



Targeted Flora, Vegetation and Black Cockatoo habitat assessment of Yandanooka North-East Road

Prepared for Shire of Mingenew

Ref: T21001

**ecological assessment
& management**

Document Control

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Abbreviations and Acronyms

BAM Act	Biosecurity and Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BoM	Bureau of Meteorology
CALM	former Department of Conservation and Land Management (now DBCA), WA Government
CALM Act	Conservation and Land Management Act 1984
DAWE	Department of Agriculture, Water and the Environment, Australian Government
DBCA	Department of Biodiversity, Conservation and Attractions, WA Government
DEC	former Department of Environment and Conservation (now DBCA), WA Government
DEE	former Department of the Environment and Energy, Australian Government (now DAWE)
DPIRD	Department of Primary Industries and Regional Development, WA Government
EPA	Environmental Protection Authority, WA Government
EPBC Act	Environment and Protection and Biodiversity Conservation Act 1999
EP Act	Environment Protection Act 1986
ESA	Environmentally Sensitive Area
EWSWA	Environmental Weed Strategy for Western Australia
GDA94	Geocentric Datum Australia 1994
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature
PEC	Priority Ecological Community
TEC	Threatened Ecological Community

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Executive Summary

The Shire of Mingenew commissioned Terratree to undertake a Targeted flora, vegetation and Black Cockatoo habitat assessment for the proposed clearing of native vegetation within the road reserve of Yandanooka North-East Road. Yandanooka North-East Road is located 20 kilometres east of Mingenew in Yandanooka. The survey area is along approximately 27 km of road and comprises approximately 22.6 hectares in total area.

The survey area lies in the Avon Botanical District within the Wheatbelt Region of the Southwest Province. The Avon Botanical District is generally comprised of scrub-heath on sandplains, thickets of Acacias and Casuarinas on laterite, York Gum (*Eucalyptus loxophleba*), Salmon Gum (*E. salmonophloia*) and Wandoo (*E. wandoo*) woodlands on loams, halophytes on saline soil (Beard 1990).

The Targeted Flora, vegetation and Black Cockatoo habitat assessment field survey was conducted on the 16th and 17th of September 2021 by Senior Botanist Kathya Tippur and Ecologist Jemma Marshall of Terratree.

A total of 31 species of native flora from 16 families were recorded within the survey area. No Threatened or Priority species were found. 18 introduced flora species, representing 17 genera from seven 7 families were recorded. No Weeds of National Significance were found during the survey, however one Declared weed species was recorded, *Echium plantagineum* (Patterson's curse). The remaining 17 species are categorised as Permitted (s11) under the *Biosecurity and Agriculture Management Act (2007)*.

The survey area is classified into two vegetation condition categories, Degraded and Completely Degraded. Degraded vegetation occupies 47.15% of the survey area, and 52.85% is Completely Degraded. Where vegetation was present in Completely Degraded areas, it was almost entirely comprised of weeds, having almost entirely displaced the original native vegetation. A strong correlation is observed between vegetation condition and weed cover.

A total of 21 significant Black Cockatoo habitat trees were recorded within the survey area, with 14 trees having one or more hollows. Three sightings of Black Cockatoos were observed on site during the survey. Species that compete with Black Cockatoos for nesting hollows including Rainbow Lorikeets (*Trichoglossus haematodus*) and the Australian Ringneck (*Barnardius zonariuns*) were also observed during the survey.

Terratree makes the following recommendations for future development on site:

- Impacts on Black Cockatoo habitat should be focused on avoidance of impacts to Black Cockatoo habitat trees with a Diameter at Breast Height of >500mm
- If impacts are unavoidable, then minimise and mitigate impacts, and assess whether the impacts should be referred to the Federal Department of Agriculture, Water and the Environment under the

Environment Protection and Biodiversity Conservation Act 1999 Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPaC 2012).

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1 Introduction

1.1 Background

The Shire of Mingenew commissioned Terratree Pty Ltd (Terratree) to undertake a Targeted flora, vegetation and Black Cockatoo habitat assessment for the proposed clearing of native vegetation within the road reserve of Yandanooka North-East Road (hereafter referred to as 'the survey area'). The clearing is required to facilitate upgrading this section of Yandanooka North-East Road. The objective of the survey was to determine the presence of Threatened and Priority Flora and other species of conservation significance, any Threatened and Priority Ecological Communities within the survey area and to record any Black Cockatoo habitat trees present.

1.2 Project Size and Location

Yandanooka North-East Road is located 20 kilometres (km) east of Mingenew in Yandanooka.

The survey area is along approximately 27 km of road and comprises approximately 22.6 hectares (ha) in total area (**Figure 1**).

1.3 Scope of Work

The scope of work for the project included the following:

- Conduct a desktop assessment to determine the broad environmental values of the survey area and surrounds and to identify Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), Threatened or Priority Flora species that could potentially occur within the survey area
- Undertake a Targeted flora and vegetation field survey in accordance with the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a)
- Undertake a Black Cockatoo habitat tree assessment in accordance with the *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010)
- Produce an inventory of the flora and vegetation communities present and
- Produce figures showing the location of any TECs, PECs or Threatened or Priority Flora if present
- Produce figures showing the extent of the vegetation communities recorded
- Produce figures showing the extent of any variation in vegetation condition observed
- Produce figures showing the location of Black Cockatoo habitat trees

- Prepare a comprehensive technical report detailing the results of the desktop assessment and field survey
- Make management recommendations to avoid in the first instance, and, if unavoidable minimise and mitigate impacts to significant biodiversity values.

2 Regulatory Context

2.1 Relevant Legislation and Guidance

2.1.1 Government Legislation

The following legislation applies to flora, vegetation and the protection of biodiversity in Western Australia:

- *Biodiversity Conservation Act 2016* (BC Act) (WA)
- *Biosecurity and Agriculture Management Act 2007* (BAM Act) (WA)
- *Conservation and Land Management Act 1984* (CALM Act) (WA)
- *Environmental Protection Act 1986* (EP Act) (WA)
- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth).

2.1.2 Government Regulatory Guidelines

The following regulatory guidelines apply to flora, vegetation and the protection of biodiversity in Western Australia:

- Environmental Factor Guideline – Flora and Vegetation (EPA 2016a)
- Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016 (WA Gazette 2016)
- Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual (EPA 2020)
- Environmental Protection (Clearing of Native Vegetation) Regulation 2004
- Environmental Protection (Environmentally Sensitive Areas) Notice 2005
- Guidance Statement No. 33 – Environmental Guidance for Planning and Development (EPA 2008)
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016b)

The following guidelines are relevant to the management of Threatened Black Cockatoo species:

- EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPac 2012)
- EPBC Act Policy Statement 1.1: Significant Impact Guidelines: Matters of National Environmental Significance 2013
- Survey Guidelines for Australia's Threatened Birds: Guidelines for detecting birds listed as threatened under the EPBC Act 1999 (DEWHA 2010)

2.2 Threatened and Priority Flora and Ecological Communities

2.2.1 Biodiversity Protection in Western Australia

Biodiversity in Western Australia is protected, managed and assessed under international, national and state agreements, legislation and policy. For Environmental Impact Assessment, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Biodiversity Conservation Act 2016* (BC Act) are of relevance to WA flora, fauna and ecological communities.

2.2.2 Biodiversity Conservation Act 2016

At the State level, the BC Act provides protection for any native plant or animal species that is indigenous to Western Australia. Any activity in Western Australia that involves taking part of or the whole of a WA native plant or animal (including damage caused by human activities) may require a licence or permit to do so.

Under the BC Act, flora and fauna that have been adequately searched for and are deemed to be either rare or in danger of extinction are gazetted as Threatened species. Specially Protected species (e.g. migratory animals) in need of special protection in the wild are provided with a separate categorisation under the Act. A third category exists for species considered to be Extinct.

The Threatened Species Scientific Committee provides advice to the Minister for Environment on the listing of flora and fauna species to be protected under the BC Act. Threatened species are categorised according to their level of threat using International Union for the Conservation of Nature (IUCN) Red List criteria:

- Critically Endangered – considered to be facing an extremely high risk of extinction in the wild
- Endangered – considered to be facing a very high risk of extinction in the wild in the near future
- Vulnerable – considered to be facing a high risk of extinction in the wild in the medium-term future.

At the State level, the term ‘Threatened’ is commonly used to refer to all species under the classification of Threatened, regardless of their Commonwealth status.

Ecological communities are naturally occurring groups of plant, animals and other organisms that interact within a unique habitat. Under the BC Act, Threatened Ecological Communities (TECs) are now protected through a statutory listing. The Threatened Ecological Communities Scientific Committee provides advice to the Minister for Environment on the listing of ecological communities to be protected under the BC Act. TECs are categorised according to their level of threat:

- Critically Endangered
- Endangered
- Vulnerable

- Presumed Totally Destroyed.

Annually, a government gazette listing current Threatened and Extinct species under the BC Act is issued by the Western Australian Government and listed on the DBCA website. These taxa are legally protected and their removal, or impact to their surroundings, cannot be conducted without Ministerial approval, obtained specifically on each occasion for each population. As the BC Act is transitioning from the Wildlife Conservation Act 1950, the current lists are scheduled under the previous legislation and contain only flora and fauna species, not ecological communities. However, the current list of TECs has been endorsed by the Minister of Environment.

DBCA maintains lists of Priority flora and fauna species and ecological communities (DBCA 2019). These are taxa that are considered poorly known, uncommon or under threat but for which there is insufficient justification, based on known distribution and population sizes, for inclusion as Threatened species or TECs under the BC Act. The categories for Priority species and ecological communities give an indication of the priority for undertaking further surveys based on the number of known sites and degree of threat to those populations.

The DBCA lists are reviewed annually and published on their website, and include all Threatened, Extinct and Priority species and Threatened and Priority ecological communities in WA. DBCA enforces regulations under the BC Act to conserve all Threatened and Priority flora, fauna and ecological communities in WA and protect significant populations.

Conservation codes used for WA flora, fauna and ecological communities are provided in **Appendix A (Tables A.1 and A.2)**.

2.2.3 Environment Protection and Biodiversity Conservation Act 1999

At a Commonwealth level, threatened flora, fauna and ecological communities are protected under the EPBC Act. The species and ecological communities protected at the State level may be different to those protected at the Commonwealth Level (and vice versa). It is therefore important to confirm their status at both State and Commonwealth levels.

Under the provisions of the EPBC Act, proposed actions that potentially have a significant impact on a matter of national environmental significance must be referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) and potentially for the approval of the Commonwealth Minister for the Environment, for a decision as to whether an assessment is required under the provisions of the Act. The matters of national environmental significance are:

- World heritage properties
- National heritage places
- Wetlands of international importance (often called ‘Ramsar’ wetlands after the international treaty under which such wetlands are listed)
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- A water resource, in relation to coal seam gas development and large coal mining development.
- The EPBC Act categorises Threatened species according to their level of threat:
 - Extinct
 - Extinct in the wild
 - Critically endangered
 - Endangered
 - Vulnerable
 - Conservation Dependent.

Threatened Ecological Communities are protected under the following categories under the EPBC Act:

- Critically Endangered
- Endangered
- Vulnerable.

Conservation codes used for Australian flora and TECs protected under the EPBC Act are provided in **Appendix A (Tables A.3 and A.4)**.

2.3 Environmentally Sensitive Areas

Under the Western Australian *Environmental Protection Act 1986* (EP Act), it is an offence to clear native vegetation without a permit or unless an exemption applies. The *Environmental Protection (Environmentally Sensitive Areas) Notice 2005* declares Environmentally Sensitive Areas (ESAs) to include:

- Wetlands and riparian vegetation within 50 m of these
- Areas covered by Threatened Ecological Communities
- Areas of vegetation within 50 m of rare flora

- Bush Forever sites (DEP 2000)
- Declared World Heritage property sites
- Areas included on the Register of the National Estate because of their natural heritage values.

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, exemptions for low impact routine and management practices do not apply to ESAs and a clearing permit is required.

2.4 Introduced Flora (Weeds)

2.4.1 Impacts and Sources of Weeds

When introduced flora (weeds) are established in an existing native vegetation complex, ecological and landscape values can be negatively impacted. Impacts from weeds include, but are not limited to:

- competition with native flora for light, water, space and nutrients
- introduction of associated plant pathogens and pests
- reduced floristic diversity
- altered vegetation structure
- increased risk of soil erosion in some instances
- altered fire regimes.

Weeds can be introduced into existing vegetation complexes by a variety of vectors, both natural and human influenced. Several of these, including wind, surface water and fauna, are naturally occurring processes. Human activities and influences which can introduce exotic flora species into an area include, but are not limited to:

- wheels and machinery, digging/drilling components, etc. that contain plant material or seeds
- altered surface water flow
- introduction of exotic fauna
- disturbance to vegetation and soil.

2.4.2 Declared Pest Plants

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) seeks to prevent serious animal and plant pests and diseases from entering Western Australia and becoming established, and to minimise the spread and impact of any that are already present. The Minister for Agriculture can categorise an organism as a declared pest under the BAM Act if:

- it has or may have an adverse effect on another organism in the area; or human beings in the area; or the environment, or part of the environment, in the area; or agricultural activities, fishing or pearling activities, or related commercial activities, carried on, or intended to be carried on, in the area

- it may have an adverse effect on any of those things if it were present in the area, or if it were present in the area in greater numbers or to a greater extent.

The Western Australian Organism List lists organisms and their legal status in Western Australia under the BAM Act (DPIRD 2019) (Table 1).

Table 1: Legal status of organisms under the BAM Act (DPIRD 2019).

Status	Description
Declared Pest, Prohibited - s12	Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Declared Pest - s22(2)	Declared pests must satisfy any applicable import requirements when imported and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia.
Permitted - s11	Permitted organisms must satisfy any applicable import requirements when imported. They may be subject to an import permit if they are potential carriers of high-risk organisms.
Permitted, Requires Permit - r73	Regulation 73 permitted organisms may only be imported subject to an import permit. These organisms may be subject to restriction under legislation other than the Biosecurity and Agriculture Management Act 2007. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Unlisted - s14	If you are considering importing an unlisted organism/s, you will need to submit the name/s for assessment, as unlisted organisms are automatically prohibited

The *Biosecurity and Agriculture Management Regulations 2013* categorises declared pests into four control categories (DPIRD 2019) (Table 2).

Table 2: Control categories for declared pests (DPIRD 2019).

Declared Plant Category	Description
C1 - Exclusion	Organisms which should be excluded from part or all of Western Australia.
C2 - Eradication	Organisms which should be eradicated from part or all of Western Australia.
C3 - Management	Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.

Declared Plant Category	Description
Unassigned	Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the Act.

Under the BAM Act, a local government can also declare a plant to be a ‘pest plant’, so long as it is not already a declared plant under the Act. These plants are gazetted under a local government’s local laws and allow control to be enforced on any private land within a local government’s boundaries. A local law can be made for the purpose of:

- “prescribing as a pest plant in that district any plant (other than a declared pest for that area) that, in its opinion, is likely to adversely affect the environment of the district, the value of property in the district or the health, comfort or convenience of the inhabitants of the district” (BAM Act).

2.4.3 Environmental Weeds

The State of the Environment Report (EPA 2007) identifies over 300 weed species as occurring in the South West bioregion. The Environmental Weed Strategy for Western Australia (EWSWA; CALM 1999) rated all weeds known in Western Australia at the time of publication according to their invasiveness, distribution and environmental impacts (Table 3). The weeds were classified into four categories: High, Moderate, Mild and Low. High-rated species are those that all three criteria apply to, and Moderate-rated species are those where only two of the criteria apply. The EWSWA assessed 1,350 weed species recorded in Western Australia, with 34 weed species classified as High.

Table 3: Criteria for Environmental Weeds Strategy rating (CALM 1999)

Criteria	Description
Invasiveness	Ability to invade bushland in good to excellent condition or ability to invade waterways.
Distribution	Wide current or potential distribution including consideration of known history of widespread distribution elsewhere in the world.
Environmental Impacts	Ability to change the structure, composition, and function of ecosystems. In particular, an ability to form a monoculture in a vegetation community.

2.4.4 Weeds of National Significance (WONS)

At a national level, there are 32 weed species listed as Weeds of National Significance (WONS) (DAWE 2021a). These are plants that have been selected for their invasiveness and impact characteristics, potential and

current area of spread and their primary industry, environmental and socioeconomic impacts. The Australian Weeds Strategy 2017–2027 (IPAC 2017) describes the broad goals and objectives in managing weeds in Australia, including WONS species. Many Weeds of National Significance are also declared pests under the BAM Act in WA.

3 Existing Environment

3.1 Biogeography

The Interim Biogeographic Regionalisation for Australia (IBRA) has defined 89 bioregions and 419 subregions across Australia, based on climate, geology, landforms, native vegetation and species (DEE 2012). These provide a useful method for reporting biodiversity patterns and categorising survey areas. The survey area is located within the Avon Wheatbelt 01 (AVW01) IBRA subregion.

A biodiversity audit of Western Australia's subregions classified this subregion as follows:

"The Avon Wheatbelt bioregion is a dissected plateau of Tertiary laterite in the Yilgarn Craton. The western subregion is characterised as 'gently undulating landscape of low relief with Proteaceous scrub-heaths, rich in endemic species, on lateritic uplands and derived sandplains. mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on Quaternary alluvials and eluvials. Within this bioregion, AVW01 is an ancient peneplain with low relief, gently undulating landscape. There is no connected drainage; salt lake chains occur as remnants of ancient drainage systems that now only function in very wet years. Lateritic uplands are dominated by yellow sandplain" (Beecham 2001).

Dominant land uses in the area are dryland agriculture and grazing. Smaller areas are used for Crown reserves, conservation, mining operations, and rural residential communities (Beecham 2001).

3.2 Regional Vegetation

The survey area lies in the Avon Botanical District within the Wheatbelt Region of the Southwest Province. The Avon Botanical District is generally comprised of scrub-heath on sandplains, thickets of Acacias and Casuarinas on laterite, York Gum (*Eucalyptus loxophleba*), Salmon Gum (*E. salmonophloia*) and Wandoo (*E. wandoo*) woodlands on loams, halophytes on saline soil (Beard 1990).

3.3 Soils and Landforms

The Department of Primary Industries and Regional Development (DPIRD 2019) soil mapping for Western Australia show the survey area lies in the Lockier Zone within the Greenough Province.

The Greenough Province is described as follows:

"Laterised plateau (dissected at the fringes) on the sedimentary rocks of the Perth Basin and gneiss of the Northampton Complex. Yellow deep sands with Pale deep sands and some Gravelly pale deep sands and Red-brown hardpan shallow loams" (Tille 2006).

The Lockier Zone is described as:

“River valleys of the Irwin, Lockier and Arrowsmith Rivers. Alluvial valley plains underlain by Proterozoic granulites, Permian and Jurassic sediments. Outliers of Victoria Plateau Zone occur within zone. Clayey to silty soils” (Purdie et al. 2004).

The characteristics of all soil subsystems within the survey area are listed in **Table 4**.

Table 4: Soil subsystems within the survey area.

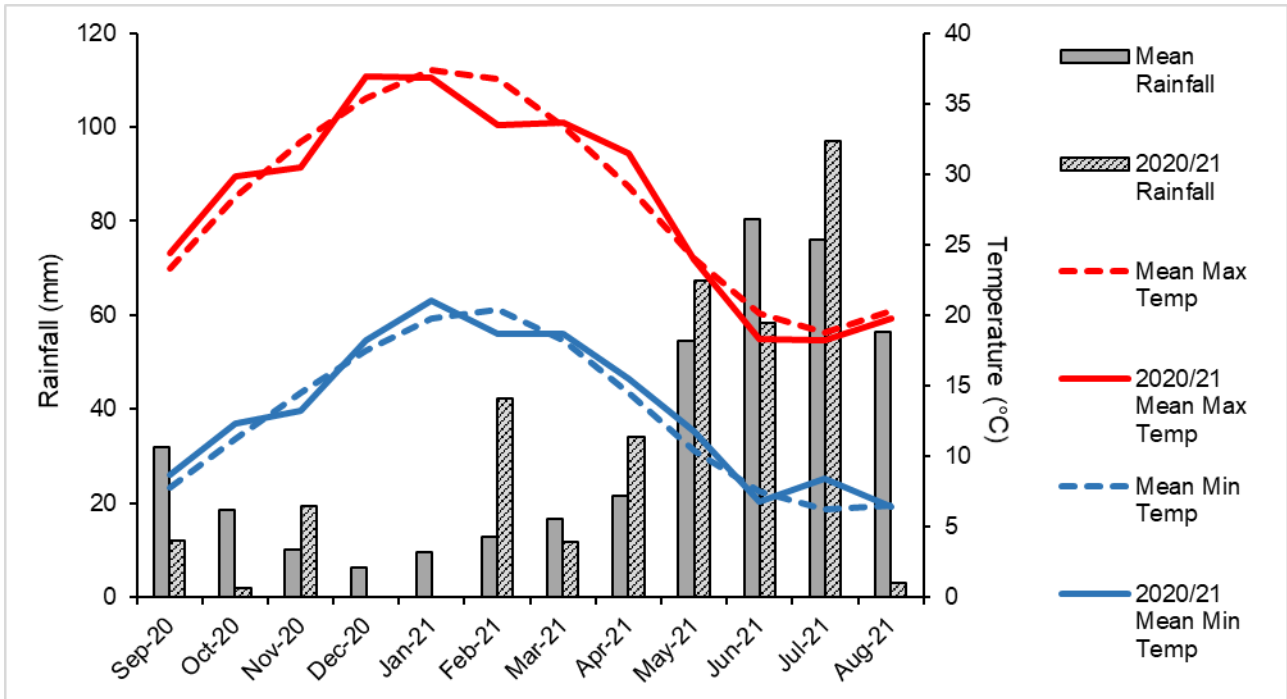
Subsystem Name (and symbol) (DPIRD 2019)	Mount Scratch 3 (226Ms_3)
Phase Description (DPIRD 2019)	Slopes and undulating rises; loamy earths and duplexes, some saline.
Location within survey area	Southern portion of the survey area.
Subsystem Name (and symbol) (DPIRD 2019)	Mullingarra 1 (226Mg)
Phase Description (DPIRD 2019)	Dissected undulating low hills with prominent rocky rises and stony ridges with short moderately inclined slopes. Gently inclined lower slopes; red and brown gravelly duplex soils and shallow soils with a high proportion of quartz gravel.
Location within survey area	Southern portion of the survey area.
Subsystem Name (and symbol) (DPIRD 2019)	Mount Budd 3 (226Mb_3)
Phase Description (DPIRD 2019)	Very gently to gently inclined lower foot slopes with cracking brown alkaline clays and minor areas of sandy loam gradational soils.
Location within survey area	Dominates the northern and central portion of the survey area. Covers a tiny section on the southern portion of the survey area.
Subsystem Name (and symbol) (DPIRD 2019)	Yandanooka 3 (226Yn_3)
Phase Description (DPIRD 2019)	Alluvial plain and lower slopes of the Yandanooka Valley. Sandy loam duplex soils and red and brown clays.
Location within survey area	Covers the lower central portion of the survey area.
Subsystem Name (and symbol) (DPIRD 2019)	Yandanooka 1 (226Yn_1)
Phase Description (DPIRD 2019)	Stream bed and immediate alluvial plain of rivers and creeks of the Yandanooka Valley. Well drained red sands and moderately well to poorly drained sandy loamy duplex soils.

Location within survey area	Covers a tiny section on the lower central portion of the assessment area.
Subsystem Name (and symbol) (DPIRD 2019)	Yandanooka 2 (226Yn_2)
Phase Description (DPIRD 2019)	Low rises of yellowish red and red sandy soils over sandstone.
Location within survey area	Covers a tiny section on the lower central portion of the assessment area.
Subsystem Name (and symbol) (DPIRD 2019)	Mount Budd 2 (226Mb_2)
Phase Description (DPIRD 2019)	Gently to moderately inclined upper foot slopes, eroded sandy loam duplex soils and rocky loams.
Location within survey area	Covers a tiny section on the northern portion of the assessment area.

3.4 Climate

The Avon Botanical District experiences a dry warm mediterranean climate with winter precipitation 300-650 mm and 7-8 dry months per year (Beard 1990).

Temperature data from Morawa airport weather station #8296 and rainfall data from Mingenew weather station #8088 are shown in **Graph 1**. Mean annual rainfall is 395.3 mm, placing the survey area within the Transitional Rainfall Zone (300-800 mm) classified by Hopper (1979). Most of the rainfall occurs between May and August. Total rainfall recorded for the 12 months prior to the survey was 347.0 mm, 48.3 mm below the mean annual rainfall for the area. Monthly mean temperatures were close to long-term mean records. Climate was not considered a limitation to the survey.



Graph 1: Rainfall data from Mingenew weather station #8088 and temperature data from Morawa airport weather station #8296 (BoM 2021).

4 Methods

The Targeted flora and Vegetation survey consisted of a desktop assessment followed by a field survey, conducted in accordance with the Environmental Protection Authority's (EPA) *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2018a) and applied in conjunction with the *Environmental Factor Guideline for Flora and Vegetation* (EPA 2018b). The Black Cockatoo Habitat Tree assessment was conducted in accordance with Survey Guidelines for Australia's Threatened Birds (DEWHA 2010) and applied in conjunction with the EPBC Act 1999 Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPaC 2012).

4.1 Desktop Review Methods

Prior to the field survey, a desktop review was undertaken to identify Threatened and Priority Flora and Ecological Communities previously recorded within the survey area and surrounds. The review involved:

- Review of findings from previous studies within or near the project area
- Review of relevant existing literature as available
- Search Threatened and Priority Flora and communities databases including:
 - DBCA Naturemap database (10 km radius)
 - Commonwealth (EPBC Act) Protected Matters Database (PMST) (10 km radius)
 - DBCA Threatened and Priority Flora (TPFL) Databases (custom database search request, 20 km radius)
 - Western Australian Herbarium Specimen (WA Herb) database (custom database search request, 20 km radius)
 - DBCA TEC Database (Custom database search request, 20 km radius)
- Analysis of aerial imagery, broadscale vegetation mapping data, and vegetation and landscape feature spatial data to identify expected vegetation assemblages and significant landscape features.

4.2 Field Survey Strategy

4.2.1 Targeted Flora and Vegetation survey

The Targeted Flora, Vegetation and Black Cockatoo Habitat assessment field survey was conducted on the 16th and 17th of September 2021 by Senior Botanist Kathya Tippur and Ecologist Jemma Marshall of Terratree. The survey area was extensively traversed by foot to verify and define vegetation communities and to search for Threatened or Priority flora identified as potentially occurring within the survey area during the desktop

review. Relevés and opportunistic sampling was conducted to delineate vegetation communities and search for Targeted species.

Where species could not be identified in the field, they were collected, labelled, pressed, dried and frozen in accordance with the requirements of the WA Herbarium. Subsequently, their identification was confirmed by Senior Botanist-Taxonomist, Kathya Tippur, by comparing collections with pressed specimens housed at the herbarium and using taxonomic keys and other reference materials.

Survey limitations are discussed in **Section 5.4**.

4.2.2 Determining Vegetation Communities

Vegetation communities encountered within the survey area are described in accordance with the Scheme for Description of Vegetation Structure in the *Native Vegetation Condition Assessment and Monitoring Manual for Western Australia* (DEC 2009) (**Table 5**). The scheme uses the dominant species in each stratum, combined with projected foliage cover to describe the vegetation units.

Table 5: Scheme for Description of Vegetation Structure in the *Native Vegetation Condition Assessment and Monitoring Manual for Western Australia* (DEC 2009)

Canopy Cover				
Growth Form/ Height Class	100% to 70%	70% to 30%	30% to 10%	10% to 2%
Trees over 30 m	Tall Closed Forest	Tall Open Forest	Tall Woodland	Tall Open Woodland
Trees 10-30 m	Closed Forest	Open Forest	Woodland	Open Woodland
Trees under 10 m	Low Closed Forest	Low Open Forest	Low Woodland	Low Open Woodland
Mallee over 8 m (Tree Mallee)	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Mallee under 8 m (Shrub Mallee)	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub
Shrubs over 2 m	Closed Tall Scrub	Tall Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs 1-2 m	Closed Heath	Open Heath	Shrubland	Open Shrubland
Shrubs under 1 m	Closed Low Heath	Open Low Heath	Low Shrubland	Very Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

4.2.3 Describing Vegetation Condition

The Keighery (1994) vegetation disturbance scale was used to determine the condition of vegetated areas within the survey area. In accordance with the EPA Guidance (EPA 2016b), the Keighery (1994) vegetation disturbance scale is applied in the south-west and interzone botanical province and ranks vegetation condition from Pristine through to Completely Degraded .

Vegetation condition ratings relate to vegetation structure, level of disturbance in each stratum, and the ability for the vegetation to recover.

The Keighery (1994) vegetation disturbance scale is presented in **Table 6**.

Table 6: Keighery vegetation disturbance scale and assessability (Keighery 1994, adapted from EPA 2016a).

Scale		Condition
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, Dieback and grazing.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, Dieback and grazing.
6	Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

4.2.4 Black Cockatoo Habitat Tree Assessment

Potential Breeding Habitat Trees as per the EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPac 2012) are defined as:

“...trees of species known to support breeding...” “...within the range of the species which either; have a suitable nest hollow OR are of a suitable Diameter at Breast Height (DBH) to develop a nest hollow. For most tree species, suitable DBH is 500mm. For Salmon Gum and Wandoo, suitable DBH is 300mm.”

The following information was recorded:

- Tree ID number
- Location - GPS coordinates (GDA 94)
- Tree condition
- Species
- Diameter at Breast Height approximately 1.5m above the ground (DBH)
- Height
- Health (alive or dead)
- The presence or absence of hollows
- Evidence of use of hollows if present
- Photo of tree and hollows if present.

As well as searching for habitat trees, visual and audio observations of Black Cockatoos were recorded as well as food and roosting habitat in accordance with Survey Guidelines for Australia's Threatened Birds (DEWHA 2010).

4.3 Mapping

Vegetation community areas and condition were digitised using QGIS 3.10 (QGIS Development team 2021), by digitising vector polygons over a high-resolution aerial photography layer (**Figure 2**).

Vegetation mapping was conducted by delineating plant communities based on distinctive characteristics such as vegetation structure, dominant species and species composition. A combination of aerial photography and ground-truthing and collecting data using a hand-held GPS unit, was used to interpret the vegetation patterns present in the survey area.

The habitat trees with an adequate DBH were digitised using QGIS 3.4 software (QGIS Development Team 2018), by digitising GSP point locations over a high-resolution aerial photograph layer in **Figure 2**.

5 Results

5.1 Desktop Review Results

5.1.1 Threatened and Priority Flora

The database search using NatureMap and EPBC Protected Matters Search Tool (PMST) for Threatened and Priority flora (TPFL) records showed a total of 35 flora records within 10 km from the search area. TPFL within 10 km consisted of sixteen Threatened, eight Priority 1, four Priority 2 and seven Priority 3 flora species.

Table 7 lists the Threatened and Priority flora species recorded within the 10 km radius search area in the NatureMap and EPBC Protected Matters database. The DBCA WA Herbarium and TPFL Databases custom search showed no records within the survey area but several nearby (DBCA 2021a, DBCA 2021b). This data provides useful information on the expected habitat and associated vegetation of Priority species potentially occurring within the survey area.

Table 7: Threatened and Priority flora recorded within 10 km radius of survey area (DAWE 2021b, DBCA 2021)

Taxon Name and Conservation Status		EBPC
THREATENED	<i>Acacia cochlocarpa</i> subsp. <i>cochlocarpa</i>	EN
	<i>Chorizema humile</i>	EN
	<i>Dasymalla axillaris</i>	CR
	<i>Eremophila nivea</i>	EN
	<i>Eremophila viscida</i>	EN
	<i>Eucalyptus crispata</i>	VU
	<i>Gastrolobium hamulosum</i>	EN
	<i>Glyceria drummondii</i>	EN
	<i>Grevillea christineae</i>	EN
	<i>Grevillea murex</i>	EN
	<i>Grevillea pythara</i>	EN
	<i>Gyrostemon reticulatus</i>	CR
	<i>Hemiandra gardener</i>	EN
	<i>Schoenia filifolia</i> subsp. <i>subulifolia</i>	EN
	<i>Verticordia spicata</i> subsp. <i>squamosa</i>	EN
	<i>Wrumbia tubulosa</i>	EN

Taxon Name and Conservation Status		EBPC
PRIORITY 1	<i>Dodonaea scurra</i>	
	<i>Grevillea leptopoda</i>	
	<i>Leucopogon stokesii</i>	
	<i>Malleostemon decipiens</i>	
	<i>Scholtzia brevistylis</i> subsp. <i>brevistylis</i>	
	<i>Tricoryne soullierae</i>	
	<i>Verticordia comosa</i>	
	<i>Vittadinia cervicalaris</i> var. <i>occidentalis</i>	
PRIORITY 2	<i>Acacia chapmanii</i> subsp. <i>chapmanii</i>	
	<i>Calothamnus arcuatus</i>	
	<i>Calytrix purpurea</i>	
	<i>Chamelaucium repens</i>	
PRIORITY 3	<i>Acacia isoneura</i> subsp. <i>isoneura</i>	
	<i>Acacia lanceolata</i>	
	<i>Cryptandra stellulata</i>	
	<i>Lechenaultia juncea</i>	
	<i>Melaleuca barlowii</i>	
	<i>Petrophile globifera</i>	
	<i>Thryptomene nitida</i>	

(VU: Vulnerable, EN: Endangered, CR: Critically Endangered)

5.1.2 Threatened and Priority Ecological Communities

The DBCA Threatened Ecological Community (TEC) database custom search revealed the survey area is not located within any TEC's or PEC's (DBCA 2021c). There is, however, records of the Priority 3 community Eucalypt woodlands of the Western Australian Wheatbelt, approximately 5 km east of Yandanooka North-East Road (DBCA 2021c).

5.2 Field Survey Results

5.2.1 Native Flora Identified

A total of thirty one (31) flora species from sixteen (16) families were recorded within the survey area. The most common families were Fabaceae, of which most were *Acacia* spp., and *Senna* spp., and Chenopodiaceae. Two other common families are Asteraceae (daises) and Poaceae (grasses). A list of all the flora species recorded in the survey area can be found in **Appendix B**. *Acacia* was the most common genera, with a representative occurring in each community.

5.2.2 Threatened and Priority Flora Recorded

No Threatened or Priority Flora was recorded during the survey.

5.2.3 Vegetation Communities

Three vegetation communities were observed within the survey area. Community 1 comprises 44.25% of the survey area and is characterised as a Low open woodland of *Eucalyptus loxophleba* subsp. *loxophleba*, over open shrubland of *Acacia daphnifolia* and *Acacia tetragonophylla* over very open shrubland of *Dodonaea* and *Acacia acuminata* over highly degraded weedy grassland. Community 2 comprises 52.85% and is characterised as an Open shrubland of *Acacia tetragonophylla* over scattered shrubs of *Senna glutinosa* subsp. *chatelainiana* over degraded weedy grassland. The drainage lines are Community 3 which make up 2.9% and are characterised as Open woodland of *Eucalyptus camaldulensis* over scattered shrubs of *Acacia* spp., over degraded weedy grassland. **Appendix C** outlines descriptions, area summaries and pictures of each vegetation community.

5.2.4 Threatened and Priority Ecological Communities and Environmentally Sensitive Areas (ESA)

No Threatened or Priority Ecological Communities or ESA's are present in the survey area.

5.2.5 Vegetation Condition

The survey area is classified into two condition categories, Degraded and Completely Degraded, in accordance with **Table 6**. Vegetation Community 1 and 3 are Degraded and occupy 47.15% of the survey area. Community 2 is Completely Degraded and accounts for 52.85%. Vegetation condition is spatially represented in **Figure 2**.

5.2.6 Introduced Flora

Eighteen (18) introduced flora species were recorded in the survey area, representing seventeen (17) genera from seven (7) families (**Appendix B**). No Weeds of National Significance (WoNS) were recorded during the

survey, however one Declared weed species listed under the *BAM Act* 2007 was recorded, *Echium plantagineum* (Patterson's curse). The remaining 17 species are categorised as Permitted (s11) under the *BAM Act* (2007) and control measures are not mandated for plants categorised as Permitted (s11) (DPIRD 2021).

Appendix B contains a full list of flora species recorded in the survey area.

5.3 Threatened Flora Habitat Trees

A total of 21 significant Black Cockatoo habitat trees were recorded within the survey area, with 14 trees having one or more hollows **Figure 2**. Habitat Trees were all York Gums (*Eucalyptus loxophleba* subsp. *loxophleba*). **Appendix D** contains the details of the 21 habitat trees found in the survey area, and **Appendix E** shows photos for each tree.

5.4 Survey Limitations

5.4.1 Flora and Vegetation survey

There were no limitations to the survey. The potential limitations of the survey, as outlined in the EPA Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016b) are listed and their impacts discussed in **Table 8**.

Table 8: Discussion of potential limitations to the survey (adapted from EPA 2016b)

Potential Limitation	Impact and Discussion
Availability of contextual information at a regional and local scale	Not a Limitation There was adequate local and regional background information to inform the Desktop study of the survey area.
Competency and experience of the team carrying out the survey, including experience in the bioregion surveyed	Not a Limitation The field survey was carried out by suitably qualified and experienced Botanist, Kathya Tippur (MSc. Botany) who has extensive experience as in Botany throughout Western Australia.
Proportion of flora recorded and/or collected, any identification issues or taxonomic uncertainty	Not a Limitation The survey and relevés were undertaken in accordance with EPA Guidance (2016b) and plant specimens collected when botanists were not able to identify plants in the field. Opportunistic sampling was undertaken between relevés to ensure the survey area was adequately sampled. Two species could not be identified beyond genus level however these genera, <i>Chenopodium</i> and <i>Atriplex</i> were not in list of TPFL targeted during the survey and is highly unlikely to be a Threatened or Priority Flora species.
Survey effort and extent	Not a Limitation The intensity of the survey was adequate. By the end of the survey no new vegetation types and few new plant species were being encountered.
Access restrictions within the survey area	Not a Limitation Access to the survey site was not inhibited, all parts of the small survey areas could be accessed on foot.
Survey timing, rainfall, season of survey	Not a Limitation The EPA (2016a) Guidance recommends South-West surveys be undertaken in Spring from September to November. The survey was undertaken in mid-September, optimal timing for this region.
Disturbance that may have affected the results of survey (e.g. fire, flood or clearing)	Not a Limitation The survey area was next to a sealed road, this did not impede the survey.
Other limitations (e.g. Mapping reliability, resources)	Not a Limitation There were no other survey specific limitations.

5.4.2 Black Cockatoo Habitat Tree Survey

There were no significant limitations to the Black Cockatoo habitat tree survey. The following factors influenced the accuracy of the survey results:

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- Tree hollows were searched for and observed visually, from the ground without the use of telescopic cameras or drones. Identifying hollows suitable for fauna species from ground level has limitation in that some hollows may not be visible at all from ground level and may get missed.
- Except when it is very hot, Black cockatoos typically roost in the evening and at night, and the survey was conducted during daylight hours DSEWPaC (2012). As such, it was not possible to directly observe roosting, however, evidence for roosting (such as feathers and scats) was searched for during the survey, as well as included in the desktop study.
- Tree locations were recorded with a handheld GPS having the accuracy of 3 to 5 meters.

6 Discussion

6.1 Threatened and Priority Flora

No Threatened or Priority Flora were recorded during the Targeted flora and vegetation survey conducted by Terratree in September 2021.

6.2 Vegetation Communities

The three vegetation communities described are distinguished by the upper stratum, which are comprised of trees (either *Eucalyptus loxophleba* subsp. *loxophleba* or *E. camaldulensis*) or large shrubs (*Acacia tetragonophylla* and *Senna glutinosa* subsp. *chatelainiana*). The lower stratum of Community 1 and 3 are homogenous containing a middle stratum of *Acacia* spp. or *Senna glutinosa* subsp. *chatelainiana* and a lower stratum comprised mostly of weedy grasses. The surrounding land use from agriculture and the degraded condition of the vegetation along the road side has allowed many weed species to colonise the area.

The upper stratum of the communities hold importance as they support significant habitat trees for Black Cockatoos. See **Section 16** below.

Vegetation community descriptions and photos can be found in **Appendix C**.

6.3 Vegetation Condition

The vegetation condition within the survey area ranges from Degraded to Completely Degraded. Where vegetation was present in Completely Degraded areas, it was almost entirely comprised of weeds, having almost entirely displaced the original native vegetation (**Photo 1**).

A strong correlation is observed between vegetation condition and weed cover, as represented in **Figure 2**.

6.4 Introduced Flora

The dominant land use surrounding the project is agriculture which, in conjunction with the degraded condition of the vegetation, has resulted in a high weed cover in the project area. One Declared weed species was recorded – *Echium plantagineum*, described below.

6.4.1 *Echium plantagineum* (Declared Pest)

Echium plantagineum is an erect annual or biennial herb, growing 0.1 – 0.6 m high. It is an invasive weed of roadsides, vacant lands and disturbed grounds that forms dense monocultures and produces large amounts

of seed that can germinate at any time of the year. Seeds may lay dormant in the soil for up to 6 years (WA Herbarium 2021).

Echium plantagineum has the tendency to out compete crops, invade pastures and can be toxic to livestock, especially horses (DPIRD 2020).

Several individuals of *Echium plantagineum* were recorded dispersed widely throughout the survey area.

6.5 Threatened Fauna Habitat Trees

A total of 21 significant Black Cockatoo habitat trees were recorded within the survey area, with 14 trees having one or more hollows **Figure 2**.

Three sightings of either *Calyptorhynchus banksia nano* (Forest Red-Tail), *Calyptorhynchus latirostris* (Carnaby) or *Calyptorhynchus baudinii* (Baudin) Cockatoos were observed to be active on the site, with a total of 3 sightings of over the 2 days of the survey. Identification of which Black Cockatoo's was too difficult to observe from a distance. Species that can compete with Black Cockatoo's for nesting hollows such as Rainbow Lorikeets (*Trichoglossus haematodus*) and the Australian Ringneck (*Barnardius zonariuns*) were also observed during the survey.

7 Conclusions and Recommendations

A total of 31 species of native flora from 16 families were recorded within the survey area. No Threatened or Priority species were found. 18 introduced flora species, representing 17 genera from seven 7 families were recorded. No WoNS were found during the survey, however one Declared weed species was recorded, *Echium plantagineum* (Patterson's curse). The remaining 17 species are categorised as Permitted (s11) under the *BAM Act* (2007) and control measures are not mandated for plants categorised as Permitted (s11) (DPIRD 2021).

The survey area is classified into two condition categories, Degraded and Completely Degraded. Degraded vegetation occupies 47.15% of the survey area, and 52.85% is Completely Degraded. Where vegetation was present in Completely Degraded areas, it was almost entirely comprised of weeds, having almost entirely displaced the original native vegetation. A strong correlation is observed between vegetation condition and weed cover.

A total of 21 significant Black Cockatoo habitat trees were recorded within the survey area, with 14 trees having one or more hollows. Three sightings of Black Cockatoos were observed on site during the survey. Species that compete with Black Cockatoo's including Rainbow Lorikeets and the Australian Ringneck were also observed during the survey.

Terratree makes the following recommendations for future development on site:

- Impacts on Black Cockatoo habitat should be focused on avoidance of impacts to Black Cockatoo habitat trees with a Diameter at Breast Height of >500mm
- If impacts are unavoidable, then minimise and mitigate impacts, and assess whether the impacts should be referred to the Federal Department of Agriculture, Water and the Environment under the *Environment Protection and Biodiversity Conservation Act 1999 Referral Guidelines for Three Threatened Black Cockatoo Species* (DSEWPaC 2012).

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9 Photos



Photo 1: Completely Degraded vegetation along Yandanooka North-East Road



Photo 2: *Eucalyptus camaldulensis* at the southern end of Yandanooka North-East Road



Photo 3: Tree hollow in *Eucalyptus loxophleba* subsp. *loxophleba* along Yandanooka North-East Road

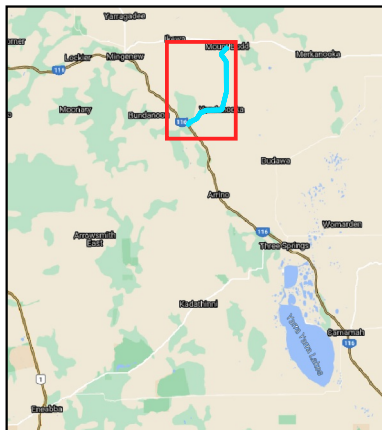
10 Figures

Figure 1: Project location map



Legend

- Yandanooka NE Rd Proposed Clearing Permit Area
- Towns
- State Road



Project Location

Project Location Map

2021 Targeted Flora, Vegetation and Black Cockatoo Habitat assessment of Yandanooka North-East Road for the Shire of Mingenew

0 2,000 4,000 6,000 8,000 10,000 m



Datum: GDA 1994
Projection: MGA Zone 50

Scale: 1: 20,000 at A3

Date: 22/10/2021	Prepared: N. Lai	Project No: T21001
Expiry: NA	Checked: J. Grehan	
Figure 1		Revision:
		Review:

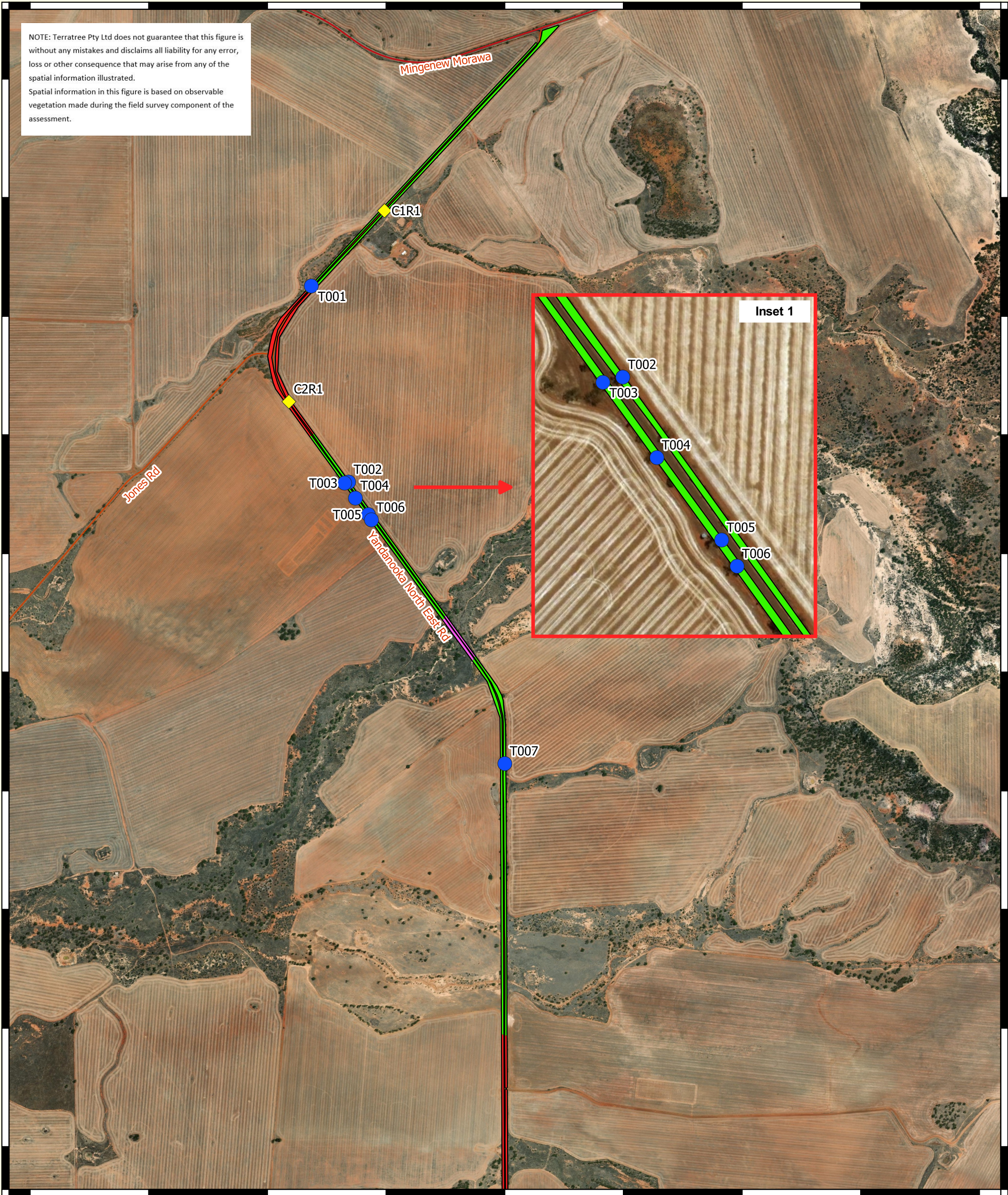
Figure 2a: Black Cockatoo Habitat trees and Vegetation Communities and Condition map

366500 367000 367500 368000 368500 369000 369500 370000 370500

NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated. Spatial information in this figure is based on observable vegetation made during the field survey component of the assessment.

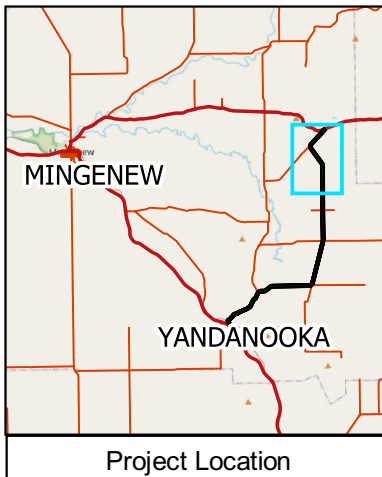
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Legend

- Yandanooka NE Rd Proposed Clearing Permit Area
 - ◆ Relevé location
 - Black Cockatoo Habitat tree
 - Local Road
 - State Road
- Vegetation Communities and Condition**
- C1 (Degraded)
 - C2 (Completely Degraded)
 - C3 (Degraded)



Black Cockatoo Habitat trees and Vegetation Communities and Condition Map

2021 Targeted Flora, Vegetation and Black Cockatoo Habitat assessment of Yandanooka North-East Road for the Shire of Mingenew

N

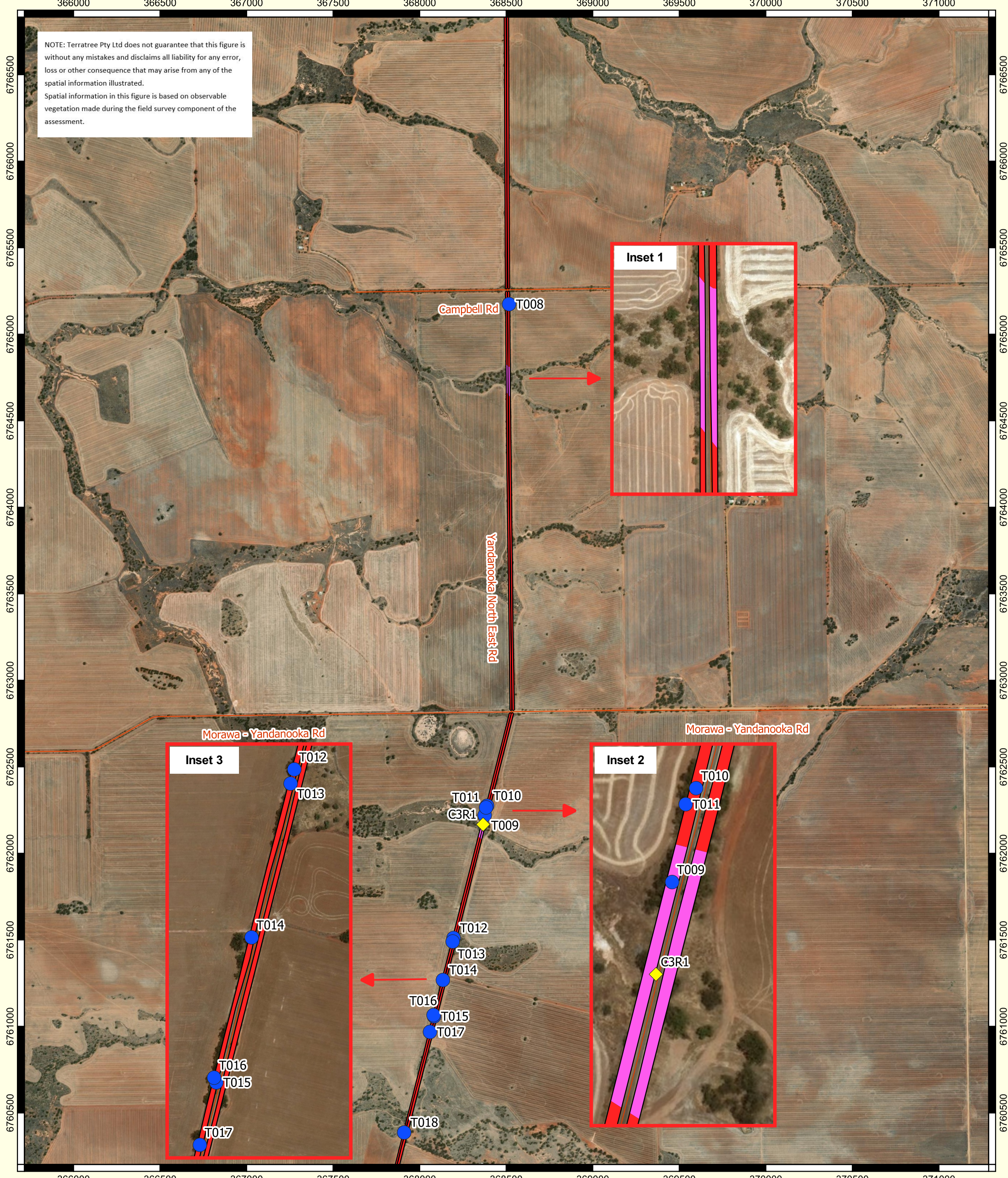
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Datum: GDA 1994 Scale: 1: 15,000
Projection: MGA Zone 50 at A3

Date: 22/10/2021	Prepared: N. Lai	Project No: T21001
Expiry: NA	Checked: J. Grehan	
	Revision:	
	Review:	

Figure 2a

Figure 2b: Black Cockatoo Habitat trees and Vegetation Communities and Condition map



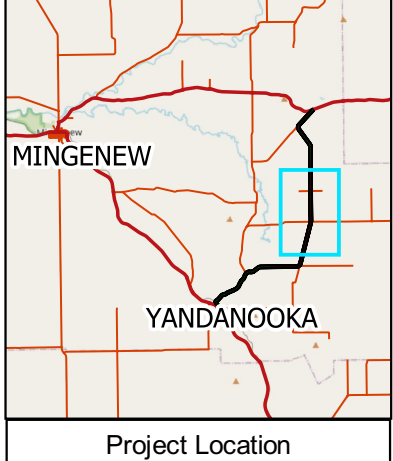
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Legend

- Yandanooka NE Rd Proposed Clearing Permit Area
- ◆ Relevé location
- Black Cockatoo Habitat tree
- Local Road
- State Road

Vegetation Communities and Condition

- C1 (Degraded)
- C2 (Completely Degraded)
- C3 (Degraded)



Black Cockatoo Habitat trees and Vegetation Communities and Condition Map

2021 Targeted Flora, Vegetation and Black Cockatoo Habitat assessment of Yandanooka North-East Road for the Shire of Mingenew

0 200 400 600 800 1,000 m

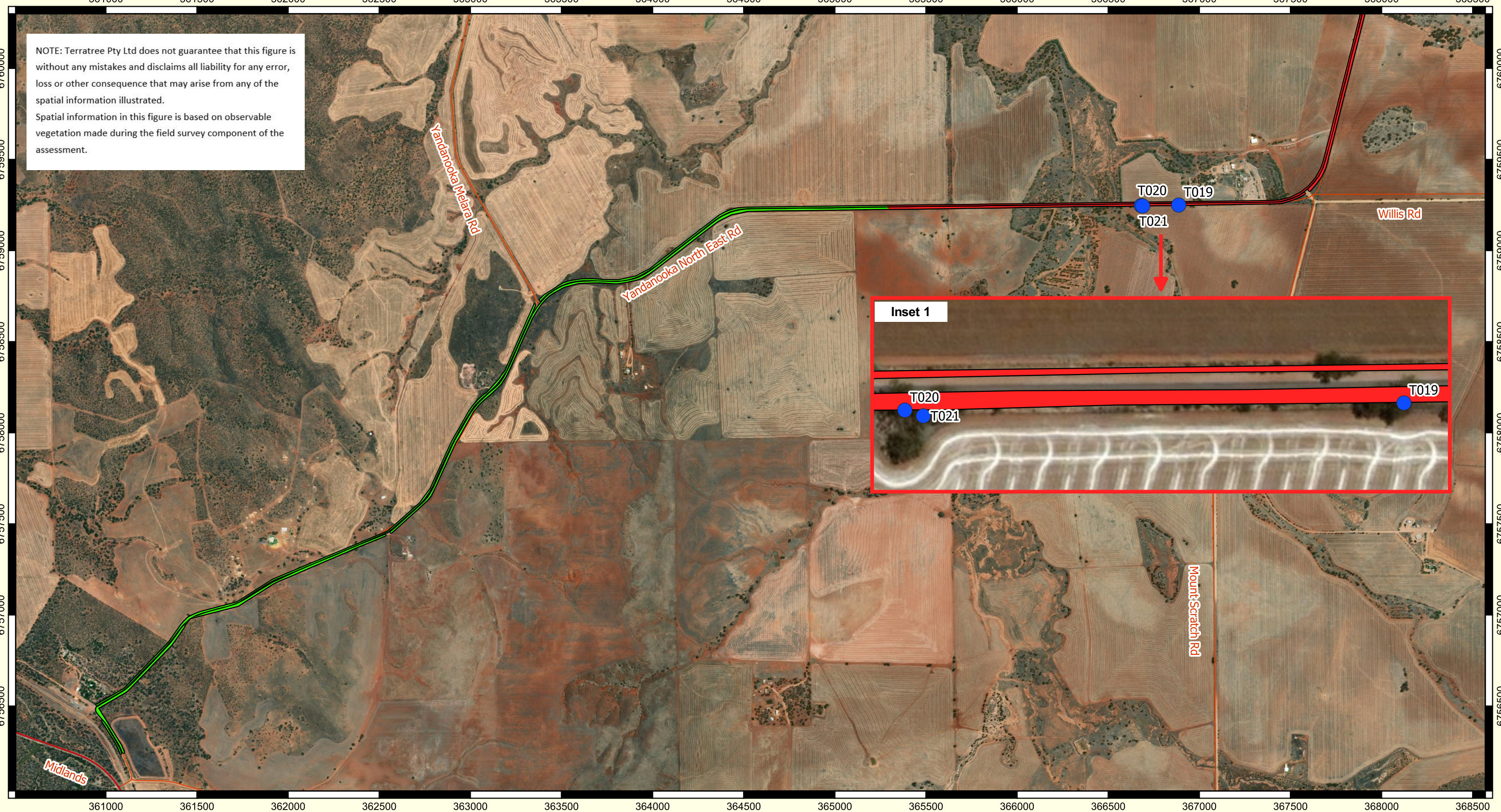
Datum: GDA 1994
Projection: MGA Zone 50
Scale: 1: 20,000 at A3

Date: 22/10/2021	Prepared: N. Lai	Project No: T21001
Expiry: NA	Checked: J. Grehan	
Figure 2b	Revision:	
	Review:	

Figure 2c: Black Cockatoo Habitat trees and Vegetation Communities and Condition map

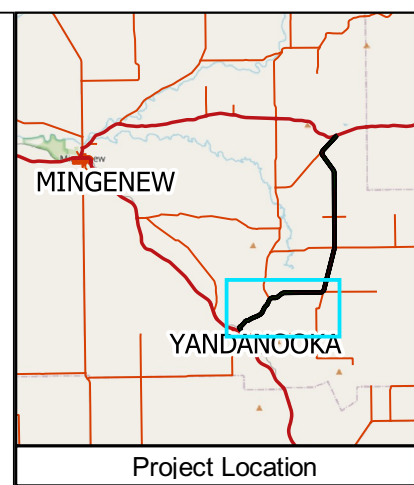
NOTE: Terratree Pty Ltd does not guarantee that this figure is without any mistakes and disclaims all liability for any error, loss or other consequence that may arise from any of the spatial information illustrated.

Spatial information in this figure is based on observable vegetation made during the field survey component of the assessment.



- Legend**
- Yandanooka NE Rd Proposed Clearing Permit Area
 - ◆ Relevé location
 - Black Cockatoo Habitat tree
 - Local Road
 - State Road

- Vegetation Communities and Condition**
- C1 (Degraded)
 - C2 (Completely Degraded)
 - C3 (Degraded)



Black Cockatoo Habitat trees and Vegetation Communities and Condition Map
 2021 Targeted Flora, Vegetation and Black Cockatoo Habitat assessment of Yandanooka, North-East Road for the Shire of Mingenew

0 200 400 600 800 1,000 m

Datum: GDA 1994 Scale: 1: 20,000 at A3
 Projection: MGA Zone 50

Date: 22/10/2021	Prepared: N. Lai	Project no: T21001
Expiry: NA	Checked: J. Grehan	
Figure 2c	Review:	Terratree
	Revision:	

11 Appendices

Appendix A: Conservation Codes under WA and Commonwealth Legislation

Table A.1: Conservation Codes for Western Australia Flora and Fauna (DBCA 2019)

Category	Code	Definition
Threatened Species	T: Threatened Species	Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act). Threatened fauna is 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.
	CR: Critically Endangered Species	Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. 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.
	EN: Endangered Species	Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. 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.
	VU: Vulnerable Species	Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”. Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. 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	EX: Extinct Species	Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.
	EW: Extinct in the Wild Species	Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no 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.
Special ly Protec	MI: Migratory Species	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and

Category	Code	Definition
		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.
	CD: Conservation Dependent Fauna	Species of Special Conservation Interest. 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). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
	OS: Other Specially Protected Species	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	Priority 1: Poorly Known Species	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g., agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. 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: 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: 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.
	Priority 4: Rare, Near Threatened and Other Species in Need of Monitoring	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Table A.2: Conservation Codes for Western Australia Ecological Communities (DBCA 2019)

Code	Definition
<p>PD: Presumed Totally Destroyed</p>	<p>An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies):</p> <p>A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or</p> <p>B) All occurrences recorded within the last 50 years have since been destroyed.</p>
<p>CR: Critically Endangered</p>	<p>An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria:</p> <p>A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply:</p> <ul style="list-style-type: none"> i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years); ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated. <p>B) Current distribution is limited, and one or more of the following apply:</p> <ul style="list-style-type: none"> i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years); ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

Code	Definition
	<p>C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).</p>
EN: Endangered	<p>An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria:</p> <p>A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply:</p> <ul style="list-style-type: none"> i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years); ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated. <p>B) Current distribution is limited, and one or more of the following apply):</p> <ul style="list-style-type: none"> i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years); ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes; iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes. <p>C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).</p>
VU: Vulnerable	<p>An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria:</p> <p>A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.</p> <p>B) The ecological community may already be modified and would be vulnerable to threatening</p>

Code	Definition
	<p>processes, is restricted in area and/or range and/or is only found at a few locations.</p> <p>C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes.</p>
P1: Priority One	<p>Poorly-known Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
P2: Priority Two	<p>Poorly-known Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
P3: Priority Three	<p>Poorly known</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4: Priority Four	<p>Adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>

Code	Definition
P5: Priority Five:	Conservation Dependent ecological communities Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Table A.3: Conservation Codes for Threatened Species under the Commonwealth EPBC Act

Code	Definition
Ex: Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW: Extinct in the Wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time: (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it 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.
CE: Critically Endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E: Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
V: Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD: Conservation Dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;

Code	Definition
	<p>(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;</p> <p>(iv) cessation of the plan of management would adversely affect the conservation status of the species.</p>

Table A.4: Conservation Codes for Threatened Ecological Communities under the Commonwealth EPBC Act

Code	Definition
CE: Critically Endangered	An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E: Endangered	An ecological community is eligible to be included in the endangered category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
V: Vulnerable	An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is not critically endangered nor endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Appendix B: All species collected during Targeted Flora Survey for the Shire of Mingenew

Family	Species	Weed Status
Amaranthaceae	<i>Ptilotus exaltatus</i>	
	<i>Ptilotus polystachyus</i>	
Araliaceae	<i>Trachymene cyanopetala</i>	
Asteraceae	<i>Arctotheca calendula</i>	*
	<i>Hyalosperma glutinosum</i>	
	<i>Hypochaeris radicata</i>	*
	<i>Ursinia anthemoides</i>	*
	<i>Sonchus oleraceus</i>	*
	<i>Monoculus monstrosus</i>	*
	<i>Podolepis aristata subsp. aristata</i>	
	<i>Pogonolepis muelleriana</i>	
	<i>Rhodanthe spicata</i>	
Boraginaceae	<i>Echium plantagineum</i>	*
Brassicaceae	<i>Raphanus raphanistrum</i>	*
	<i>Rapistrum rugosum</i>	*
Caryophyllaceae	<i>Petrorhagia dubia</i>	
Chenopodiaceae	<i>Atriplex ?cinerea</i>	
	<i>Chenopodium gaudichaudianum</i>	
	<i>Chenopodium sp</i>	
	<i>Enchylaena tomentosa</i>	
	<i>Sclerolaena eurotioides</i>	
Convolvulaceae	<i>Convolvulus clementii</i>	
Fabaceae	<i>Acacia acuminata</i>	
	<i>Acacia daphnifolia</i>	
	<i>Acacia tetragonophylla</i>	
	<i>Medicago polymorpha</i>	*
	<i>Lupinus cosentinii</i>	*
	<i>Trifolium hirtum</i>	*
	<i>Senna glutinosa</i>	
	<i>Senna glutinosa subsp. chatelainiana</i>	
Lauraceae	<i>Cassythia racemosa</i>	*

Family	Species	Weed Status
Loranthaceae	<i>Amyema fitzgeraldii</i>	
Malvaceae	<i>Abutilon cryptopetalum</i>	
	<i>Androcalva luteiflora</i>	
	<i>Malva parviflora</i>	*
Myrtaceae	<i>Eucalyptus camaldulensis</i>	®
	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	
Poaceae	<i>Aristida holathera</i> var. <i>holathera</i>	
	<i>Avena barbata</i>	*
	<i>Avena fatua</i>	*
	<i>Austrostipa elegantissima</i>	
	<i>Austrostipa nitida</i>	
	<i>Bromus diandrus</i>	*
	<i>Lamarckia aurea</i>	*
	<i>Lolium perenne</i>	*
	<i>Monachather paradoxus</i>	
Proteaceae	<i>Hakea preissii</i>	
Sapindaceae	<i>Dodonaea inaequifolia</i>	
Solanaceae	<i>Solanum lasiophyllum</i>	
Thymelaeaceae	<i>Pimelea microcephala</i>	

* Weed, ® Native in part of range, naturalised elsewhere

Appendix C: Vegetation Community Descriptions

Table C. 1: Vegetation Community 1

Community Details		Description
Date:	16/09/21	Low open woodland of <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> , over open shrubland of <i>Acacia daphnifolia</i> and <i>Acacia tetragonophylla</i> over very open shrubland of <i>Dodonaea</i> and <i>Acacia acuminata</i> over degraded weedy grassland.
Easting:	0367993	
Northing:	6770945	
Relevés:	R1	
Area of survey area (ha)	9.99	
Percent of survey area (%):	44.25	

Photo: Type 1 vegetation along Yandanooka North-East Road



Table C. 2: Vegetation Community 2

Community Details		Description
Date:	16/09/2021	Open shrubland of <i>Acacia tetragonophylla</i> over scattered shrubs of <i>Senna glutinosa</i> subsp. <i>chatelainiana</i> over degraded weedy grassland.
Easting:	0367591	
Northing:	6770140	
Relevés:	R1	
Area of survey area (ha)	11.93	
Percent of survey area (%):	52.85	

Photo: Type 2 vegetation along Yandanooka North-East Road



Table C. 3: Vegetation Community 3

Community Details		Description
Date:	17/09/2021	Open woodland of <i>Eucalyptus camaldulensis</i> over scattered shrubs of <i>Acacia</i> spp., over degraded weedy grassland.
Easting:	368384	
Northing:	6762209	
Relevés:	R1	
Area of survey area (ha)	0.65	
Percent of survey area (%):	2.9	

Photo: Type 3 vegetation along Yandanooka North-East Road



Appendix D: Black Cockatoo Habitat Trees

Tree ID	Species	Co-ordinate Easting	Co-ordinate Northing	DBH (mm)	Tree Health	Tree Condition	Hollows Y/N	Hollow Comments
T001	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367684	6770629	550	Alive	Good	N	
T002	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367842	6769802	430	Alive	Good	Y	2 x hollow, One top entry and one side entry. Tree pruned
T003	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367826	6769797	680	Alive	Good	Y	1 x hollow, side entry
T004	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367870	6769734	560	Alive	Good	N	
T005	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367925	6769664	600	Alive	Good	N	
T006	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367939	6769642	610	Alive	Senescing	Y	Many very small hollows
T007	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368501	6768615	610	Alive	Good	N	
T008	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368517	6765174	550	Alive	Good	Y	1 x hollow, side entry
T009	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368375	6762221	720	Alive	Good	N	
T010	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368389	6762275	660	Alive	Senescing	Y	3 x hollows, top entry, side entry and spout shape

Tree ID	Species	Co-ordinate Easting	Co-ordinate Northing	DBH (mm)	Tree Health	Tree Condition	Hollows Y/N	Hollow Comments
T011	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368384	6762266	300	Dead	Good	Y	1 x hollow, side entry
T012	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368196	6761511	510	Alive	Good	Y	1 x hollow, side entry
T013	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368191	6761490	510	Alive	Senescing	Y	1 x hollow, side entry
T014	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368134	6761268	700	Alive	Good	Y	2 x hollows, one knothole and one side entry. Multiple small hollows. Broken branches
T015	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368084	6761058	350	Alive	Good	Y	1 x hollow, top entry. Broken branches
T016	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368081	6761065	550	Alive	Good	Y	1 x hollow, top entry
T017	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0368659	6760968	600	Alive	Good	Y	1 x hollow, side entry
T018	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0367911	6759250	1000	Alive	Good	N	
T019	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0366886	6759250	780	Alive	Good	Y	1 x hollow, side entry. Broken branches
T020	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0366682	6759247	560	Alive	Good	N	
T021	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	0366688	6759244	520	Alive	Senescing	Y	1 x hollow, side entry

Appendix E: Photos of Habitat Trees



T001



T002



T003



T004



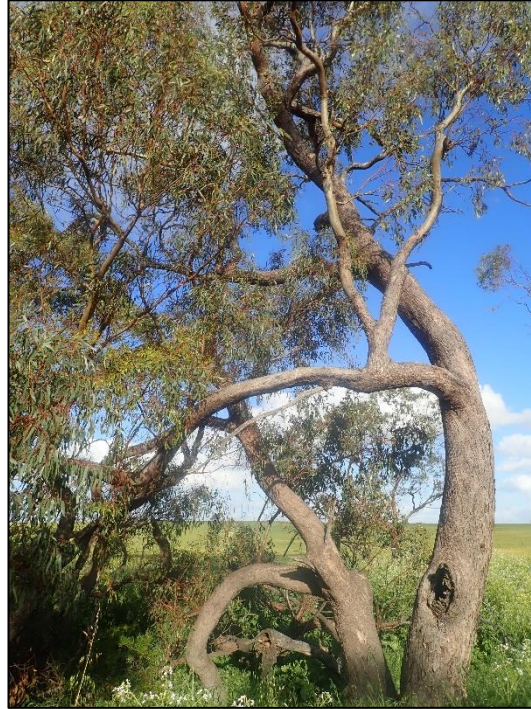
T005



T006



T007



T008



T009



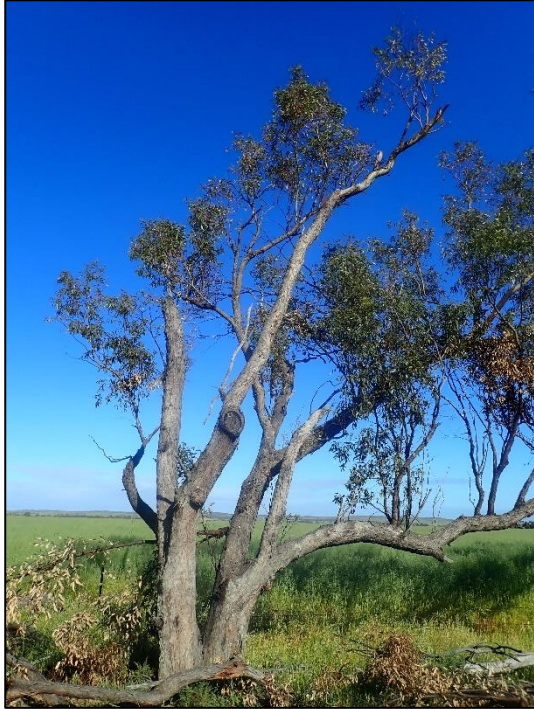
T010



T011



T012



T013



T014



T015



T016



T017



T018



T019



T020



T021