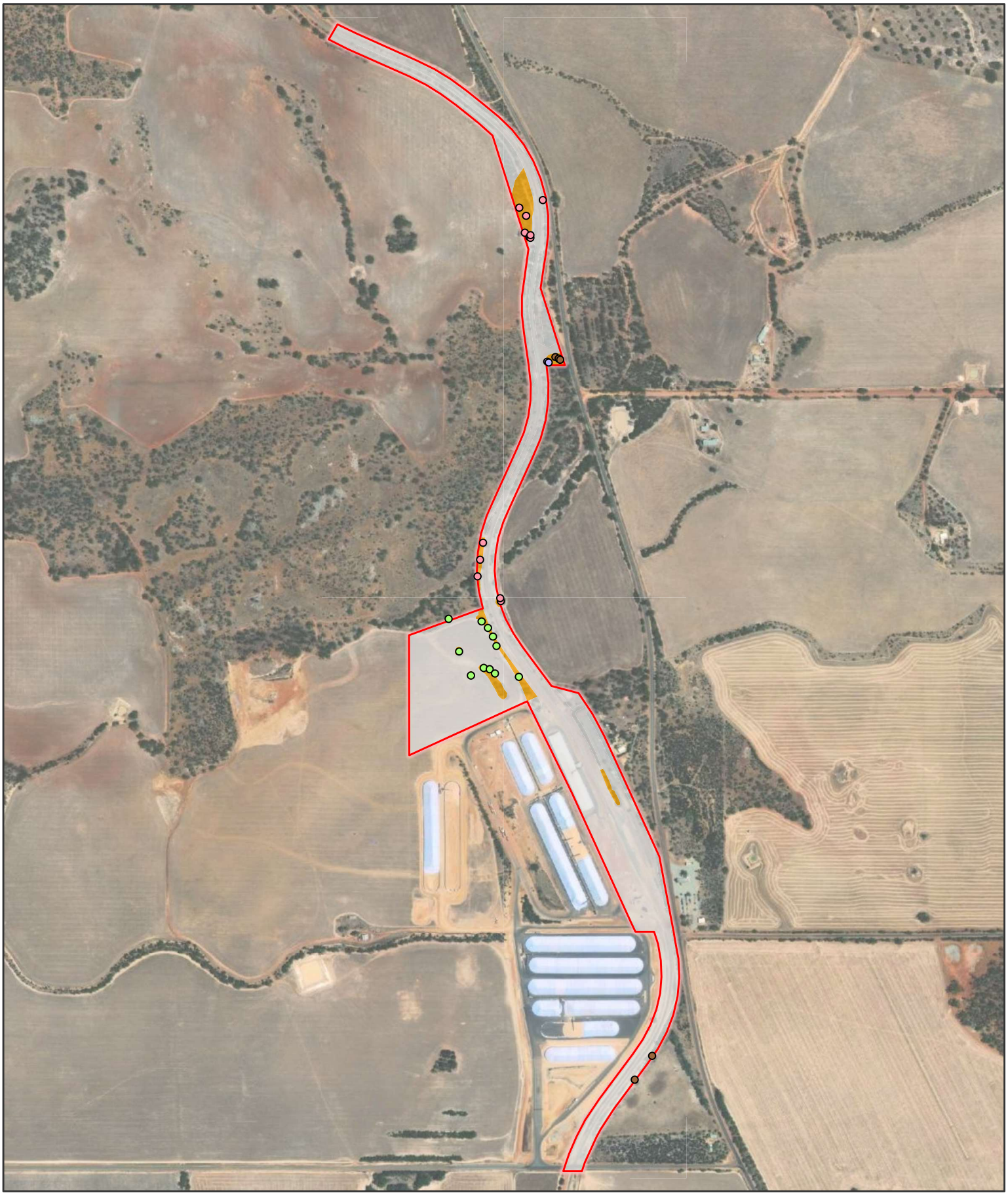

Figure 4-6: Carnaby's Cockatoo roosting and potential breeding habitat within the survey area

Survey area

Roosting habitat

Roosting

Non-roosting

Potential breeding trees

- River red gum (*Eucalyptus camaldulensis*)
- York gum (*Eucalyptus loxophleba*)
- Salmon gum (*Eucalyptus salmonophloia*)
- Wandoo gum (*Eucalyptus wandoo*)

0 100 200 400

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

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5. Discussion and Recommendations

5.1. Flora

The flora likelihood of occurrence assessment conducted in Appendix C determined that the most likely vegetation communities to contain threatened or priority flora were the S1 mixed shrublands, EW1 and EW2 communities. Each of these communities potentially provide suitable habitat for multiple conservation significant flora species. Communities EW3 and S2 were also found to comprise marginal habitat for several significant flora species possibly occurring within the survey area. It is recommended that a more detailed targeted survey for threatened and priority flora be conducted within the vegetation communities EW1, EW2, EW3, S1 and S2 to determine the presence/absence of significant flora within these areas.

5.2. Vegetation

The *Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt* (DotEE, 2015) does not mention rail corridors as synonymous with road corridors, but it comments on roads as linear infrastructure, allowing for the possibility of treating rail corridors in a similar fashion. This has relevance to the patch of Category A Wheatbelt Woodlands TEC represented by the northern-most EW1 community (Figure 4-1, Figure 4-2) as if treated as a non-roadside patch then the 0.5 ha community is below the minimum 2 ha patch size, although it is continuous with the large patch of EW2 to the south, which was assessed to be Category D Wheatbelt Woodlands TEC. If taken as roadside vegetation due to the linear nature of the rail corridor then the patch size is required to be a minimum of five meters in width, which the patch exceeds. Regardless of the specific category, this patch meets requirements to be included in the Wheatbelt Woodlands TEC due to the connection with EW2 vegetation along the rail corridor. A precautionary approach has been taken in this report and hence a Category A rating was assigned to the patch.

5.3. Fauna

A total of 22 vertebrate fauna species were recorded within the survey area, comprising 20 birds, one mammal and one reptile. Results are comparable to other surveys of a similar nature and size, such as the CBH Corrigin Grain Receival Site Expansion, where 23 vertebrate fauna species were recorded (19 birds, three mammals and one reptile; ELA 2021).

The majority of the survey area was cleared and devoid of any fauna habitat values (i.e. 17.43 ha; 74.36%). However, seven broad fauna habitat types were mapped during the survey including Salmon Gum woodland, York Gum Woodland, Wandoo Woodland, Mixed Shrubland, Scattered trees and shrubs, Isolated trees, and Planted tree lines. All mapped fauna habitats were somewhat degraded by historical clearing, the presence of weeds and vehicle tracks; however, the woodland and shrubland habitats provide at least moderate value to fauna, as they provide refuge and shelter in an otherwise cleared and fragmented landscape. These habitats also provide some habitat features for conservation significant fauna species such as Carnaby's Cockatoo, which is considered to potentially occur. No other Threatened or Priority fauna species listed under the EPBC Act, the BC Act, or by DBCA are considered as likely or to potentially occur, and no evidence of these species was recorded during the survey.

For Carnaby's Cockatoo, a total of 6.01 ha of suitable foraging habitat was recorded within the survey area; however, the majority of this is negligible to low quality (i.e. 4.25 ha or 18.13%), as it comprised of scattered or occasional primary or secondary foraging species such as the occasional Salmon Gum, *Grevillea* sp., or York Gum. The planted line of pine trees is considered to represent the highest quality foraging habitat present within the survey area. Pine trees represent an important foraging resource for Carnaby's Cockatoo (Valentine and Stock 2008); however, given that only four or five pine trees were present within the survey area, the quality was assigned as low to moderate at best.

Areas of Eucalyptus Woodlands that contained Salmon Gum, York Gum and/or Wandoo were assigned a low quality rating, given the presence of primary foraging species at 10-20% PFC. Whilst Salmon Gum and Wandoo are primary foraging species, the majority of Carnaby's Cockatoo diet is made up of proteaceous trees and shrubs such as Banksias and Hakea (Valentine and Stock 2008), which were not present within the survey area. Despite the presence of suitable foraging habitat, no evidence of foraging was observed during the survey. However, multiple records of Carnaby's Cockatoo do exist within 20 km of the survey area, with the closest record being approximately 5.2 km to the north.

In addition to foraging habitat, 30 potential breeding trees and 1.3 ha of potential roosting habitat were recorded within the survey area. Potential breeding and roosting trees comprised of Salmon Gum, *Eucalyptus camaldulensis*, York Gum and Wandoo. Salmon Gum in particular is an important breeding resource for Carnaby's Cockatoo as it is regularly used for nesting (Johnstone and Kirkby 2018). York Gum is less well documented with only a few known breeding attempts documented in this tree species (Johnstone and Kirkby 2018; Northern Agricultural Catchments Council 2022). None of the potential breeding trees recorded within the survey area contained any hollows that would be suitable for nesting (i.e. with a minimum opening diameter of 10 cm).

Groups of tall trees within the survey area also provide potential roosting habitat (approximately 1.3 ha) for Carnaby's Cockatoo; however, there are no known or suspected roost sites within 20 km of the survey area, with the closest known roost site being approximately 27 km to the south of the survey area (Birdlife 2021).

Although the survey area does provide some suitable foraging, potential breeding, and potential roosting habitat for Carnaby's Cockatoo, given the lack of proteaceous trees and shrubs, the overall quality of the habitat present is considered low or negligible to low, with some very small patches of low to moderate quality habitat. Given the low quality of the habitat present, and that no evidence of the species occurring within the survey area was observed during the surveys, as well as the lack of suitable nesting hollows present, then it is considered unlikely that Carnaby's Cockatoo is currently utilising the site for any of the above-mentioned activities; however, given the present of such habitat, it is possible that these habitats could be utilised by the species in the future.

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Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (M)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

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

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.

Threatened species (T)

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

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Critically Endangered species	CR	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered species	EN	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
Vulnerable species	VU	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)© of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

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

Category	Code	Description
Extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.
Extinct in the wild species	EW	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

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

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

Categories are detailed below.

Category	Code	Description
Migratory species	M	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). 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. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Species of special conservation interest (conservation dependent fauna)	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Category	Code	Description
		Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Other specially protected species	OS	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

Priority species (P)

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. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

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

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

Category	Code	Definition
Priority 1	P1	*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. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	P2	*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. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	P3	*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. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

Category	Code	Definition
Priority 4	P4	*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. © Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix B Likelihood of occurrence assessment criteria

Likelihood rating	Criteria
Recorded	The species has previously been recorded within survey area from DBCA database search results and/or from previous surveys of the survey area, and/or the species has been confirmed through a current vouchered specimen at WAH.
Likely	The species has not previously been recorded from within the survey area. However, (to qualify requires one or more criteria to be met): • the species has been recorded in close proximity to the survey area, and occurs in similar habitat to that which occurs within the survey area • core habitat and suitable landforms for the species occurs within the survey area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present • there is a medium to high probability that a species uses the survey area
Potential	The species has not previously been recorded from within the survey area. However, (one or more criteria requires to be met): • targeted surveys may locate the species based on records occurring in proximity to the survey area and suitable habitat occurring in the survey area • the survey area has been assessed as having potentially suitable habitat through habitat modelling • the species is known to be cryptic and may not have been detected despite extensive surveys • the species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys The species has been recorded in the survey area by a previous consultant survey or there is historic evidence of species occurrence within the survey area. However, (one or more criteria requires to be met) • doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution) • coordinates are doubtful
Unlikely	The species has been recorded locally through DBCA database searches. However, it has not been recorded within the survey area and • it is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded • it is unlikely to occur due to few historic record/s and no other current collections in the local area. The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the survey area through DBCA database searches. The species has not been recorded in the survey area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.
Does not occur	The species is not known to occur within the IBRA bioregion based on current literature and distribution. The conspicuous species has not been recorded in the survey area despite adequate survey efforts at an appropriate time of year to detect the species within potentially suitable habitat. The survey area lacks important habitat for a species that has highly selective habitat requirements. The species has been historically recorded within survey area or locally; however, it is considered locally extinct due to significant habitat changes such as land clearing and/or introduced predators.

Appendix C Flora likelihood of occurrence assessment

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Acacia ataxiphylla subsp. magna		EN	EN	Typically grey (to brown) sands with over laterite with *Eucalyptus wandoo* woodlands or shrublands featuring *E. macrocarpa*. Other associated species include *Allocasuarina campestris, Leptospermum erubescens, Dianella revoluta, Xanthorrhoea* sp.	DBCA, PMST, NatureMap	Potential	Unlikely	No close records, shrublands similar but lacking *E. macrocarpa*
Acacia cochlocarpa subsp. cochlocarpa		EN	CR	Undulating Plains to low hills with usually brown sand to loam, gravelly. Vegetation associated is shrublands with *Allocasuarina campestris*. Also found in disturbed areas adjacent.	DBCA, PMST, NatureMap	Likely	Potential	Record within 5km, appropriate habitat in S1 & S2 communities.
Acacia cochlocarpa subsp. velutinosa		CR	CR	Gently sloping topography with hard white clay, which appears to be a localised unique soil type possibly associated with the Cadoux Fault Line. Open *Allocasuarina campestris* shrubland over low heath.	PMST	Potential	Unlikely	Possible habitat in S1 but no close records.
Acacia denticulosa		VU	EN	On or near granite outcrops, and occasionally on sandplains, or a range of soils such as silt, clay, loam or sand	DBCA	Potential	Unlikely	No large granite outcrops, no close records
Acacia pharangites	Wongan Gully Wattle	EN	EN	Gullies growing in clay soils over and around areas of greenstone. Mixed scrubland communities near Wongan Hills.	DBCA, NatureMap	Unlikely	Unlikely	Restricted to the Wongan Hills
Acacia pygmaea	Dwarf Rock Wattle	EN	EN	In crevices at the summit of ridges growing in laterite-based soils. Situated along three adjacent ridges around Mount Matilda and Mount O'Brien near Wongan Hills. Open *Eucalyptus ebbanoensis* mallee over open heathland communities composed of *Allocasuarina campestris, Banksia pulchella, Banksia hewardiana* and *Persoonia divergens*.	DBCA	Unlikely	Unlikely	Restricted to the Wongan Hills
Acacia vassalii	Vassal's Wattle	EN	EN	Sandy or loamy soils, low scrub communities	DBCA, PMST, NatureMap	Potential	Unlikely	A bit south of the range, no close records

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Andersonia gracilis		EN	VU	Found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils supporting low open heath vegetation with species such as Calothamnus hirsutus, Verticordia densiflora and Kunzea recurva over sedges.	PMST	Does not occur	Does not occur	Survey area far to the east of population/ range.
Caladenia drakeoides	Hinged Dragon Orchid	EN	EN	Among shrubs near salt lakes and in winter-wet areas	DBCA, PMST, NatureMap	Potential	Unlikely	Within range, but no suitable habitat
Chorizema humile		EN	CR	Sandy clay or loam. Plains	PMST	Potential	Unlikely	Within range, potential habitat in S1 community, but no close records
Conostylis wonganensis	Wongan Conostylis	EN	EN	Yellow sand over clay or laterite on gradual slopes and is found scattered through species-rich heath with emergent mallees. Associated species include *Eucalyptus pyriformis, Ecdeiocolea monostachya* and *Hakea scoparia*.	DBCA, NatureMap	Potential	Unlikely	No close records, a bit south of the range, no suitable habitat.
Dasymalla axillaris		CR	CR	Sandy soils, only found in areas of recent disturbance.	DBCA, PMST, NatureMap	Potential	Unlikely	Potential habitat in S1 & S2 but no close records and very far from main population
Daviesia dielsii		EN	EN	Sandy, often gravelly soils	PMST	Unlikely	Unlikely	No close records, far from population.
Daviesia euphorbioides		EN	CR	Clayey sand and sandy gravel on sandplains in heath	DBCA, PMST, NatureMap	Potential	Potential	Closest record 3.5km, potential habitat in S1 community.
Eremophila ternifolia	Wongan Eremophila	EN	EN	Rocky situations in the Wongan Hills, red clays between breakaways.	DBCA, NatureMap	Unlikely	Unlikely	Too far from population, no suitable habitat.
Eucalyptus recta	Silver Mallet	EN	EN	Sandy Laterite, gravel rises and gravelly sands on slopes typical of mallet eucalypts and is associated with the blue mallet (*E. gardneri*) and/or Salmon gum (*E. salmonophloia*)	PMST	Potential	Potential	A bit south of the range but potential habitat in EW1 and EW3

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Gastrolobium appressum		VU	EN	White/yellow sand with quartz gravel. Sandplains, low rises	PMST	Unlikely	Unlikely	A bit out of range, no close records.
Gastrolobium glaucum	Spike Poison	EN	EN	Soils containing sand, loam, clay and gravel on slightly sloping habitat in mixed low heath dominated by *Hakea, Melaleuca* and *Acacia*	DBCA, PMST, NatureMap	Potential	Potential	Appropriate habitat in shrubland community, only 13km from nearest point
Gastrolobium hamulosum		EN	CR	Pale yellow clay loam with some sand and gravel on clay flats. It also grows in white and grey sand or sandy clay. Also recorded on Quartzite ridges or disturbed ground with other colonising shrubs, such as in low heath with *Allocasuarina campestris, Melaleuca*, and *Eucalyptus* species.	DBCA, PMST, NatureMap	Potential	Potential	Within range, no close records but potential habitat in EW1 and S1
Grevillea dryandroides subsp. dryandroides	Phalanx Grevillea	EN	EN	Open heath on grey sandy loam and yellow gravelly sand, with shrubs of *Allocasuarina* and *Melaleuca*.	PMST	Potential	Unlikely	Appropriate habitat in shrubland community, but too far from nearest population
Grevillea dryandroides subsp. hirsuta		EN	VU	Yellow sand in heath, sometimes with *Eucalyptus* or *Banksia* species, often on roadsides. Associated species include: *Hakea platysperma, Verticordia eriocephala, Conospermum* sp., *Grevillea excelsior, Verticordia serrata, Verticordia tumida subsp. tumida, Synaphea spinulosa, Dianella revoluta, Grevillea hookeriana, Verticordia* sp., *Allocasuarina campestris, Gastrolobium spinosum, Hakea incrassata, Leptospermum erubescens* and *Grevillea cagiana*.	PMST	Potential	Unlikely	A bit west of known range.
Grevillea pythara		CR	CR	Sandy or sandy loam with gravel	PMST	Unlikely	Unlikely	Restricted to Pithara area
Gyrostemon reticulatus		CR	CR	Dense shrubland in brown/yellow loamy sand on sloping topography	PMST	Unlikely	Unlikely	Outside the known range
Lysiosepalum abollatum	Woolly Lysiosepalum	CR	EN	Open mallee-heath in orange-brown, sandy clay over laterite at the base and lower slopes of hills. Associated with *Eucalyptus ebbanoensis*, *Acacia pharangites* & *A. congesta* subsp. *wonganensis* with	DBCA, PMST, NatureMap	Potential	Unlikely	No suitable habitat

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
				understorey of *Halgania, Allocasuarina, Leptospermum* and *Hibbertia* species.				
Melaleuca sciotostyla	Wongan Melaleuca	EN	EN	Clayey sand and laterite, scree slopes.	DBCA, PMST	Potential	Potential	No close records, but within range.
Microcorys eremophiloides	Wongan Microcorys	VU	EN	Laterite. Occurs as scattered plants in closed health with emergent mallees. Associated species include *Allocasuarina campestris*, *Banksia* spp., *Eucalyptus drummondii* and *E. ebbanoensis*	DBCA, PMST, NatureMap	Potential	Potential	Record within 5km, potential habitat in EW2 and S1 communities
Philotheca wonganensis		EN	EN	Dense shrubland and woodland with a shrubby understorey.	PMST	Unlikely	Unlikely	No close records, limited distribution to Wongan Hills
Rhagodia acicularis	Wongan Rhagodia	VU	EN	Red soils on gravely lateritic slopes in 10–12 m tall woodlands, dominated by gimlet and morel, with low mixed shrubland. Associated species include *Eucalyptus salubris, Eucalyptus longicornis, Acacia resinosa, Eremophila ternifolia* and *Melaleuca* sp.	DBCA	Potential	Unlikely	Restricted to the Wongan Hills, no close records
Roycea pycnophylloides		EN	EN	Seasonally wet grey-brown clay soils in open flats near the margins of salt lakes, Saline flats	PMST	Unlikely	Unlikely	No close records, no suitable habitat
Stylidium coroniforme subsp. coroniforme	Wongan Hills Triggerplant	EN	EN	Shallow yellow sand over laterite on open areas in low scrub and heath. Upland habitats consisting of *Allocasuarina* and *Banksia* shrubland and mallee woodland. Disturbance opportunist.	DBCA	Unlikely	Unlikely	Restricted to the Wongan Hills
Verticordia staminosa subsp. staminosa	Wongan Featherflower	EN	CR	Known from 1 population on a granite outcrop near Wongan Hills, WA	DBCA, PMST, NatureMap	Unlikely	Unlikely	Restricted to the Wongan Hills, no suitable habitat
Acacia trinalis			P1	Swampy areas, around salt lakes and on flats growing in sandy or clay-loam soils.	DBCA, NatureMap	Potential	Unlikely	Record within 5km, but no suitable habitat in survey area
Calandrinia uncinella (ex. Calandrinia sp. Piawaning)			P1	Wetlands to saline river flats	DBCA, NatureMap	Unlikely	Unlikely	No suitable habitat

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Grevillea sp. Trayning (W. Johnston WJ 071)			P1	Eucalypt woodlands on brown sandy loam. Associated species include *Melaleuca acuminata*, *Grevillea*, *Eremophila* and *Santalum acuminatum*	DBCA, NatureMap	Unlikely	Potential	Closest record 14km south of survey area, EW1 a close match for described habitat.
Guichenotia glandulosa			P1	Creek line or incised drainage off granite outcropping. Associated species include *Allocasuarina huegeliana, Grevillea endlicheriana, Lepidosperma* sedges, *Dianella revoluta, Acacia pulchella, Drosera micrantha*.	DBCA, NatureMap	Unlikely	Unlikely	A bit out of the known range, no suitable habitat.
Jacksonia debilis			P1	Shrublands to low heath on sandy, sandy clay or gravelly soils. Variety of Myrtaceous – Proteaceous associated species	DBCA, NatureMap	Likely	Potential	Closest record 200m from survey area, potential habitat in S1 community
Lepidosperma lyonsii			P1	Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	NatureMap	Does not occur	Does not occur	Goldfields species
Scaevola tortuosa	Tortuous-stem Scaevola		P1	Drainage lines or salt-lakes with samphire to gentle slopes with York gum woodland.	DBCA, NatureMap	Potential	Potential	Within range, records 12km away in habitat matching EW2
Acacia congesta subsp. wonganensis			P2	Lateritic rises and breakaways. York gum Woodland to *Allocasuarina campestris, Acacia* and *Melaleuca* shrublands.	DBCA, NatureMap	Potential	Potential	A bit south of the known range but potential habitat in S1, S2, EW1 and EW2
Acacia drewiana subsp. minor			P2	Sandy loam to gravelly sand on undulating plains to hills. Allocasuarina – Acacia – Melaleuca shrublands to Mallee heaths.	DBCA, NatureMap	Potential	Unlikely	Local records generally limited to the Wongan Hills
Acacia dura			P2	Variety of plains to hills habitats with vegetation mixed shrublands to Eucalyptus woodlands	DBCA	Potential	Unlikely	No close records, local records generally limited to the Wongan Hills
Boronia ericifolia			P2	Sandy loam, clay, laterite. Low-lying spots	DBCA, NatureMap	Potential	Unlikely	No close records
Calandrinia wilsonii			P2	Salt lakes, Saline wetlands to drainage lines with Halophytes/Samphire	DBCA, NatureMap	Potential	Unlikely	No suitable habitat

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Calothamnus quadrifidus subsp. asper			P2	Limited to the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Restricted to the Wongan Hills
Eremophila sargentii			P2	Flats to lateritic hills. Variety of vegetation from Salmon gum Woodlands to Allocasuarina shrublands.	DBCA, NatureMap	Potential	Potential	A bit south of existing range but potential habitat in EW1 and S1
Grevillea endlicheriana subsp. Wongan Hills			P2	Granite outcroppings with *Allocasuarina – Grevillea –* Myrtaceous shrublands	DBCA, NatureMap	Potential	Potential	A bit south of existing range but potential habitat in S1
Grevillea kenneallyi			P2	Sandy soils in lateritic landforms. Low Mallee woodlands to Acacia – Allocasuarina Shrublands. Other associated species include *Petrophile shuttleworthiana* and *Micromyrtus racemosa*	DBCA, NatureMap	Potential	Potential	Approx. 20km south of known range but potential habitat in EW2 & S1
Papistylus grandiflorus			P2	Brown, brown-red or yellow sandy clay, yellow-brown rocky sand, granite. Hillslopes, plains. Variety of woodlands to shrublands.	DBCA, NatureMap	Unlikely	Unlikely	Only a single record in local area at Wongan Hills. Outside main range.
Verticordia wonganensis			P2	Pale sands on flats/plains with heathlands to shrublands	DBCA, NatureMap	Potential	Unlikely	No close records. Limited to Wongan Hills and north-east, no suitable habitat.
Acacia campylophylla			P3	Lateritic gravelly soils. Mixed shrublands with *Allocasuarina, Acacia, Banksia* and *Gastrolobium* species or Wandoo Jam woodlands.	DBCA, NatureMap	Potential	Potential	Broad range, potential habitat in S1, S2, EW1, closest record 16km southwest
Acacia filifolia			P3	Yellow sand, gravelly lateritic sand. Sandplains. Allocasuarina Shrublands, sometimes Mallee shrublands	DBCA, NatureMap	Potential	Potential	Locally restricted to the Wongan Hills, but species has large range, potential habitat in S1.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Acacia phaeocalyx			P3	Yellow or white sand, often over laterite. Flats, hillsides. Mid to tall shrublands with various *Allocasuarina*, Mallees, Myrtaceae and Proteaceae.	DBCA, NatureMap	Potential	Potential	Closest record 10km north, potential habitat in S1.
Acacia repanda			P3	Loam, sandy or gravelly loam. Near granite outcrops. *Acacia – Allocasuarina* shrublands or fringing exposed granite	DBCA, NatureMap	Unlikely	Unlikely	A single record at Wongan Hills otherwise not in Wheatbelt Bioregion
Acacia scalena			P3	Yellow or yellow gravelly sand, loam. Various shrublands to Mallee woodlands	DBCA	Potential	Unlikely	A bit south of known range.
Banksia horrida	Prickly Dryandra		P3	Sand, sometimes with gravel. Mallee – Allocasuarina – Proteaceous shrublands to woodlands	DBCA, NatureMap	Potential	Potential	Record within 5km, potential habitat in S1-2, EW1-2 communities
Chamelaucium sp. Wongan Hills (B.H. Smith 1140)			P3	Typically low-lying York gum woodland or *Melaleuca Acacia Allocasuarina* shrublands in association with flats and fringing salt lakes.	DBCA, NatureMap	Potential	Potential	Within range, closest record 17km, S1 habitat only partially suitable, but drainage system with 1.5km.
Daviesia nudiflora subsp. drummondii			P3	Wide variety of vegetation and habitats within range	DBCA, NatureMap	Potential	Potential	Multiple records 17+ km both north and south, potential habitat in all good (or better) condition vegetation.
Dicrastylis velutina			P3	Sandy soils, gravelly loam. Variety of habitat with Allocasuarina, Myrtaceous, Proteaceous Shrublands	DBCA, NatureMap	Potential	Unlikely	Within species range and S1 potential habitat, but locally restricted to the Wongan Hills
Eucalyptus macrocarpa x pyriformis			P3	Sand, lateritic sandy soils. Hills, rocky ironstone ridges, sandplains	NatureMap	Potential	Potential	Closest record 8km north of site, well within species range.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Eucalyptus sargentii subsp. onesis	Mortlock River Mallee		P3	Low lying depressions or drainage lines, often saline.	DBCA, NatureMap	Potential	Potential	Record within 5km, potential habitat in EW1 & EW2
Guichenotia impudica			P3	Laterite to lateritic soils with Mallee woodlands or shrublands with *Allocasuarina*.	DBCA, NatureMap	Likely	Likely	Multiple close records, appropriate habitat in S1 and EW2 communities
Hemiandra coccinea			P3	White or grey, often gravelly sand. Sandplains, gravel pits.	DBCA, NatureMap	Potential	Unlikely	Within range but locally restricted to the Wongan Hills
Lepidosperma sp. Meckering (R. Davis WW 27-32)			P3	*Eucalyptus* woodlands (Salmon gum/Wandoo/Gimlet) on undulating plain to hills with brown sandy loam to clay.	DBCA, NatureMap	Potential	Potential	In centre of range, potential habitat in EW1, EW2, EW3 communities
Melaleuca sclerophylla			P3	Wide variety of habitats within range, typically undulating plains, hills or breakaways.	DBCA, NatureMap	Potential	Potential	Closest record 16km, within species main distribution, all vegetation in good or better condition potential habitat.
Persoonia chapmaniana			P3	White sand clay, yellow sand. Vicinity of salt lakes	DBCA, NatureMap	Potential	Unlikely	No suitable habitat
Persoonia pungens			P3	White or yellow sand, often over laterite. Various shrublands to York/Wandoo woodland	DBCA, NatureMap	Potential	Potential	Closest population 16km north west, well within distribution, EW1, EW2, EW3 potential habitat.
Phebalium brachycalyx			P3	Sand, gravelly soils. Lateritic uplands, hills. Mallee shrublands	DBCA, NatureMap	Potential	Unlikely	Broad scattered range, but locally restricted to the Wongan Hills
Podotheca pritzelii			P3	Sand ridges in salt flats or fringing vegetation around saline lakes or drainage channels.	DBCA, NatureMap	Potential	Unlikely	No suitable habitat

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Schoenus capillifolius			P3	Brown mud. Claypans	DBCA, NatureMap	Potential	Unlikely	No suitable habitat
Schoenus pennisetis			P3	Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.	DBCA, NatureMap	Potential	Unlikely	No suitable habitat
Stylidium periscelianthum			P3	Sandy or loamy clay soils, damp patches or minor drainages, wet flats, low granitic hills. A variety of Eucalypt woodlands or mixed shrublands	DBCA, NatureMap	Potential	Potential	Closest record 8km north, well within distribution, EW2 potential habitat.
Stylidium sacculatum			P3	Clayey sand or sand. Lower slopes and flats. Open Wandoo or Marri woodland, Allocasuarina shrubland	DBCA, NatureMap	Unlikely	Unlikely	No close records, on edge of distribution
Styphelia cordata (ex. Leucopogon sp. Bungulla (R.D. Royce 3435))			P3	White-yellow sand, brown-yellow loam over clay, laterite. Hills, plains, summits, disturbed sites. *Allocasuarina campestris* shrublands.	DBCA, NatureMap	Potential	Potential	Closest record 7km, potential S1 habitat
*Styphelia tamminensis (*ex. *Leucopogon tamminensis* var. *tamminensis)*			P3	White to yellow sandplains, sometimes with gravel. Mixed shrublands – Mallee, Allocasuarina, Acacia, Proteaceous, Myrtaceous	DBCA, NatureMap	Potential	Potential	Within distribution, closest record 7km east, potential S1 habitat.
Synaphea constricta			P3	Sand or sandy clay-loam over laterite. Various Allocasuarina – Proteaceous – Myrtaceous Shrublands	DBCA, NatureMap	Potential	Potential	No close records, but within distribution and potential S1 habitat.
Tetratheca retrorsa			P3	Lateritic breakaways, Granite outcroppings. Various Allocasuarina – Proteaceous – Myrtaceous Shrublands to Wandoo Woodland.	DBCA, NatureMap	Potential	Unlikely	Closest record 13km north, not no breakaways or large granite outcroppings.
Thomasia tenuivestita			P3	Variety of plains to hills habitats with vegetation mixed shrublands to Eucalyptus woodlands	DBCA, NatureMap	Potential	Potential	Record within 5km, all EW and S1, S2 communities potential habitat

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Thysanotus tenuis			P3	Granite country with *Eucalyptus* (usually *loxophleba*) woodlands or clay loam flats with Salmon Gum Woodlands	DBCA, NatureMap	Potential	Potential	No close records, but within broad distribution and potential EW1 & EW2 habitat.
Verticordia mitchelliana subsp. *mitchelliana*			P3	Yellow sand in mallee scrub or shrubland	DBCA	Potential	Unlikely	No close records, 20km west of known range.
Verticordia venusta			P3	Yellow sand, sandy gravel. Sandplains	DBCA	Potential	Potential	15km from closest record, within distribution, potential S1 habitat.
Acacia botrydion			P4	Gravelly lateritic soils. Hillslopes. Associated with the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Species restricted to the Wongan Hills
Acacia semicircinalis	Wongan Wattle		P4	Gravelly lateritic soils. Hillslopes. Associated with the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Species restricted to the Wongan Hills
Banksia bella	Wongan Dryandra		P4	Gravelly lateritic clay, laterite. Associated with the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Species restricted to the Wongan Hills
Banksia comosa	Wongan Dryandra		P4	Gravelly lateritic clay, laterite. Associated with the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Species restricted to the Wongan Hills
Daviesia spiralis			P4	Gravelly lateritic clay & sand. Associated with the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Species restricted to the Wongan Hills
Eucalyptus caesia subsp. *caesia*			P4	Loam. Granite outcrops. Various shrublands and Woodlands	DBCA, NatureMap	Potential	Unlikely	Closest record 14km north, but very scattered in distribution and no big granite outcrops.
Eucalyptus caesia subsp. *magna*			P4	Loam. Granite outcrops. Various shrublands and Woodlands	NatureMap	Potential	Unlikely	Closest record 13km north, but very scattered in distribution and no big granite outcrops.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence		Justification
		EPBC Act	BC Act / DBCA			Pre field survey	Post field survey	
Loxocarya albipes			P4	Lateritic gravel. Dry heath. Associated with the Wongan Hills	DBCA, NatureMap	Unlikely	Unlikely	Species restricted to the Wongan Hills

Appendix D Fauna likelihood of occurrence assessment

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Calidris ferruginea	Curlew Sandpiper	CR, M	CR, M	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	DBCA, PMST, NatureMap	Unlikely	No suitable habitat present.
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	EN	Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodlands and in shrubland or kwongan heathland. Forages seasonally in pine plantations, around Perth metropolitan, and forests containing Marri, Karri and Jarrah.	DBCA, PMST, NatureMap	Potential	Some suitable (but marginal) habitat is present within the Salmon Gum and Wandoo woodlands. In addition, multiple records occur within 20 km of the survey area, with the closest record being approximately 5.2 km to the north.
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU	Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The most dense populations have been found in riparian jarrah forest. Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive.	DBCA, PMST	Unlikely	There is a lack of suitable den and refuge sites present within the survey area and no nearby records occur.
Egernia stokesii badia	Western Spiny-tailed Skink	EN	VU	York Gum woodland, with some records in Gimlet (*E. salubris*) and Salmon Gum (*E. salmonophloia*). Populations persist in woodland patches as small as one hectare and completely surrounded by wheat fields. Sites with the greatest number of	DBCA, PMST	Unlikely	There are no nearby records, with the closest record being approximately 39 km to the south east. Some suitable habitat occurs within the woodland habitats present within the survey area, however, there are few fallen logs or areas with good connectivity.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
				individuals contain numerous fallen logs and were subjected to low-intensity grazing by domestic stock.			
Falco hypoleucos	Grey falcon	VU	VU	It prefers timbered lowland plains (especially those that are acacia-dominated) which are interspersed with tree-lined watercourses. The majority of its habitat has an average rainfall of less than 500 mm but frequents other habitats including grassland and sand dune habitats.	PMST	Unlikely	There are no tree-lined watercourse habitats or acacia dominated habitats present within the survey area. Species may occasionally occur within the local area, but would be unlikely to utilise the habitats present within the survey area.
Idiosoma nigrum	Shield-backed Trapdoor Spider	VU	EN	In the Wheatbelt, the Shield-backed Trapdoor Spider typically inhabits clay soils whereas the arid Midwest populations are associated with rocky habitats, primarily in positions with increased moisture retention properties like gullies and drainage lines on southern facing slopes. Leaf litter and twigs are extremely important to the species as it provides material for the burrows, reduced soil moisture loss and increased prey availability.	DBCA, PMST, NatureMap	Unlikely	No suitable habitat is present within the survey area due to the highly degraded nature of the site.
Lagostrophus fasciatus subsp. fasciatus	Banded hare-wallaby	VU	VU	*Lagostrophus fasciatus* usually lives in woodlands with thick, dense shrubs, particularly in areas with high densities of *Acacia ligulata*, *A. coriacea*, *Heterodendrum oleifolium*, and *Diplolaena dampieri*, which are the main source of food and also used for shelter.	NatureMap	Does not occur	The species is locally extinct and now only known from two populations at Mt Gibson Wildlife Sanctuary and at Faure Island.
Leipoa ocellata	Malleefowl	VU	VU	Occurs in scrubland and woodland dominated by mallee and wattle species. In Western Australia they are also found in some shrublands dominated by *Acacia*, and occasionally in woodlands dominated	DBCA, PMST, NatureMap	Unlikely	No suitable habitat is present within the survey area, and no nearby records occur.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
				by eucalypts such as Wandoo (*E. wandoo*), Marri (*Corymbia calophylla*) and Mallet (*E. astringens*).			
Macrotis lagotis	Bilby	VU	VU	Preferred habitat includes hummock grassland in plains and alluvial areas, open tussock grassland on uplands and hills, and mulga woodland/shrubland on ridges and rises.	NatureMap	Does not occur	The species is locally extinct and not known to occur within the area based on current literature and distribution.
Pezoporus occidentalis	Night Parrot	EN	CR	Triodia (Spinifex) grasslands and/or chenopod shrublands in the arid and semi-arid zones, and Astrebla spp. (Mitchell grass), shrubby samphire and chenopod associations, scattered trees and shrubs, Acacia aneura (Mulga) woodland, treeless areas and bare gibber.	PMST	Does not occur	The species is locally extinct and not known to occur within the area based on current literature and distribution.
Phascogale calura	Red-tailed Phascogale	VU	CD	Historically widespread throughout woodland habitats, however, now they are restricted to remnant mature *Eucalyptus wandoo* or *Allocasuarina huegeliana* woodlands in the south of the wheatbelt. A preference for unburnt habitat with a continuous canopy and the presence of tree hollows.	PMST	Unlikely	Whilst some Salmon Gum and Wandoo woodland is present within the survey area, it is highly fragmented and does not provide continuous canopy cover or any hollows, both of which are essential requirements for the species.
Phascogale tapoatafa subsp. wambenger	South-western Brush-tailed Phascogale		CD	Inhabits dry sclerophyll forests and open woodlands with trees with hollows and sparse ground cover.	DBCA	Unlikely	No suitable habitat is present within the survey area, and no nearby records occur.
Rostratula australis	Australian Painted Snipe	EN	EN	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent	DBCA, PMST NatureMap	Unlikely	There is an old species record within the survey area; however, the record is dated 2002. It is possible that the species occurred due to the presence of bore drains or waterlogged grassland areas associated with the nearby farm; however, it would likely have been as a vagrant. There is no suitable habitat present within the survey area and so the species is considered unlikely to occur.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
				tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca).			
Teyl sp. (BY Main 1953/2683, 1984/13)	Minnivale Trapdoor Spider		CR	Perched swamps on high terrain in the central and northern Wheatbelt. Prefer bushland with deep leaf litter and low levels or erosion where their soil invertebrate prey is plentiful.	DBCA	Unlikely	No suitable habitat is present within the survey area, and no nearby records occur.
Calidris ruficollis	Red-necked stint	M	M	In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals.	DBCA, NatureMap	Unlikely	No suitable habitat present.
Tringa glareola	Wood sandpiper	M	M	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums Eucalyptus camaldulensis and often with fallen timber.	DBCA, NatureMap	Unlikely	No suitable habitat present.
Tringa nebularia	Common greenshank	M	M	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and	DBCA	Unlikely	No suitable habitat present.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
				saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms.			
Aspadites ramsayi	Woma python	-	P1	Shelter during the day in hollows, burrows dug by other animals or thick vegetation. Prefers open myrtaceous heath on sandplains and dunefields dominated by *Triodia*.	DBCA	Unlikely	Some suitable habitat is present within the Sandplain habitat, however, there are a lack of hollows within the survey area and no nearby records.
Idiosoma clypeatum	Shield-backed Trapdoor Spider		P3	In the Wheatbelt, the Shield-backed Trapdoor Spider typically inhabits clay soils whereas the arid Midwest populations are associated with rocky habitats, primarily in positions with increased moisture retention properties like gullies and drainage lines on southern facing slopes. Leaf litter and twigs are extremely important to the species as it provides material for the burrows, reduced soil moisture loss and increased prey availability.	DBCA	Unlikely	Whilst some suitable habitat is present within the woodland habitats, and records occur approximately 6 km south of the survey area, given the degraded nature of the habitats present, the high level of disturbance and high level of fragmentation, the species is considered unlikely to occur.
Aganippe castellum	Tree-stem trapdoor spider	-	P4	Burrows are built against the base or trunk of a tree in sandy loam or loamy gravel soils or nodulated soil near gravel pits and granite outcrops. Burrows in flood-prone depressions, and flats that support myrtaceous shrub communities.	DBCA	Unlikely	Whilst some suitable habitat is present within the Allocasuarina - Melaleuca shrublands, there is a lack of flood-prone depressions. No suitable habitat is present.
Isoodon fusciventer	Quenda, Southwestern Brown Bandicoot		P4	Inhabits scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses.	DBCA	Unlikely	Survey area lacks dense understorey or cover. No signs of the species occurring were observed during the survey and no nearby records exist.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Notamacropus irma	Western Brush Wallaby		P4	Inhabits open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest.	DBCA	Unlikely	No suitable habitat present.
Oxyura australis	Blue-billed Duck		P4	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached	DBCA	Unlikely	No suitable habitat present.
Pseudomys occidentalis	Western Mouse		P4	Long unburned mature vegetation on gravelly sand to sandy clay. Especially with Santalum acuminatum and sedge-like plants. Associated vegetation is highly variable, including Eucalyptus, Acacia, Isopogon, Allocasuarina and Melaleuca forming open woodlands, low and tall shrubland, mallee and heath.	DBCA	Unlikely	No suitable habitat present.
Thinornis rubricollis	Hooded plover, hooded dotterel		P4	It mainly occurs on wide beaches backed by dunes with large amounts of seaweed and jetsam, creek mouths and inlet entrances	DBCA, NatureMap	Unlikely	No suitable habitat present.
Actitis hypoleucos	Common Sandpiper	M	M	Wide range of coastal wetlands and some inland wetlands. Is mostly found around muddy margins or rocky shores and rarely on mudflats.	DBCA, PMST	Unlikely	No suitable habitat present.
Apus pacificus	Fork-tailed Swift	M	M	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur	PMST	Unlikely	The species may occasionally fly over the survey area, but would not utilise any of the habitats present, given it is a mostly aerial species.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
				over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes.			
Calidris acuminata	Sharp-tailed Sandpiper	M	M	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. They also occur in saltworks and sewage farms.	DBCA, PMST, NatureMap	Unlikely	No suitable habitat present.
Calidris melanotos	Pectoral Sandpiper	M	M	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	PMST	Unlikely	No suitable habitat present.
Motacilla cinerea	Grey Wagtail	M	M	This species inhabits fast-flowing mountain streams and rivers with riffles and exposed rocks or shoals, often in forested areas. It is also found in more lowland watercourses, even canals, where there are artificial waterfalls, weirs, millraces or lock gates. Outside of the breeding season it occupies a wider variety of habitats, including farmyards, sewage farms, forest tracks, tea estates and even town centres.	PMST	Unlikely	No suitable habitat present.

Scientific name	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Falco peregrinus	Peregrine falcon		OS	The Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water in trees with old rave or Wedge-tailed Eagle nests, and may even be found nesting on high city buildings	DBCA, NatureMap	Unlikely	Records occur throughout the region. Whilst the species may occasionally fly over the survey area, it would not be dependant on any of the fauna habitats present. Given the thin, linear nature of the survey area, it is unlikely that this species would occur.

Appendix E Flora species list

Family	Scientific Name	Significance	Listed Wheatbelt Woodland TEC component
Aizoaceae	*Mesembryanthemum nodiflorum*	Weed – s11	
Amaranthaceae	*Ptilotus divaricatus*		
Amaranthaceae	*Ptilotus exaltatus*		
Amaranthaceae	*Ptilotus polystachyus*		
Amaranthaceae	*Ptilotus* sp.		
Asparagaceae	*Lomandra effusa*		Yes
Asteraceae	*Arctotheca calendula*	Weed – s11	
Asteraceae	*Monoculus monstrosus*	Weed – s11	
Asteraceae	*Sonchus oleraceus*	Weed – s11	
Asteraceae	*Waitzia acuminata*		
Boryaceae	*Borya* sp.		Likely
Brassicaceae	*Brassica tournefortii*	Weed – s11	
Brassicaceae	*Raphanus raphanistrum*	Weed – s11	
Casuarinaceae	*Allocasuarina campestris*		Yes
Chenopodiaceae	*Atriplex semibaccata*		Yes
Chenopodiaceae	*Dysphania melanocarpa*		
Chenopodiaceae	*Enchylaena tomentosa*		Yes
Chenopodiaceae	*Maireana brevifolia*		Yes
Chenopodiaceae	*Rhagodia preissii*		Yes
Chenopodiaceae	*Salsola australis*		
Chenopodiaceae	*Sclerolaena diacantha*		
Cyperaceae	*Lepidosperma* sp.		
Cyperaceae	*Lepidosperma tenue*		Yes
Ericaceae	*Astroloma serratifolium*		
Fabaceae	*Acacia acuaria*		Yes
Fabaceae	*Acacia acuminata*		Yes
Fabaceae	*Acacia assimilis* subsp. *assimilis*		
Fabaceae	*Acacia hemiteles*		Yes
Fabaceae	*Acacia microbotrya*		
Fabaceae	*Acacia* sp.		
Fabaceae	*Acacia saligna*		
Fabaceae	*Chamaecytisus palmensis*	Weed – s11	
Fabaceae	*Gastrolobium obovatum*		
Fabaceae	*Gastrolobium spinosum*		Yes
Geraniaceae	*Erodium cygnorum*		Yes
Goodeniaceae	*Dampiera lavandulacea*		Yes
Goodeniaceae	*Scaevola hamiltonii*		
Goodeniaceae	*Scaevola spinescens*		Yes
Haloragaceae	*Glischrocaryon aureum*		
Hemerocallidaceae	*Dianella revoluta*		
Iridaceae	*Romulea rosea*	Weed – s11	
Lauraceae	*Cassytha* sp.		
Myrtaceae	*Ericomyrtus serpyllifolia*		

Family	Scientific Name	Significance	Listed Wheatbelt Woodland TEC component
Myrtaceae	*Eucalyptus loxophleba*		Yes
Myrtaceae	*Eucalyptus salmonophloia*		Yes
Myrtaceae	*Eucalyptus* sp.		
Myrtaceae	*Eucalyptus torquata*		
Myrtaceae	*Eucalyptus utilis*		
Myrtaceae	*Eucalyptus wandoo*		Yes
Myrtaceae	*Melaleuca marginata*		Yes
Myrtaceae	*Melaleuca radula*		Yes
Pinaceae	*Pinus pinaster*	Weed – s11	
Plumbaginaceae	*Limonium sinuatum*	Weed – s11	
Poaceae	*Aira caryophyllea*	Weed – s11	
Poaceae	*Aristida contorta*		
Poaceae	*Austrostipa elegantissima*		Yes
Poaceae	*Austrostipa* sp.		
Poaceae	*Avena barbata*	Weed – s11	
Poaceae	*Bromus diandrus*	Weed – s11	
Poaceae	*Cenchrus setaceus*	Weed – s11	
Poaceae	*Ehrharta longiflora*	Weed – s11	
Poaceae	*Eragrostis curvula*	Weed – s11	
Poaceae	*Monachather paradoxus*		
Poaceae	*Neurachne alopecuroidea*		
Poaceae	*Rytidosperma caespitosum*		Yes
Poaceae	*Triticum aestivum*	Weed – s11	
Poaceae	*Vulpia* sp.	Weed – s11	
Polygalaceae	*Comesperma integerrimum*		Yes
Proteaceae	*Grevillea biternata*		
Proteaceae	*Grevillea eryngioides*		
Proteaceae	*Grevillea petrophiloides* subsp. *petrophiloides*		
Rhamnaceae	*Stenanthemum pomaderroides*		
Rubiaceae	*Opercularia vaginata*		
Rutaceae	*Phebalium megaphyllum*		
Santalaceae	*Santalum acuminatum*		Yes
Santalaceae	*Santalum spicatum*		Yes
Solanaceae	*Solanum hoplopetalum*		
Solanaceae	*Solanum lasiophyllum*		
Solanaceae	*Solanum nigrum*	Weed - s11	
Surianaceae	*Stylobasium australe*		

Appendix F Relevé Details

Relevé:	R01					
Date:	9/11/2021	**Site:**	CBH Konnongorring			
Vegetation Unit:	PT1	**Location (UTM):**	50 J	**Dominant species**	**Height**	**Cover**
Condition:	Degraded		478610 m E	*Eucalyptus loxophleba*	16	25
Soil:	Light brown sandy loam		6564066 m S	*Eucalyptus torquata*	10	20
Landform:	Flat			*Eucalyptus camaldulensis*	16	10
Rock Type:	N/A	**Outcropping:**	0%	*Austrostipa elegantissima*	1	2
Photograph:				**Other species**		
				**Brassica tournefortii*	0.7	4
				**Ehrharta longiflora*	0.5	15
				Enchylaena tomentosa	0.2	2
				**Avena barbata*	0.5	1
				**Triticum aestivum*	0.3	0.1
				Ptilotus polystachyus	1	1

Relevé:	R02					
Date:	9/11/2021	**Site:**	CBH Konnongorring			
Vegetation Unit:	S1	**Location (UTM):**	50 J	**Dominant species**	**Height**	**Cover**
Condition:	Good		478641 m E	*Acacia acuminata*	4	2
Soil:	Clay loam		6564136 m S	*Acacia saligna*	3	2
Landform:	Flat			*Grevillea biternata*	1.2	8
Rock Type:	N/A	**Outcropping:**	0%	*Ericomyrtus serpyllifolia*	1.1	5
Photograph:				*Austrostipa elegantissima*	1	4
				Dianella revoluta	0.8	1
				Monachather paradoxus	0.4	12
				Neurachne alopecuroidea	0.3	2
				Scaevola hamiltonii	0.1	5
				Dampiera lavandulacea	0.2	1
				Other species		
				**Avena barbata*	0.5	0.1
				Ptilotus polystachyus	0.7	0.1
				Enchylaena tomentosa	0.2	0.1

Relevé:	R03					
Date:	9/11/2021	**Site:**	CBH Konnongorring			
Vegetation Unit:	EW2	**Location (UTM):**	50 J	**Dominant species**	**Height**	**Cover**
Condition:	Good		478350 m E	*Eucalyptus loxophleba*	14	10
Soil:	Brown clay loam		6565660 m S	*Acacia acuminata*	6	25
Landform:	Slope			**Avena barbata*	1.5	30
Rock Type:	Granite	**Outcropping:**	2-10%	*Ptilotus polystachyus*	0.8	5

Photograph:

Other species
**Ehrharta longiflora*
**Sonchus oleraceus*
Austrostipa sp.
Austrostipa elegantissima
Dianella revoluta
Enchylaena tomentosa
Grevillea biternata
Ptilotus divaricatus
Ptilotus exaltatus
Rhagodia preissii
Scaevola spinescens
Stylobasium australe

Relevé:	R04					
Date:	9/11/2021	**Site:**	CBH Konnongorring			
Vegetation Unit:	S1	**Location (UTM):**	50 J	**Dominant species**	**Height**	**Cover**
Condition:	Good		478336 m E	*Grevillea petrophiloides subsp. petrophiloides*	3	1
Soil:	Clay Loam		6566015 m S	*Grevillea biternata*	1	15
Landform:	Slope			*Austrostipa elegantissima*	1	8
Rock Type:	N/A	**Outcropping:**	0%	*Gastrolobium obovatum*	0.6	6
Photograph:				*Dianella revoluta*	0.6	2
				Austrostipa sp.	1	1
				Cassytha sp.	1	2
				Stenanthemum pomaderroides	0.3	3
				Opercularia vaginata	0.2	0.5
				Glischrocaryon aureum	0.5	0.5

Other species
Waitzia acuminata
Acacia sp.
Monachather paradoxus
Neurachne alopecuroidea
Comesperma integerrimum

Relevé:	R04					
				Dampiera lavandulacea		
				Lepidosperma sp.		

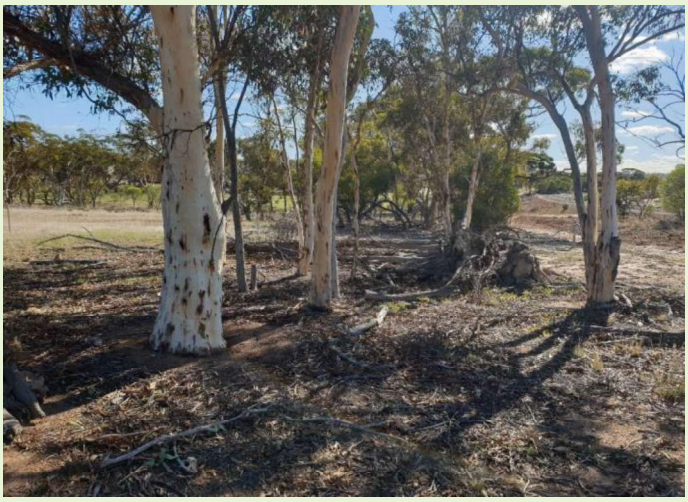
Relevé	R05					
Date:	9/11/2021	**Site:**	CBH Konnongorring			
Vegetation Unit:	S1	**Location (UTM):**	50 J	**Dominant species**	**Height**	**Cover**
Condition:	Very Good		478256 m E	*Allocasuarina campestris*	3	5
Soil:	Gravelly clay loam		6566105 m S	*Acacia assimilis subsp. assimilis*	3	4
Landform:	Slope			*Grevillea biternata*	1.2	25
Rock Type:	Laterite	**Outcropping:**	0%	*Austrostipa elegantissima*	1.5	10
Photograph:				*Cassytha sp.*	2	1
				*Grevillea petrophiloides subsp. petrophiloides*	2	0.5
				Austrostipa sp.	1	1
				Dianella revoluta	1	1
				Gastrolobium obovatum	0.4	3
				Monachather paradoxus	0.4	2
				Neurachne alopecuroidea	0.3	3
				Dampiera lavandulacea	0.3	1
				Opercularia vaginata	0.2	0.5
				Borya sp.	0.1	1
				Other species		
				Aristida contorta		
				**Avena barbata*		
				Glischrocaryon aureum		
				Melaleuca radula		
				Santalum spicatum		

Relevé:	R06					
Date:	9/11/2021	**Site:**	CBH Konnongorring			
Vegetation Unit:	EW1	**Location (UTM):**	50 J	**Dominant species**	**Height**	**Cover**
Condition:	Very Good		478313 m E	*Eucalyptus salmonophloia*	20	10
Soil:	Pale brown clay loam		6565947 m S	*Eucalyptus loxophleba*	16	15
Landform:	Flat			*Santalum acuminatum*	2	5
Rock Type:	N/A	**Outcropping:**	0%	*Scaevola spinescens*	1	10
Photograph:				*Rhagodia preissii*	1	8
				Austrostipa elegantissima	1	5
				Melaleuca marginata	1	3
				**Mesembryanthemum nodi florum*	0.1	6
				Sclerolaena diacantha	0.1	3

Relevé:	R06

Other species
Enchylaena tomentosa
Ptilotus exaltatus

Relevé:	R07					
Date:	01/06/2022	**Site:**	CBH Konnongorring, Additional area			
Vegetation Unit:	EW3	**Location (UTM):**	50 J 371	**Dominant species**	**Height**	**Cover**
Condition:	Degraded		478207 m E	*Eucalyptus wandoo*	12	35
Soil:	Grey brown sandy clay loam		6565015 m S	**Arctotheca calendula*	0.1	10
Landform:	Gentle hillslope			Annual Grasses[1]	0.1	10
Rock Type:	Granite	**Outcropping:**	>1%	*Lepidosperma tenue*	0.4	1
Photograph:				*Rytidosperma caespitosum*	0.5	1



Other species
**Aira caryophyllea*
**Romulea rosea*
Austrostipa elegantissima
Enchylaena tomentosa
Erodium cygnorum
Santalum acuminatum

[1] An indeterminate mix of germinating grasses, most likely consisting of *Avena barbata*, *Bromus* and *Ehrharta* species.

Relevé:	R08					
Date:	01/06/2022	**Site:**	CBH Konnongorring, Additional area			
Vegetation Unit:	EW3	**Location (UTM):**	50 J 383	**Dominant species**	**Height**	**Cover**
Condition:	Degraded		478242 m E	*Eucalyptus wandoo*	10	25
Soil:	Grey brown sandy clay loam		6564879 m S	*Allocasuarina campestris*	3	0.5
Landform:	Gentle hillslope			*Rytidosperma caespitosum*	0.4	8
Rock Type:	Laterite	**Outcropping:**	1%	*Lepidosperma tenue*	0.3	1
Photograph:				**Arctotheca calendula*	0.1	5

Other species
**Monoculus monstrosus*
**Romulea rosea*
Acacia assimilis subsp. assimilis
Austrostipa elegantissima
Dianella revoluta
Enchylaena tomentosa
Erodium cygnorum
Lomandra effusa
Ptilotus exaltatus

Appendix G Flora species matrix

Species	Vegetation Community						
	EW1	EW2	EW3	S1	S2	PT1	PT2
**Aira cupaniana*			x				
**Arctotheca calendula*			x				
**Avena barbata*		x	x	x	x	x	x
**Brassica tournefortii*						x	
**Cenchrus setaceus*						x	x
**Ehrharta longiflora*		x	x			x	
**Eragrostis curvula*							x
**Limonium sinuatum*					x		
**Mesembryanthemum nodiflorum*	x		x				
**Monoculus monstrosus*			x				
**Romulea rosea*			x				
**Sonchus oleraceus*		x					
**Triticum aestivum*						x	
**Vulpia* sp.					x		
Acacia acuminata		x		x	x		
Acacia assimilis subsp. assimilis			x	x			
Acacia hemiteles						x	
Acacia microbotrya						x	x
Acacia sp.				x		x	
Acacia saligna				x			
Allocasuarina campestris			x	x			
Aristida contorta				x			
Austrostipa sp.		x	x	x	x		
Austrostipa elegantissima	x	x	x	x	x	x	
Borya sp.				x			
Cassytha sp.				x			
Chamaecytisus palmensis							x
Comesperma integerrimum		x		x			
Dampiera lavandulacea				x			
Dianella revoluta		x	x	x			
Enchylaena tomentosa	x	x	x	x	x	x	
Ericomyrtus serpyllifolia				x	x		
Erodium cygnorum			x				
Eucalyptus camaldulensis						x	
Eucalyptus loxophleba	x	x				x	
Eucalyptus salmonophloia	x						
Eucalyptus sp.						x	
Eucalyptus torquata						x	
Eucalyptus wandoo			x				
Gastrolobium obovatum				x			
Glischrocaryon aureum				x			
Grevillea biternata		x		x	x		

Species	Vegetation Community						
	EW1	EW2	EW3	S1	S2	PT1	PT2
Grevillea petrophiloides subsp. *petrophiloides*				x			
Lepidosperma sp.				x			
Lepidosperma tenue			x				
Lomandra effusa			x				
Maireana brevifolia	x	x	x				
Melaleuca marginata	x						
Melaleuca radula				x			
Monachather paradoxus				x			
Neurachne alopecuroidea				x	x		
Opercularia vaginata				x			
Pinus pinaster							x
Ptilotus divaricatus		x					
Ptilotus exaltatus	x	x	x				
Ptilotus polystachyus		x		x		x	x
Rhagodia preissii	x	x					
Rytidosperma caespitosum			x				
Santalum acuminatum	x		x				
Santalum spicatum				x			
Scaevola hamiltonii				x			
Scaevola spinescens	x	x					
Sclerolaena diacantha	x						
Solanum hoplopetalum			x				
Solanum lasiophyllum					x	x	
Stenanthemum pomaderroides				x			
Stylobasium australe		x					
Waitzia acuminata				x			

* Indicates introduced (weedy) species

Appendix H Assessment of the Eucalypt woodlands of the Western Australian Wheatbelt ecological community

KEY DIAGNOSTIC CHARACTERISTICS

Key diagnostic characteristics (DotEE 2015)	Outcome
Indicators	
Location and physical environment The distribution of the ecological community is limited to these IBRA bioregions and subregions: • Avon Wheatbelt - subregions AVW01 Merredin and AVW02 Katanning; • Mallee - MAL02 Western Mallee only; and • Jarrah Forest – outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall. They are effectively an extension of the Avon Wheatbelt landscape in that they comprise areas subject to similar climate, landscape and threats.	Yes. The survey area is located in the Avon Wheatbelt IBRA Bioregion and AVW02 Katanning subregion.
Structure The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10% (crowns measured as if they are opaque).	Yes. Crown cover in the woodland vegetation communities EW1, EW2, EW3 and PT1 are ≥10%.
Presence of key species The key species of the tree canopy are species of *Eucalyptus* as identified in Table 2a (DotEE 2015). These are species that typically have a single trunk. One or more of the tree species in Table 2a are dominant or co-dominant within a patch of the ecological community. If other species are present in the tree canopy (e.g. species in Table 2b or other taxa) then these collectively do not occur as dominants in the tree canopy.	Yes. *Eucalyptus salmonophloia, E. loxophleba* and *E. wandoo* are dominants/co-dominants within vegetation communities EW1, EW2, EW3 and parts of PT1, and are listed in Table 2a (DotEE 2015). PT1 has various *Eucalyptus* spp. dominant, with *E. loxophleba* co-dominant in some parts.
Presence of native understorey A native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs, as specified in section 2.3.2 and in Table A1 of Appendix A (DoE 2015).	Yes. Native understorey is present in communities EW1 and EW2 in areas of Good or Very Good Condition. PT1 has *Acacia microbotrya* or *A. hemiteles* as dominant understory in places, which do occur in Table A1 of Appendix A (DotEE 2015).

Key diagnostic characteristics (DotEE 2015)	Outcome
	EW3 includes scattered native herbs, shrubs and co-dominant native sedges and grasses in the understory, of which *Allocasuarina campestris*, *Santalum acuminatum*, *Lepidosperma tenue* and four others are listed in Table A1 of Appendix A (DotEE 2015). 25 of the 61 native flora taxa recorded in the survey area occur within Table A1 of Appendix A (DotEE 2015). It should be noted that the plant species list in Tables A1 and A4 of Appendix A (DotEE 2015) do not include all plant species that may be encountered in the WA Wheatbelt woodland ecological community.

Key diagnostic characteristics (DotEE 2015)	Outcome
Contra-indicators	
Mallees dominant A dominant presence of eucalypts with a mallee growth form. However, mallee species can occur as an understorey or minor canopy component of the ecological community, as noted in the diagnostic features, above.	No. Mallee eucalypts are not dominant in vegetation communities EW1, EW2, EW3 and parts of PT1.
Non-eucalypts dominant A dominant presence of non-eucalypt species in the tree canopy, for instance *Acacia acuminata* (jam) or *Allocasuarina huegeliana* (rock sheoak). However, these non-eucalypt species can be present as an understorey or minor canopy component of the ecological community.	No. Some non-eucalypt species are present but are not dominant in the tree canopy in vegetation communities EW1, EW2 and EW3. Yes: PT2 is dominated by Pinus pinaster, PT1 has *A. microbotrya* co-dominant for parts of it.
Shrublands or Herblands Shrublands or herblands in which the tree canopy layer is very sparse to absent, either naturally or maintained so through long-term disturbance. Native vegetation where a tree canopy was formerly present is often referred to as 'derived' or 'secondary' vegetation. These sites would fall below the 10 per cent minimum canopy cover threshold for a woodland, noted in the diagnostic features, above.	No. Vegetation communities EW1, EW2 and EW3 are woodlands with a tree canopy present. PT1 only has a tree canopy in parts. Yes: S1 and S2 are shrublands. Parts of PT1 are shrub dominated. EW3 where it is represented by isolated trees in the Additional area do not meet the canopy cover requirements
Adjacent bioregions Woodlands that have the same key eucalypt species but occur in adjacent bioregions, notably the Coolgardie, Esperance Sandplains, Yalgoo and Geraldton Sandplains bioregions. These are not part of the national ecological community. All woodlands that occur in bioregions outside the wheatbelt, as defined in this conservation advice, are not part of the WA Wheatbelt Woodland ecological community.	No. The survey area is not located in the Coolgardie, Esperance Sandplains, Yalgoo or Geraldton Sandplains bioregions.
Habitat-restricted eucalypt species Woodlands dominated by eucalypts that are restricted to granite outcrops and rocky rises, for instance *Eucalyptus caesia* (caesia or gungurru). However, some woodlands occur on the base around rock outcrops, but not on the actual outcrop, and these may be part of the ecological community, for instance York gum – jam woodlands.	No. The woodlands within the survey area do not occur on granite outcrops or rocky rises.
Condition thresholds and minimum patch size	

Key diagnostic characteristics (DotEE 2015)	Outcome
Where native vegetation meets the description and key diagnostic characteristics of the WA Wheatbelt Woodland ecological community, above, the condition thresholds and considerations in Table 3 (DotEE 2015) apply. There are four categories a patch can be classified as: Category A: Patches likely to correspond to a condition of Pristine / Excellent / Very Good (Keighery 1994) or a High Roadside Conservation Value (RCV; Roadside Conservation Committee of WA [RCC] 2014). Category B: Patches likely to correspond to a condition of Good (Keighery 1994) or a Medium-High RCV (RCC 2014), AND retains important habitat features. Category C: Patches likely to correspond to a condition of Good (Keighery 1994) or a Medium-High RCV (RCC 2014). Category D: Patches likely to correspond to a condition of Degraded to Good (Keighery 1994) or a Medium-Low to Medium-High RCV (RCC 2014) BUT retains important habitat features. The criteria for these categories are listed below.	Yes. One part of vegetation community EW1 meet the following criteria: Category A (for Very Good condition): • Exotic plant species 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. • Patch <2ha (0.5ha in VG condition) but is continuous with other woodlands in good condition. • If considering the rail as equivalent to a road (linear infrastructure) then patch width is >5 m. EW1 and EW2 East of the rail line count as roadside vegetation. Category B (for Good condition): • Exotic plant species account for >30% to 50% of total vegetation cover in the understorey layers (i.e. below the tree canopy). • Mature trees either absent or when present have > 5 trees per 0.5 ha. • Roadside patch width ≥5 m. EW1, EW2 and EW3 West of the rail line are part of a large patch of degraded to good woodland outside the survey area that extends to the Additional Area and thus meet the criteria for Category D (for Degraded to Good condition): • Exotic plant species account for >50% to 70% of total vegetation cover in the understorey layers (i.e. below the tree canopy); • Mature trees present with ≥5 trees per 0.5 ha; • Patch size is >5 ha, as the vegetation inside the survey area is continuous with vegetation outside. Patches of EW3 within the Additional area that are separated from the above listed communities do not reach the minim size threshold and therefore do not meet the minimum patch size for Category D.

Key diagnostic characteristics (DotEE 2015)	Outcome
	EW3 East of the rail line are part of an approximately 12 ha patch of degraded woodland outside the survey area and thus meet the criteria for Category D (for Degraded condition): • Exotic plant species account for >50% to 70% of total vegetation cover in the understorey layers (i.e. below the tree canopy) but uncertain outside the survey area; • Mature trees present with ≥5 trees per 0.5 ha; • Patch size is >5 ha, as the vegetation inside the survey area is continuous with vegetation outside.

CONDITION THRESHOLDS

Cover of exotic plants (weeds) AND	Mature trees[1] AND	Minimum patch size (non-roadside patches)[2] OR	Minimum patch width (roadside patches only)[3]
Category A: Patches likely to correspond to a condition of Pristine / Excellent / Very good (Keighery 1994) or a High RCV (RCC 2014).			
Exotic plant species 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.	2 hectares or more	5 metres or more
Category B: Patches likely to correspond to a condition of Good (Keighery 1994) or a Medium-High RCV (RCC 2014) AND retains important habitat features.			
Exotic plant species account for more than 30, to 50% of total vegetation cover in the understorey layers (i.e. below the tree canopy)	Mature trees are present with at least 5 trees per 0.5 ha.	2 hectares or more	5 metres or more
Category C: Patches likely to correspond to a condition of Good (Keighery 1994) or a Medium-High RCV (RCC 2014).			
Exotic plant species account for more than 30, to 50% of total vegetation cover in the understorey layers (i.e. below the tree canopy).	Mature trees either absent or less than 5 trees per 0.5 ha are present.	5 hectares or more	5 metres or more
Category D: Patches likely to correspond to a condition of Degraded to Good (Keighery 1994) or a Medium-Low to Medium-High RCV (RCC 2014) BUT retains important habitat features.			
Exotic plant species account for more than 50 to 70% of total vegetation cover in the understorey layers (i.e. below the tree canopy).	Mature trees are present with at least 5 trees per 0.5 ha.	5 hectares or more	5 metres or more

[1] Mature trees have a DBH of 30 cm or above. Trunk diameter varies among eucalypt species, for instance gimlet and mallets tend to have slender trunks (Gosper et al. 2013b, as cited in DotEE 2015). The DBH for mature trees aligns with the EPBC referral guidelines for the breeding habitat of threatened black cockatoo species (SEWPaC 2012). These note that, for salmon gum and wandoo trees, suitable nest hollows can develop in trees with a DBH of 30 cm or more. Note that larger trees may be killed by factors such as intense fire or flood, but the patch may still be in reasonable condition if there are immature trees regenerating.

[2] The minimum patch size thresholds apply to native vegetation remnants that do not occur along roadsides.

[3] Minimum patch width applies only to vegetation remnants along roadsides and tend to be long but narrow. This criterion recognises the importance of native vegetation remnants along road verges, e.g their value as wildlife corridors particularly if linking to other non-roadside remnants, habitat for threatened species and other reasons as detailed by Jackson (2002) and RCC (2015), as cited in DotEE (2015). The width here is based on the native understorey component rather than width of the tree canopy. Some allowance must be made for small breaks or variations in native species cover along linear patches. Given the generally open nature of the tree canopy and some understorey structures, a break in the continuity of native vegetation cover of 50 metres or more, is likely to indicate that separate patches are present. An exception is for main, often bitumen-covered, roads that bisect otherwise continuous vegetation; most local government roads in the Wheatbelt have a road reserve of 20 metres. In these cases, native vegetation along either side of the road is considered to be a separate patch.

Appendix I Fauna species list

Species	Common Name	Observation Type
Birds		
Acanthiza inornata	Western Thornbill	Observed
Anthochaera carunculata	Red Wattlebird	Observed
Artamus cyanopterus	Dusky Woodswallow	Observed
Barnardius zonarius	Australian Ringneck	Observed
Cacatua sanguinea	Little corella	Observed
Coracina maxima	Ground Cuckoo-shrike	Observed, also nest observed
Coracina novaehollandiae	Black-faced Cuckoo Shrike	Observed
Corvus coronoides	Australian Raven	Observed
Cracticus torquatus	Grey Butcher bird	Observed
Eolophus roseicapilla	Galah	Observed
Epthianura albifrons	White-fronted Chat	Observed
Falco cenchroides	Nankeen Kestrel	Heard and Nest Observed
Hirundo neoxena	Welcome Swallow	Observed
Lichenostomus virescens	Singing Honeyeater	Observed
Lichmera indistincta	Brown Honeyeater	Observed
Merops ornatus	Rainbow Bee-eater	Observed
Microcarbo melanoleucos	Little Pied Cormorant	Observed
Pomatostomus superciliosus	White-browed Babbler	Observed
Smicrornis brevirostris	Weebill	Observed
Streptopelia senegalensis	Laughing Dove	Observed
Mammals		
Macropus fuliginosus	Western Grey Kangaroo	Tracks, Scats
Reptiles		
Tiliqua rugosa	Bobtail	Observed

Appendix J Carnaby's Cockatoo foraging habitat quality criteria

Quality	Criteria[1]
High	High foraging value including: • Primary food sources (i.e. Woodlands with tree banksias or marri/jarrah) present at > 60% projected foliage cover; and • Vegetation may be in Good or higher condition with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium to long term).
Moderate to high	Moderate to High foraging value including: • Primary food sources (i.e. Woodlands with tree banksias or marri/jarrah) with 40-60% projected foliage cover; • Primary food sources (i.e. Woodlands with tree banksias or marri/jarrah) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Secondary food sources with >60% projected foliage cover; • Pine plantations with trees more than 10 years old; and • Vegetation may be in Good or higher condition.
Moderate	Moderate foraging value including: • Primary food sources (i.e. Woodlands with tree banksias or marri/jarrah) present at 20-40% projected foliage cover; • Secondary food sources (i.e. Woodlands with primarily secondary food items such as Peppermint, Tuart, York gum, Wattles, etc.) present at 40-60% projected foliage cover; and • Vegetation may be in Degraded or Good condition.
Low to moderate	Low to Moderate foraging value including: • Primary food sources (i.e. shrubby banksias, woodlands with banksias, marri or jarrah, Eucalypt Woodland/Mallee of small-fruited species) present at 5-20% projected foliage cover; • Secondary food sources (i.e. Woodlands with secondary food items such as Peppermint, Tuart, York gum, Wattles, being dominant) present at 20-40% projected foliage; and • Vegetation may be in Degraded or Good condition.
Low	Low foraging value including: • Primary food sources (i.e. shrubby banksias, marri or jarrah trees or open woodland, open Eucalypt Woodland/Mallee of small-fruited species) present at 2-5%; • Secondary food sources (i.e. Woodlands with secondary food items such as Peppermint, Tuart, York gum, Wattles being dominant.) present at 10-20% projected foliage cover; • Vegetation in Degraded condition; • Short-term and/or seasonal food sources such as paddocks with melons or other known food-source weeds (e.g. Erodium spp.).
Negligible to low	Negligible to low foraging value including: • Primary food sources at < 2% PFC, or secondary food sources at <10% PFC. This could include urban areas or cleared paddocks with scattered foraging trees; • Vegetation in Degraded or lower condition; • Short-term and/or seasonal food sources such as paddocks partly vegetated with melons or weeds (e.g. *Erodium* spp.).
Nil	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g. salt lakes, dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes; • Grassy paddocks.

1 Primary and secondary food items compiled using the following sources: Finn 2012, Groom 2011, Heydenrych 2012, SEWPaC 2012 and DotEE 2017.

Appendix K Black Cockatoo potentially suitable trees recorded within the survey area

Tree ID	Tree species	DBH (mm)	Easting	Northing	Suitable Hollow	Foraging, roosting, breeding evidence	Tree rank (1-4)	Comments
82	*Eucalyptus camaldulensis*	>500	478555.5	6563976	No	None	4	Not roosting
83	*Eucalyptus camaldulensis*	>500	478595	6564030	No	None	4	Also provides Roosting
92	Salmon gum	>300	478251.4	6565062	No	None	4	Also provides Roosting
93	Salmon gum	>300	478250	6565069	No	None	4	Also provides Roosting
94	York gum	>500	478357.1	6565606	No	None	4	Not roosting
95	York gum	>500	478360.2	6565604	No	None	4	Not roosting
96	*Eucalyptus camaldulensis*	>500	478375.5	6565616	No	None	4	Also provides Roosting
97	*Eucalyptus camaldulensis*	>500	478382.7	6565613	No	None	4	Not roosting
98	*Eucalyptus camaldulensis*	>500	478386.3	6565610	No	None	4	Not roosting
106	Salmon gum	>300	478346.8	6565972	No	None	4	Also provides Roosting
107	Salmon gum	>300	478308.9	6565937	No	None	4	Not roosting
108	Salmon gum	>300	478293.4	6565955	No	None	4	Not roosting
110	Salmon gum	>300	478306.1	6565898	No	None	4	Not roosting
111	Salmon gum	>300	478316.5	6565888	No	None	4	Not roosting
112	Salmon gum	>300	478318.7	6565887	No	None	4	Not roosting
113	Salmon gum	>300	478318.8	6565893	No	None	4	Not roosting
116	Salmon gum	>300	478211.1	6565195	No	None	4	Also provides Roosting
117	Salmon gum	>300	478204.5	6565156	No	None	4	Also provides Roosting
118	Salmon gum	>300	478198.5	6565118	No	None	4	Also provides Roosting
363	Wandoo	370	478292	6564889	No	None	4	Also provides Roosting
367	Wandoo	370	478241	6564959	No	None	4	Also provides Roosting
368	Wandoo	440	478233	6564980	No	None	4	Also provides Roosting
370	Wandoo	420	478221	6565000	No	None	4	Also provides Roosting
371	Wandoo	>300	478207	6565015	No	None	4	Also provides Roosting
375	Wandoo	530	478132	6565021	No	None	4	Also provides Roosting
378	Wandoo	390	478156	6564946	No	None	4	Also provides Roosting
379	Wandoo	730	478183	6564892	No	None	4	Also provides Roosting

Tree ID	Tree species	DBH (mm)	Easting	Northing	Suitable Hollow	Foraging, roosting, breeding evidence	Tree rank (1-4)	Comments
380	Wandoo	590	478212	6564909	No	None	4	Also provides Roosting
381	Wandoo	720	478225	6564906	No	None	4	Also provides Roosting
382	Wandoo	450	478237	6564897	No	None	4	Also provides Roosting

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