360 environmental | Part of SLR

Twin Rivers

NVCP Supporting Documentation

Prepared for

All Track WA

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1 Introduction

1.1 Background

360 Environmental Pty Ltd (360 Environmental) was commissioned by All Track WA Pty Ltd (All Track) to prepare a Native Vegetation Clearing Permit (NVCP) application for Lot 1, Wannamal Road West, Boonanarring (Study Area). Boonanarring is situated approximately 89 km north northeast of Perth in the Shire of Gingin, Western Australia. The nearest town site to the location is Gingin. The application is to support the clearance of 13.76 ha of vegetation for the development of a gravel quarry (the Impact Area).

Under Section 51C of the State *Environmental Protection Act 1986* (EP Act), clearing of any native vegetation requires an approved clearing permit, unless an exemption applies. Exemptions generally apply to small areas of vegetation cleared for maintenance/ fire issues, or for proposals that have already been assessed by the Environmental Protection Authority (EPA) or Department of Water, Environment and Regulation (DWER) through a separate process. Exemptions do not apply to the proposed clearing, therefore an NVCP is required before clearing can commence.

Ecological surveys were undertaken in February 2020 and identified minimal constraints to be considered in the impact assessment and mitigation process. A second round of surveys were undertaken in October 2020 (botanical) and in September 2020 (fauna). Early consultation with DWER and the Federal Department of Agriculture, Water and Environment (DAWE) resulted in some additional targeted work being undertaken within and area surrounding the Study Area.

1.2 Definitions

In this document, the following terms are defined as:

- Impact Area: the 13.76 ha area proposed for clearing
- Study Area: the general area covered by the Impact Area, and the areas being retained, approximately 20.28 ha (Figure 1).

1.3 Responsible Applicant

All Track WA is responsible for the implementation of the clearing described within this document. Correspondence relating to this NVCP application should be addressed to:

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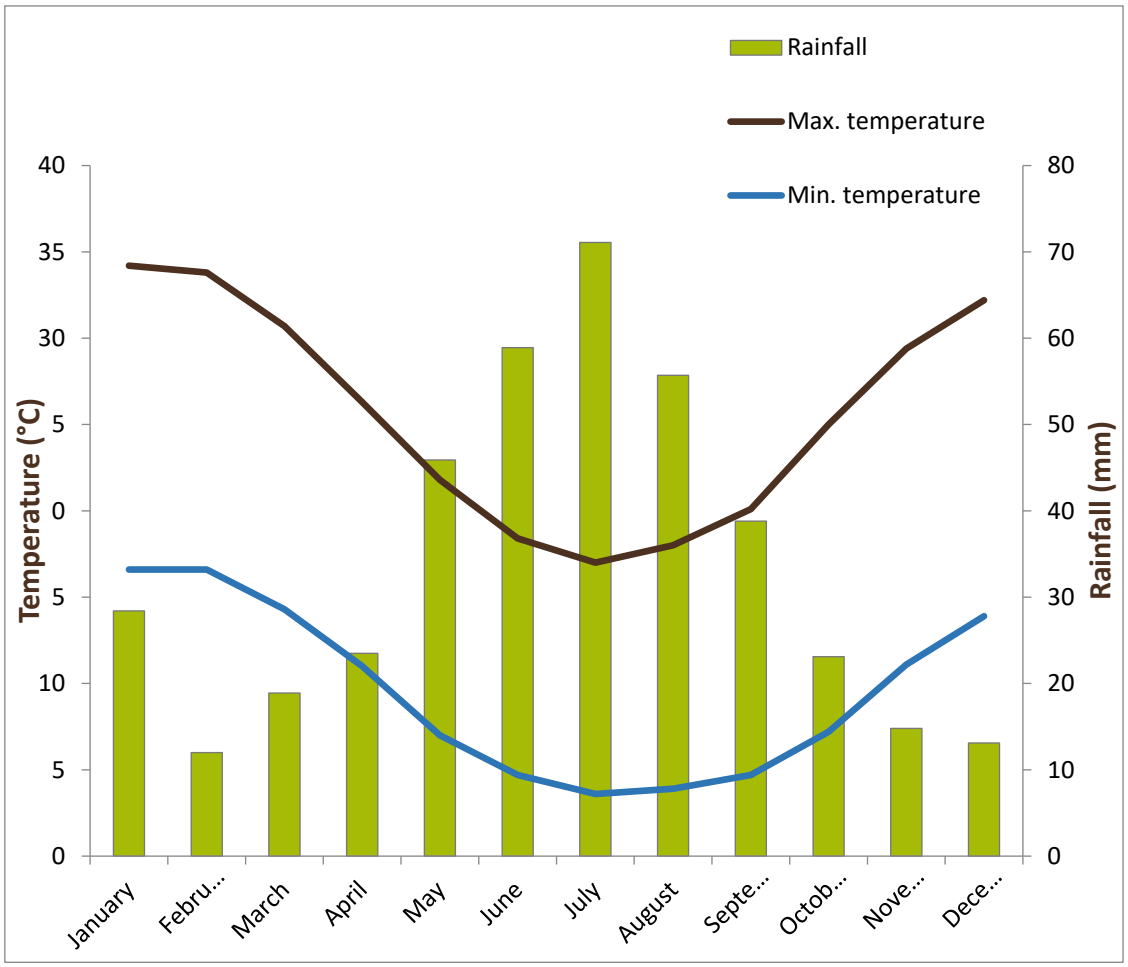
2 Site Overview

2.1 Climate

The most representative long-term official Bureau of Meteorology weather station currently operating near the Study Area is Gingin Aero (Station Number 9178), located approximately 32.4 km south. The average maximum temperature of the area is 25.7°C whilst the minimum is 11.1°C. The number of days the area receives rainfall per year is 99.2 and the average amount of rainfall received per year is 620.7 mm.



Graph 1: Long-term monthly average rainfall and maximum and minimum temperatures from 1996 to 2021 March (BoM2021)

2.2 Bioregion

The Study Area is located within the Swan Coastal Plain bioregion of the Interim Biogeographic Regionalization of Australia (IBRA) and within the Dandaragan Plateau (SWA1) subregion. The Dandaragan Plateau subregion is bordered by the Dandaragan and Derby Faults. It is made up of cretaceous marine sediments mantled by laterites and sands. The vegetation is characterized by Marri woodland, Jarrah and Marri woodland, Banksia low woodland and scrub-heaths on gravelly sandplains and laterite pavement (Desmond 2001).

2.3 Topography

Regional topography contours indicate the range within the Study Area is between 231m AHD as the lowest and 264m AHD as the highest point (Landgate, 2021).

2.4 Surface Geology and Soil Land Systems

Soil-landscape system mapping of Western Australia describes broad soil and landscape characteristics from regional to local scales. Most of the Impact Area is within the Dandaragan System, characterized as subdued dissected lateritic plateau, undulating low hills and rises with narrow alluvial plains. With variable deep sands and sandy gravels plus minor earths, duplexes and clays and marri woodlands and shrublands (Department of Agriculture and Food WA, 2012). The Study Area is also bordered by the Capitella System characterized as subdued stripped lateritic plateau, undulating to gently undulating low rises with gently undulating plain including dunes with pale and yellow deep sands, sandy gravels, some duplex from sandstones plus alluvial and aeolian deposits (Department of Agriculture and Food WA, 2012). The Study Area is then systematically divided further into two land subsystems (Figure 2):

- **222Da**: Undulating to rolling rises with breakaways. Areas dominated by duricrust (rock outcrop).
- **222Cp**: Drainage depressions and sand rises. Yellow deep sand.

The 1:1,000,000 surface geology mapping indicates the geology of the Study Area falls within the ferruginous duricrust 38498 surface geology unit, which is characterized by Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite (Geoscience Australia, 2008).

2.5 Biological Environment

2.5.1 Broad Vegetation Types

Mapping of the vegetation of the Swan Coastal Plain region which included the Study Area was completed on a broad scale (1:1,000,000) by (Beard 1981). These vegetation units were later re-assessed by Shepherd, Beeston, and Hopkins (2002) to account for clearing in the intensive land use zone, dividing some larger vegetation units into smaller units.

Gingin 1027 is mapped over the entire Study Area. Gingin 1027 is described as low forest, woodland, or low woodland with scattered trees: Jarrah (*Eucalyptus marginata*), Banksia (Banksia spp.) or Casuarina (*Allocasuarina* spp.). The vegetation type is described below and its representation across the state, bioregion and local government authority is shown in Table 1.

Table 1: Broad Vegetation Types Within the Study Area, the State and Regional Representation (Department of Biodiversity, Conservation and Attractions, DBCA)

Vegetation Type	Pre-European Extent (HA)	Current Extent (HA)	Remaining (%)	Current Extent Managed in DBCA Lands (%)
Vegetation Type in Western Australia				
1027	39,809.21	23,462.16	58.94	21.68
Vegetation Type in Swan Coastal Plain bioregion				
1027	39,534.38	23,367.69	59.11	21.83
Vegetation Type in Dandaragan Plateau subregion				
1027	39,268.58	23,197.04	59.07	21.76
Vegetation Type in the Shire of Gingin				
1027	27,632.97	17,871.98	64.68	24.80

2.5.2 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared to prevent degradation of important environmental values such as Threatened flora, TECs or significant wetlands. Exemptions contained in the Environmental Protection (Clearing of Native vegetation) Regulations 2004 for low impact land clearing do not apply in ESAs and a clearing permit is required.

No ESAs are identified across the Study Area. The closest ESA to the impact area is located approximately 1.5 km to the northeast within Lot 1 (DWER, 2018a) (Figure 3). Two other ESAs are mapped within the Impact Area to the north northwest of approximately 2.5 km and 3.3 km respectively.

2.5.3 Conservation Areas

The Study Area is not mapped within a Bush Forever Sites (Department of Planning 2014). There are no Bush Forever Sites within a 20 km radius of the Study Area.

The Study Area is located directly north of the Boonanarring Nature Reserve vested under the Conservation Commission of Western Australia for the purpose of Conserving Flora and Fauna (Figure 3) (DBCA, 2017). Boonanarring Nature Reserve is a 'C' class reserve of approximately 9250 ha, with connections to 10,000 ha of protected remnant vegetation in Moore River Nature Reserve. The reserve provides a sustainable habitat for small native mammals including *P. albocinereus*, *Sminthopsis* sp(p). and *T. rostratus*, most likely due to its large area of remanent vegetation encompassing many habitat types (Moore et al 2016). The reserve supports two listed TECs and 22 listed threatened species (DBCA, 2017).

2.5.4 Hydrology and wetlands

No surface water features are mapped within the Study Area (DWER2016). The Study Area is not within a mapped 100 Year ARI Floodplain Area.

Several minor, non-perennial watercourses, swamps, marsh areas and earth dams are mapped surrounding the Study Area to the north and east as shown in Figure 4 (DWER,2016).

No geomorphic wetlands are mapped within the Study Area (DBCA, 2017c). Lot 5549 contains three Conservation Category Wetlands (CCWs) and three Resource Enhancement Wetlands (REWs). These wetlands and their proximity to the Study Area are listed below and shown in Figure 4 (DBCA 2017d):

- REW (11214) 1.0 km to the east of the Study Area
- CCW (11212) 1.2 km to the northeast of the Study Area
- REW (11213) 1.4 km to the east of the Study Area
- CCW (11211) 2.5 km to the north of the Study Area
- REW (10948) 3.1 km to the northwest of the Study Area
- CCW (11209) 3.3 km to the northeast of the Study Area.

3 Assessment Methodology

3.1 Desktop Assessment

An initial desktop assessment was undertaken in 2019 which included a review of current and relevant tenure and land ownership details, literature sources, databases with a search buffer of 10 km, and GIS information to determine:

- Possible environmental survey and approvals requirements
- The location of areas with minimal environmental sensitivities/constraints and any highly constrained areas.

Priority Ecological Communities (PEC) and TEC within the Swan Coastal Plain bioregion were examined to determine if any corresponded with the Study Area. In addition, paid DBCA searches, a NatureMap search and an EPBC Protected Matters Search (PMST) were undertaken to identify the potential for Threatened and Priority species and Matters of National Environmental Significance (MNES) to occur within or surrounding the Study Area (Department of the Environment and Energy 2019). These database searches are described in Table 2. Conservation significant flora and fauna species identified from the desktop assessment were further examined to determine a likelihood of occurrence both prior and post the 2019 field survey.

Table 2: Database Searches of the Study Area

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Ecological Communities database (DBCA2019b)	25 July 2019	Listed TECs and PECs	10 km radius
Threatened and Priority Flora Database (TPFL) (DBCA2019c)	17 July 2019	Threatened and Priority Flora	10 km radius
Western Australian Herbarium flora (DBCA2019d)	17 July 2019		10 km radius
DBCA Black Cockatoo Records (DBCA2019e)	12 July 2019	Black Cockatoo Records	20 km radius (DBCA recommended)
NatureMap (DBCA2019f)	11 July 2019	Threatened and Priority Flora and Fauna	10 km radius
Protected Matters Search Tool (PMST) (Department of the Environment and Energy 2019)	11 July 2019	Threatened and Priority Flora and Fauna	10 km radius

3.2 Flora and Vegetation Survey

360 Environmental undertook a detailed single season flora and vegetation survey on 6 September 2019 by botanist Shenaye Hummerston (Flora licence number FB62000125) (Appendix A). The field survey included an assessment of three quadrats for each vegetation type, mapping notes, vegetation condition notes and mapping, opportunistic flora collections and observations. The vegetation survey was completed across a Study Area of 20.28 ha including an Impact Area of13.76 ha Impact Area with the following objectives:

- Conduct a desktop study and background research, investigating relevant literature, databases, and spatial datasets to determine the environmental values, species of conservation significance and any potential issues, such as PEC and TECs that may be present
- Conduct a detailed single season flora and vegetation survey
- Develop a full species inventory containing all species located within the Impact Area
- Development of maps showing, condition, vegetation communities, locations of any threatened and priority species, significant communities, quadrat locations, invasive species, and background information
- Produce a flora, vegetation, and fauna report of the target area.

3.3 Targeted Flora Assessment

The targeted survey for threatened flora was carried out by Brian Morgan (Principal Botanist) and Susan Downes (Botanist) on 26 to 28 October 2020. The Study Area was traversed on foot, targeting conservation significant species by walking transects within the Area. The targeted species included:

- Two Endangered Orchids:
  - *Thelymitra stellata* (EN) –Star Sun Orchid
  - *Thelymitra dedmaniarim* (EN) –Cinnamon Sun Orchid.
- Other conservation significant flora, including but not limited to:
  - *Banksia mimica* (EN)
  - *Goodenia arthrotricha* (EN)
  - *Conospermum densiflorum* subsp. *unicephalatum* (EN).

The survey was conducted in accordance with the EPA requirements for environmental surveys and reporting for flora surveys in Western Australia where relevant, and as documented in:

- Western Australia: Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)
- Federal: Matters of National Environmental Significance impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (DoE, 2013) and DAWE's (2013) Draft survey guidelines for Australia's threatened orchids.

3.4 Black Cockatoo Habitat Assessment

The Black Cockatoo Habitat Assessment was undertaken on 6 and 13 September 2019 by Ecologist Evan Webb. Any trees meeting the following criteria for potential breeding habitat were recorded using the Fulcrum mobile data-collection application:

- Native trees (e.g. Jarrah, Tuart, Marri, Wandoo and Salmon Gum)
- Diameter at breast height (DBH) of greater than 500 mm (greater than 300 mm for Wandoo and Salmon Gum) regardless of the presence or absence of hollows (DBH is measured approximately 1.3 meters from the ground)
- Any trees containing hollows (observed from the ground), which were then categorised as:
    - Hollows with an estimated opening diameter of less than 120 mm
    - Hollows with an estimated opening diameter of greater than 120 mm and therefore have the potential to be used by Black Cockatoos for breeding.

The Black Cockatoo assessment involved assessing the habitat for tree and shrub species known to be important dietary items e.g. Marri and Banksia sp. as outlined within the referral and revised draft referral guidelines. It also included looking for:

- Evidence of feeding (chewed cones, seed, and nut material)
- Opportunistic observations of Black Cockatoos foraging or utilising the Study Area.

Whilst undertaking the assessment any evidence of roosting or areas identified as having high roosting potential were identified, recorded, and mapped.

3.5 Black Cockatoo Hollow Assessment

A black cockatoo hollow inspection of the Studyt Area was undertaken by Principal Ecologist Greg Harewood from 25-27 September 2020. Following consultation with the Department of Agriculture, Water, and the Environment (DAWE) and the DWER in 2020 to discuss the proposed quarry after the initial survey work was completed. Both DAWE and DWER advised a Black Cockatoo hollow assessment should be undertaken to better understand the potential impact to breeding habitat. DAWE advised the assessment should include the number of hollows, hollow size, and evidence of use as a minimum. A drone was utilised to view and assess 72 trees

identified in the habitat assessment (360 Environmental 2020) as containing hollows that may be suitable for Black Cockatoo breeding. The parameters recorded for each tree included:

- Number of hollows
- Type (chimney, spout, side entry)
- Entrance size (<10, 10 – 15, 15 – 20 or 20+ cm)
- Field assessment (no hollow, unsuitable hollow, appears suitable – no signs of use, chewed/chipped hollow, confirmed nest hollow, undecided – review pictures).

Photographs were taken of each hollow and assessed for the suitability for use by Black Cockatoos. An assessment of the vegetation type at the Offset Sites was undertaken in spring 2020 and is reported in 360 Environmental (2020a). That survey data was used to assess the quality of foraging habitat for Black Cockatoos at the Offset Sites.

4 Results

4.1 Desktop Assessment Results

4.1.1 Flora and Vegetation Survey

The Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment (360 Environmental 2020) desktop assessment identified populations of 48 conservation significant species occurring within 10 km of the Survey Area, which was comprised of:

- 17 Threatened Flora species
- One Priority 1 species
- Seven Priority 2 species
- 14 Priority 3 species
- Nine Priority 4 species.

The desktop assessment identified three Threatened Ecological Communities as likely to occur within the Survey Area:

- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Banksia WL SCP)
- Swan Coastal Plain *Banksia attenuata* - *Banksia menziesii* woodlands (SCP23b)
- *Banksia ilicifolia* woodlands (SCP22).

4.1.2 Likelihood Occurrence

A likelihood of occurrence assessment was undertaken and determined 16 conservation significant species as having a high likelihood of occurrence, seven conservation significant species as having a medium likelihood of occurrence, seven conservation significant species as having a medium likelihood of occurrence, 23 conservation significant species as having a low likelihood of occurrence.

4.1.3 Black Cockatoo Habitat

The Study Area occurs within the known breeding distribution of the Carnaby's Black Cockatoo (EN) (Department of Sustainability Environment Water Population and Communities, 2012; Department of the Environment and Energy 2017). The DBCA database search returned 110 records of the species within a 20 km radius of the Study Area, 96 of which occurred in the past decade (DBCA 2019). Confirmed Carnaby's breeding areas occur approximately 12 km northwest of the Study Area and 25 km southeast of the Study Area. There was one confirmed Carnaby's roost site, which occurs approximately 20 km south of the Study Area.

The Study Area occurs approximately 15 km north of the modelled distribution of the Forest Red-tailed Black Cockatoo (VU) (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017). Given the mobility of the species, it may potentially occur within the Study Area. The DBCA database search returned one record of the species within a 20 km radius of the Study Area which occurred in the past decade (DBCA, 2019).

The Baudin's Black Cockatoo (VU) is unlikely to occur within the Study Area based on modelled distribution (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017). The DBCA database search did not return any records of the species (DBCA 2019).

4.2 Survey Results

4.2.1 Detailed Flora and Vegetation Survey 2019

The survey recorded a total of 49 taxa from 19 families across 37 genera. The most dominant families were Orchidaceae (eight species) and Fabaceae (six species). The least dominant genus was *Hibbertia* (four species) (360 Environmental 2020).

4.2.1.1 Flora of Conservation Significance

No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened Flora pursuant to the BC Act 2016 were recorded during the survey.

Two Priority species as listed by DBCA *Lasiopetalum venustum* (P3) and *Synaphea grandis* (P4) were recorded within the Impact Area.

4.2.1.2 Introduced Flora

No introduced flora species were recorded within the Impact Area.

4.2.1.3 Vegetation Type and Condition

One vegetation type was identified to occur across the Study Area, covering 20.28 ha. EmBsXp is described as *Eucalyptus marginata – Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preissii*. This vegetation occurred on grey sands on the upper slopes and crest of the laterite ridge (Figure 6).

The vegetation condition within the Survey Area ranges from Good to Very Good condition (Figure 7). The majority of the Impact Area was in Good condition (91%) in accordance with EPA (2016) Vegetation Condition Scale. Disturbances include historic logging and burning. In summary, condition across the Study Area consisted of:

- Very Good: 1.65 ha, 8%
- Good: 18.40 ha, 91%
- Completely Degraded (cleared): 0.23 ha, 1% (360 Environmental, 2020).

4.2.2 Black Cockatoo Habitat Assessment 2019

4.2.2.1 Breeding Habitat

The 2019 field survey identified 190 Black Cockatoo potential breeding trees with a DBH of greater than 500mm within the Study Area. The trees comprised of 134 Jarrah trees (*Eucalyptus marginata*), 52 Marri trees (*Corymbia calophylla*), and four stages (dead trees) (360 Environmental 2020).

A total of 306 hollows were recorded within 101 trees based on visualisation using binoculars from the ground (some trees contained multiple hollows). Of these, 162 hollows with a diameter greater than 120mm were recorded within 72 trees. These trees were 59 Jarrah (*Eucalyptus marginata*), 15 Marri (*Corymbia calophylla*) and 2 stags. No evidence of hollows currently being used for Black Cockatoo breeding was observed within the Study Area during this survey.

4.2.2.2 Foraging Habitat

The 2019 Black Cockatoo foraging assessment identified a total of 13.76ha of Black Cockatoo foraging habitat within the Impact Area, consisting of Marri and Jarrah woodland over a midstorey of *Banksia sessilis.*

Evidence of Carnaby's Black Cockatoo foraging was recorded at five locations within the Impact Area, all of which were chewed Marri nuts.

4.2.2.3 Roosting Habitat

No evidence of Black Cockatoo roosting was observed within the Impact Area. The Jarrah and Marri within the Impact Area is considered suitable roosting habitat.

4.2.2.4 Sightings

There were no sightings of Carnaby's Black Cockatoos within the Impact Area, however one was sighted 60 m south of the Study Area.

4.2.3 Follow-up Black Cockatoo Habitat Assessment 2020

4.2.3.1 Breeding Habitat

The 72 trees identified as potential breeding trees in 2019 were re-surveyed via drone within the Impact Area. The 72 trees supported 167 hollows, 98.2% of which were determined to be unsuitable for Black Cockatoos when surveyed. Three trees (one Jarrah and two Marri) were found to have suitable hollows of which one contained one suitable hollow with visible chew marks (potential nest hollow). These three significant trees will be protected by an exclusion zone with a radius of 50 m (Figure 8).

4.2.3.2 Foraging Habitat

Black Cockatoo foraging habitat was mapped by 360 Environmental in September 2019 at the Impact Area (360 Environmental 2020), and in spring 2020 (360 Environmental 2020a). The vegetation mapping was interpreted by Ecologist Evan Webb to determine its value for Black Cockatoos. Approximately 91% of the surveyed area was mapped as having Very High-quality foraging habitat. In addition to protecting the hollows, the exclusion zone around the three significant trees also protects 2.07 ha of foraging habitat.

5 Environmental Management Measures

To minimize the risk of impact from the activities associated with the Proposal, the following environmental management measures will be implemented:

- The proposal has been designed to avoid the three trees containing potential Black Cockatoo nesting hollows. An exclusion zone with a radius of 50 m has been applied to the three trees, protecting those trees and 2.07 ha of foraging habitat surrounding the trees.
- An exclusion zone of 40 m between the main road and the impact site to manage the visual impacts from the operational site and reduce the amount of native vegetation loss.
- Induction of all contractors and/or internal personal undertaking the clearing in accordance with All Track WA procedures. GPS coordinates of clearing permit area to be supplied to contractor.
- The Proposal has been designed to use an existing cleared access track as the access road, rather than creating new tracks in order to limit unnecessary clearing of native vegetation.
- Dieback and weed control will be in place to minimise the risk of spread or introduction of dieback or new weed species.
- Prior to clearing and earthworks commencing within the clearing permit area, the area will be clearly delineated (by barrier tape or star pickets) to ensure that no clearing occurs beyond the permitted area.
- Vegetation clearing will be scheduled to occur immediately before planned earthworks and construction to minimise the potential for dust, where practicable.
- No clearing will be undertaken during the black cockatoo breeding season and all hollows will need to be checked before removal.
- Rehabilitation and restoration of the land post extraction life will be implemented on site.

6 Assessment Against the Ten Clearing Principles

The proposed clearing of 13.76 ha has been assessed against the Ten Clearing Principles as defined in DER's Guide to Assessment: Clearing of Native Vegetation Under the EP Act, considering the current extent and condition of the native vegetation on the site. The assessment is presented in Table 3

Table 3: Assessment Against the 10 Clearing Principles

Principle	Assessment	Outcome
Principle (a) – Native vegetation should not be cleared if it compromises a high level of biological diversity	A database search with a 10 km buffer from the centre of the site and subsequent likelihood assessment was undertaken and identified 48 conservation significant species potentially occurring within 10 km of the Study Area. Of these, 17 are Threatened flora species, one is a Priority 1 species, seven are Priority 2 species, 14 are Priority 3 species and nine are Priority 4 species. A search of the DBCA database and EPBC PMST for TECs and PECs identified three Threatened Ecological Communities as likely to occur within the Impact Area: • Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Banksia WL SCP) • Swan Coastal Plain *Banksia attenuata - Banksia menziesii* woodlands (SCP23b) • *Banksia ilicifolia* woodlands (SCP22). A survey conducted for the Site recorded a total of 49 taxa from 19 families across 37 genera within 13.76 ha. The most dominant families were Orchidaceae (eight species) and Fabaceae (six species). The most dominant genus was *Hibbertia* (four species). No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened Flora pursuant to the BC Act 2016 were recorded during the survey. Two priority species as listed by the DBCA; *Lasiopetalum venustum* (P3) and *Synaphea grandis* (P4) were recorded within the Impact Area. One vegetation type was identified to occur across the Study Area, covering 20.28 ha. EmBsXp is described as *Eucalyptus marginata - Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preissii*. The vegetation condition in the Study Area ranges from Completely Degraded to Very Good, with the majority of the Study Area in Good condition (91%). Disturbances included historic logging and burning. In summary, the vegetation condition across the Study Area consisted of:	Proposed clearing of 13.76 ha is **unlikely** to be at variance with this principle.

Principle	Assessment	Outcome
	• Very Good: 1.65 ha, 8% • Good: 18.40 ha, 91% • Completely Degraded: 0.23 ha, 1% Due to the presents of a similar environment adjacent to the Impact Area, species identified during the survey area are likely present in the proposed surrounding areas. No Threatened flora species were identified in the Impact Site. The proposed clearing is not likely to be at variance with the principle due to the presents of similar vegetation and fauna condition in the local area which reduces the impact caused by the proposed clearing.	
Principle (b) Native vegetation should not be cleared if it compromises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia	The desktop fauna search suggests that two species may potentially occur on the Impact Site, Carnaby's cockatoo (En) and the Red-Tailed Black Cockatoo (Vu). The Study Area occurs within the known breeding distribution of the Carnaby's Black Cockatoo. The DBCA database search returned 96 records of the species within a 20 km radius of the target area within the last decade. Known Carnaby breeding areas occur 12 km northwest and 25 km south of the Study Area. One confirmed Carnaby roost site occurs approximately 20 km south of the Study Area. A targeted habitat assessment and tree hollow inspection for the site identified 72 trees containing hollows that may be suitable for Black Cockatoo breeding. Of the 72 trees, a total of three trees (one jarrah and two Marri) contained hollows with appropriate internal and external dimensions to facilitate Black Cockatoo breeding. Of the three trees, one marri contained a potential nest hollow displaying chew mark, indicating use by Black Cockatoos. The other Marri and Jarrah tree each contained one suitable hollow but showed no signs of use by Black Cockatoos. Vegetation mapped across Impact Site is suitable for Black Cockatoo foraging habitat. It can be described as *Eucalyptus marginata – Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanhorhoea preisii*. The vegetation condition ranges from Completely Degraded to Very Good. The majority of the Study Area was in Good condition (91%), with the quality of the foraging habitat mapped as Very High. Evidence of Black Cockatoo foraging was recorded at five locations within the Study Area, all of which were chewed Marri nuts. This in conjunction with the dominant flora species that are known foraging species for Black Cockatoos demonstrates the Study Area is value as a foraging site. There	Proposed clearing of 13.76 ha is **unlikely** to be at variance with this principle.

Principle	Assessment	Outcome
	were no sightings of Carnaby's Black Cockatoos within the Study Area, however one was sighted 60 m south of the Study Area. Although no evidence of roosting was observed within the Study Area, any large trees have the potential to be used for roosting by Black Cockatoos. The proposed clearing of 13.76 ha of Very High-quality foraging habitat has been designed to avoid clearing of the three breeding significant trees and a 50 m diameter buffer will be implemented around each tree. The vegetation clearing area exceeds the threshold of 1 ha as identified by the EPBC act referral guidelines for three threatened Black Cockatoo species. The local significance of the impact is lessened, however, due to the presence of extensive amounts of foraging (predominantly Banksia) habitat in the adjacent (and protected) Boonanaring Nature Reserve, and nearby Bartlett's Well Reserve (360 Environmental 2013). Identified black cockatoo breeding trees have been retained onsite and a 50m buffer around the trees for protection. Considering the proposed management measures and similar surrounding environments which support black cockatoo foraging and breeding habitat the proposed clearing is unlikely to be at variance with this principle.	
Principle (c) –Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora.	A desktop review of database searches identified *Andersonia gracilis* (T), *Banksia mimica* (T), *Chamelaucium sp. Gingin* (T), *Conospermum densiflorum subsp. Unicephalatum* (T), *Drakaea elastica* (T), *Eucalyptus leprophloia* (T), *Eucalyptus recta* (T), *Eucalyptus x balanites* (T), *Goodenia arthrotricha* (T), *Grevillea curviloba subsp. Incurve* (T), *Paracaleana dixonii* (T), *Thelymitra dedmaniarum* (T), *Thelymitra stellate* (T), *Anigozanthos viridis subsp. Terraspectans* (T), *Diuris drummondii* (T), *Eleocharis keigheryi* (T), *Ptychosema pusillum* (T) as potentially occurring within the site. Two DBCA priority species, *Lasiopetalum venustum* (P3) and *Synaphea grandis* (P4), were recorded within the Study Area. The site survey (2019) and targeted survey for threatened flora (2020) recorded No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened Flora pursuant to the BC Act were recorded during the survey. Due to the lack of records of Threatened flora species in the Impact area, the proposed clearing is considered to be unlikely at variance with this principle.	The Proposal is **unlikely** to be at variance with this principle.

Principle	Assessment	Outcome
Principle (d) –Native vegetation should not be cleared if it comprises the whole or a part of or is necessary for the maintenance of a Threatened Ecological Community (TEC).	One vegetation type was identified to occur across the Study Area, covering 20.05 ha. EmBsXp is described as *Eucalyptus marginate – Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanhorhoea preisii*. This vegetation occurred on grey sands on the upper slopes and crest of the laterite ridge. The vegetation, EmBsXp, ranged from Completely Degraded to Very Good condition in accordance with EPA (2016) Vegetation Condition Scale (360 Environmental, 2020). No Threatened flora species pursuant to the EPBC Act and/or gazetted as Threatened/Declared Rare Flora pursuant to the BC Act were recorded during the survey. Vegetation association EmBsXphas been determined to have affiliation with FCT SCPS18 which is not listed as a PEC or a TEC by DBCA or listed under the EPBC Act (360 Environmental, 2020). There are no mapped TECs within 10 km of the study area. The clearing of the proposed land will not compromise the whole or a part of or is necessary for the maintenance of a TEC.	The Proposal is **unlikely** to be at variance with this principle.
Principle (e) –Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	The proposed area is located within the Swan Coastal Plain bioregion of the Interim Biogeographic Regionalisation of Australia (IBRA) and within the Dandaragan Plateau (SWA1) subregion. The Dandaragan Plateau subregion is bordered by the Dandaragan and Derby Faults. It is made up of Cretaceous marine sediments mantled by laterites and sands. The vegetation is characterised by Marri woodland, Jarrah and Marri woodland, Banksia low woodland and scrub-heaths on gravelly sandplains and laterite pavement (Desmond 2001). The proposed area falls within the Beard /Shepherd vegetation units Gingin 1027. These units have 59.11% of their pre-European extents remaining within the SWA1 subregion (Government of Western Australia 2017). The National Objectives and Targets for Biodiversity Conservation 2001-2005 include a target to have clearing controls in place that prevent clearance of ecological communities with an extent below 30% pre-1750 (Commonwealth of Australia 2000). Using these targets as an indicator of vegetation that has been extensively cleared, the vegetation within the State and bioregion is not considered to be extensively cleared as they do not fall below this threshold.	The Proposal is **unlikely** at variance with this principle.

Principle	Assessment	Outcome
Principle (f) –Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	No surface water features are mapped within the Study Area (Department of Water and Environmental Regulation 2016). The Study Area is not within a mapped 100 Year ARI Floodplain Area. A number of minors, non-perennial watercourses, swamps, march areas and earth dams are mapped surrounding the Study Area to the north and east. No geomorphic wetlands are mapped within the Study Area (Department of Biodiversity Conservation and Attractions 2017b). Lot 5549 contains three Conservation Category Wetlands (CCWs) and three Resource Enhancement Wetlands (REWs). These wetlands and their proximity to the Study Area are listed below: • REW (11214) 1.0 km to the east of the Study Area • CCW (11212) 1.2 km to the northeast of the Study Area • REW (11213) 1.4 km to the east of the Study Area • CCW (11211) 2.5 km to the north of the Study Area • REW (10948) 3.1 km to the northwest of the Study Area • CCW (11209) 3.3 km to the northeast of the Study Area. The site does not contain any vegetation associated with watercourses or wetlands and is not within the immediate vicinity of any surface water features.	The proposal is **unlikely** at variance with this principle.
Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	The DER has defined land degradation as including the following (DER 2014): • The clearing of vegetation • Decline in vegetation condition • Soil erosion and soil acidity (caused by wind and water erosion due to vegetation clearing) • Salinity • Waterlogging/flooding. The Study area is mapped as extremely low/ very low probability Acid Sulphate Soil (ASS) risk (CSIRO, 2021).	The proposal is **unlikely** to be at variance with the principle.

Principle	Assessment	Outcome
	The vegetation within the Impact Area ranges from Completely Degraded to Very Good (Figure 6). The majority of the Study Area was in Good condition (91%). Disturbances included historic logging and burning. In summary, condition across the Study Area consisted of: • Very Good: 1.65 ha, 8% • Good: 18.40 ha, 91% • Completely Degraded: 0.23 ha, 1%. One vegetation type was identified to occur across the Study Area, covering 20.05 ha. EmBsXp is described as *Eucalyptus marginata –Corymbiacalophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanhorhoea preisii*. This vegetation occurred on grey sands on the upper slopes and crest of the laterite ridge. The Impact Site is surrounded on three sides by already cleared land, any land degradation caused by the clearing is not likely to be significantly different from what is already present immediately adjacent to the site.	
Principle (h) –Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	No ESAs are identified across the Study Area. The closest ESA is located approximately 1.5 km to the northeast of the Study Area within the Lot Boundary of lot 1 (DWER 2018) (Figure 3). Two other ESA's are mapped within the Lot boundary to the north northwest of the Study Area approximately 2.5 km and 3.3 km respectively (Figure 3). The Study Area is not mapped within a Bush Forever Sites (Department of Planning 2014). There are no Bush Forever Sites within 20 km of the Study Area. The Study Area is located directly north of the Boonanarring Nature Reserve vested under the Conservation Commission of Western Australia for the purpose of Conserving Flora and Fauna (Figure 3) (DBCA2017a). The nature reserve is separated from the site by Wannamal Road West. The proposed action will retain a 40 m vegetation buffer between the main road and Impact Site. Given the distance from the Impact Site to the Nature Reserve and the ESA's the proposed clearing is unlikely to have an impact on the conservation value of this reserve.	The Proposal is **unlikely** to be at variance with this Principle.

Principle	Assessment	Outcome
Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or ground water	No surface water features are mapped within the Study Area (Department of Water and Environmental Regulation 2016). The Study Area is not within a mapped 100 Year ARI Floodplain Area (DWER2016). The area is mapped as extremely low/ very low probability Acid Sulphate Soil (ASS) risk (CSIRO, 2021). The Study Area is under the Gingin groundwater proclamation area (DWER, 2020) and Gingin brook proclaimed surface water areas, with the closest rivers and tributaries being in Perth. The Study Area does not include any P1 or P2 public drinking water source area, with the nearest P1 area visible approximately 26km away from Study Area. Given the lack of surface water features and the considerable distance of the site from nearby surface water features, clearing of the proposed site is unlikely to result in the deterioration of the quality of surface or ground water.	The proposal is **unlikely** to be at variance with the principle
Principle (j) –Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	No surface water features are mapped within the Study Area (Department of Water and Environmental Regulation 2016). The Study Area is not within a mapped 100 Year ARI Floodplain Area (DWER2016). Also, no geomorphic wetlands are mapped within the Study Area (Department of Biodiversity Conservation and Attractions 2017b). Lot 5549 contains three Conservation Category Wetlands (CCWs) and three Resource Enhancement Wetlands (REWs). A few minor, non-perennial watercourses, swamps, march areas and earth dams are mapped surrounding the Study Area to the north and east as shown in Figure 4 (DWER2016). Most of the Study Area is within the Dandaragan System, characterised as subdued dissected lateritic plateau, undulating low hills and rises with narrow alluvial plains. With variable deep sands and sandy gravels plus minor earths, duplexes and clays and marri woodlands and shrublands (Department of Agriculture and Food WA 2012). The Study Area is also bordered by the Capitella System characterised as subdued stripped lateritic plateau, undulating to gently undulating low rises with gently undulating plain including dunes with pale and yellow deep sands, sandy gravels, some duplex from sandstones plus alluvial and aeolian deposits (Department of Agriculture and Food WA 2012). The Study Area is then systematically divided further into two land subsystems (Figure 3): • 222Da: Undulating to rolling rises with breakaways. Areas dominated by duricrust (rock outcrop). • 222Cp: Drainage depressions and sand rises. Yellow deep sand.	The proposal is **unlikely** to be at variance with the principle

Principle	Assessment	Outcome
	The 1:1,000,000 surface geology mapping indicates the geology of the Study Area falls within the ferruginous duricrust 38498 surface geology unit, which is characterised by Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite (Geoscience Australia 2008). Considering the surface geology, soil land systems and the proximity of wetlands and surface water channels of the Impact Area, the proposed clearing is not likely to cause or exacerbate the incidence, or intensity of flooding.	

7 Summary of Assessment and Conclusion

In summary, after desktop and field assessments of the environmental values of the proposed disturbance area, it is considered that the proposal to clear approximately 13.76 ha of native vegetation is not significant . The assessment of the Impact Site shows that, the proposed action is unlikely to be at variance with the Ten clearing Principles.

A total 72 potential breeding trees contained hollows with an opening diameter greater than 12mm and are therefore potentially of a suitable size to be used for breeding by Black Cockatoo species. No evidence of Black Cockatoo breeding was recorded during the field survey. Approximately 20.05 ha of Very High Quality of Black Cockatoo foraging habitat was mapped within Survey Area, the Impact Area will clear a total of 13. 76 ha and retain 6.29 ha as buffers around Black Cockatoo potential breeding trees and between the main road and Impact Area.

One vegetation type was mapped within the Impact Area. This vegetation type is consistent with the broadscale vegetation complex mapping for the area. The vegetation present across the Impact Area is not considered to be representative of a Threatened or Priority Ecological Community. The vegetation is similar to vegetation mapped within the proposed offset and is considered to be Good Condition. Due to the presents of similar vegetation type within the surrounding area the clearing of 13.76 ha will not have a significant impact on the biodiversity of the area.

Implementation of the proposed management measures will prevent disturbance to three trees containing potential Black Cockatoo nesting habitat and protect approximately 6.29 ha of native vegetation from direct impacts associated with the Proposal. The proposed management measures will also ensure that new weeds do not become established at the site and that the risks or introducing die back are minimised.

8 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data, and analyses ('client's information') provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive, or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness, and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive, and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions, and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions, and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

9 References

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Figures

Legend

- Cadastral Lines
- Study Area

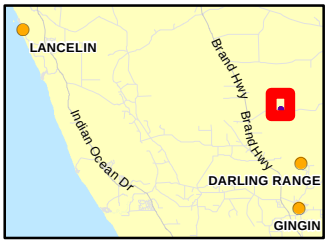
0 210 420 630 Meters

1:20,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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EC	VM	FJ	0

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Twin Rivers
NVCP Supporting Document

Figure 1
Study Area

K:\Projects\9.0 APP\3389 Twin Rivers Approvals\3389 002 NVCP MXDs\3389 NVCP F01 Study Area.mxd

Legend

- Cadastral Lines
- Impact Area

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- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP

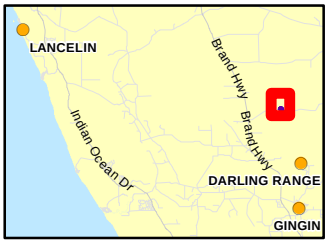

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Figure 2
Impact Area

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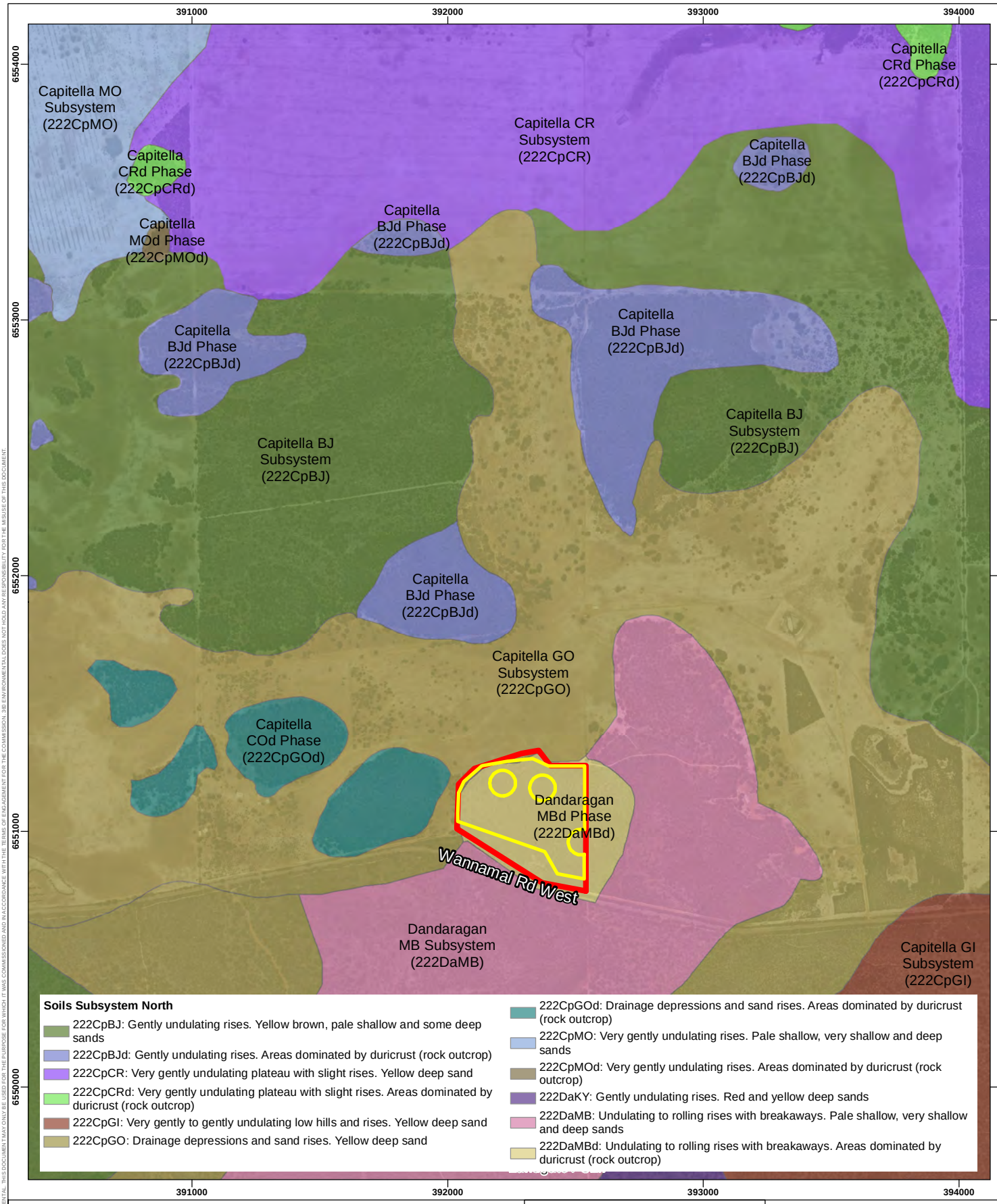

Legend

- Impact Area
- Study Area

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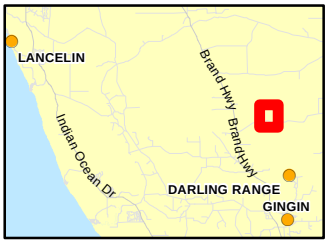
- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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EC	VM	FJ	0

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Figure 3
Land Systems

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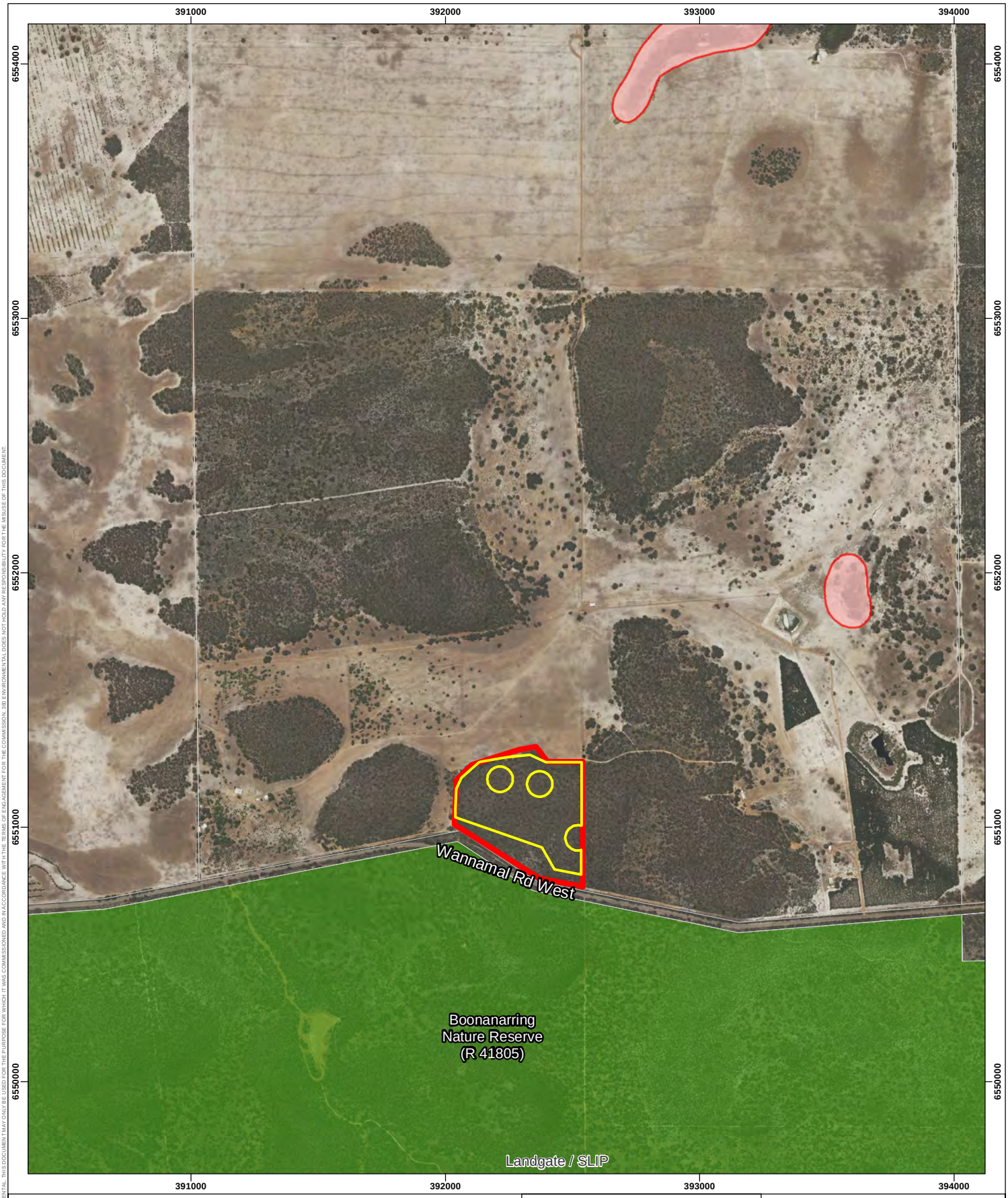

Legend

- Cadastral Lines
- DBCA Managed Land
- Environmentally Sensitive Areas
- Impact Area
- Study Area

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1:20,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP

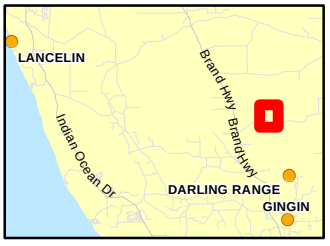

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Figure 4
Conservation Estate and Environmentally Sensitive Areas

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Legend

- Cadastral Lines
- Impact Area
- Study Area

Hydrography

- Watercourse - minor
- Watercourse - indefinite
- Swamp
- Marsh Area

Geomorphic Wetlands

- Conservation Category
- Resource Enhancement Category

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1:20,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP

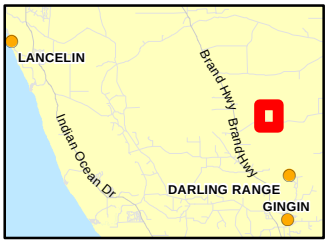

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Figure 5
Hydrology

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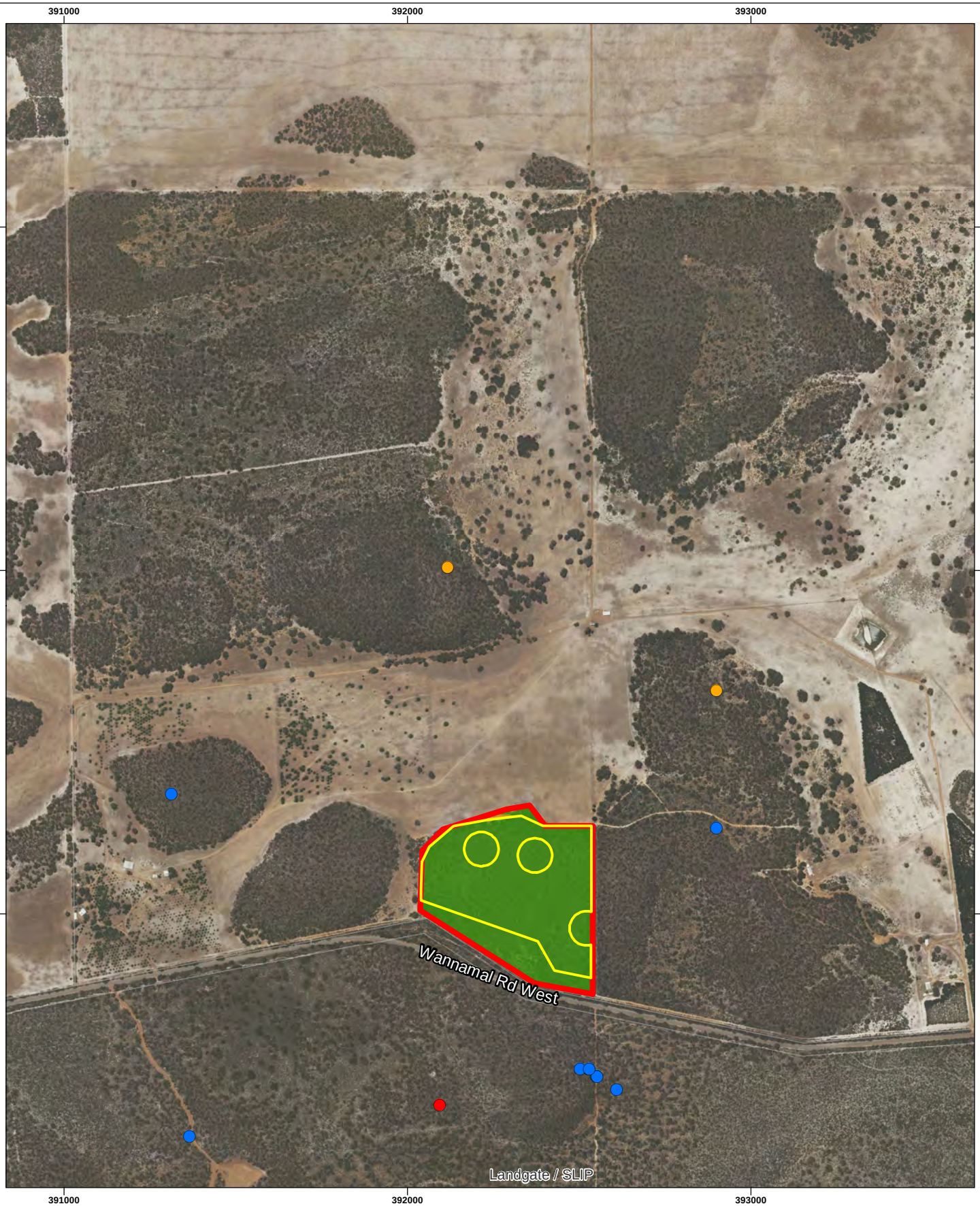


Legend

- Cadastral Lines
- Impact Area
- Study Area

DBCA Threatened and Priority Flora

- *Hibbertia glomerata* subsp. *ginginensis* P(2)
- *Lasiopetalum venustum* P(3)
- *Persoonia rudis* P(3)
- *Tetratheca hirsuta* subsp. *boonanarring* P(2)

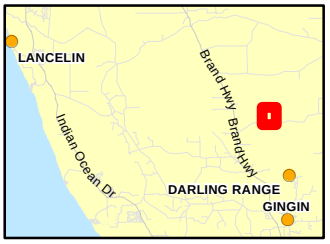
Vegetation Units

- EmBsXp
- Cleared

0 160 320 480 Meters
1:15,000 @ A4
N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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EC	VM	FJ	0

All Track WA

Twin Rivers
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Figure 6
Flora and Vegetation

K:\Projects\9.0 APP\3389 Twin Rivers Approvals\3389 002 NVCP MXDs\3389 NVCP F06 Flora and Vegetation.mxd

Legend

- Cadastral Lines
- Impact Area
- Study Area

Vegetation Condition

- Very Good
- Good
- Cleared

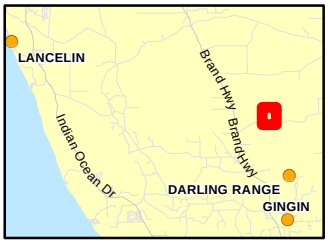
0 160 320 480 Meters

1:15,000 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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CREATED	CHECKED	APPROVED	REVISION
EC	VM	FJ	0

All Track WA

Twin Rivers
NVCP Supporting Document

Figure 7
Vegetation Condition

K:\Projects\9.0 APP\3389 Twin Rivers Approvals\3389 002 NVCP MXDs\3389 NVCP F07 Vegetation Condition.mxd

Legend

- Impact Area
- Study Area

Black Cockatoo foraging habitat

- EmBsXp
- Potential Nest Hollow
- Suitable Hollows

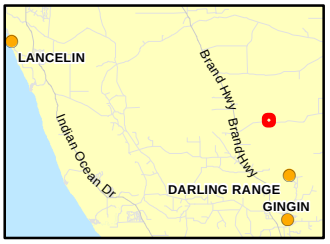
0 30 60 90 Meters

1:3,500 @ A4

N

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS

LOCALITY MAP



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Twin Rivers
NVCP Supporting Document

Figure 8
Black Cockatoo Habitat

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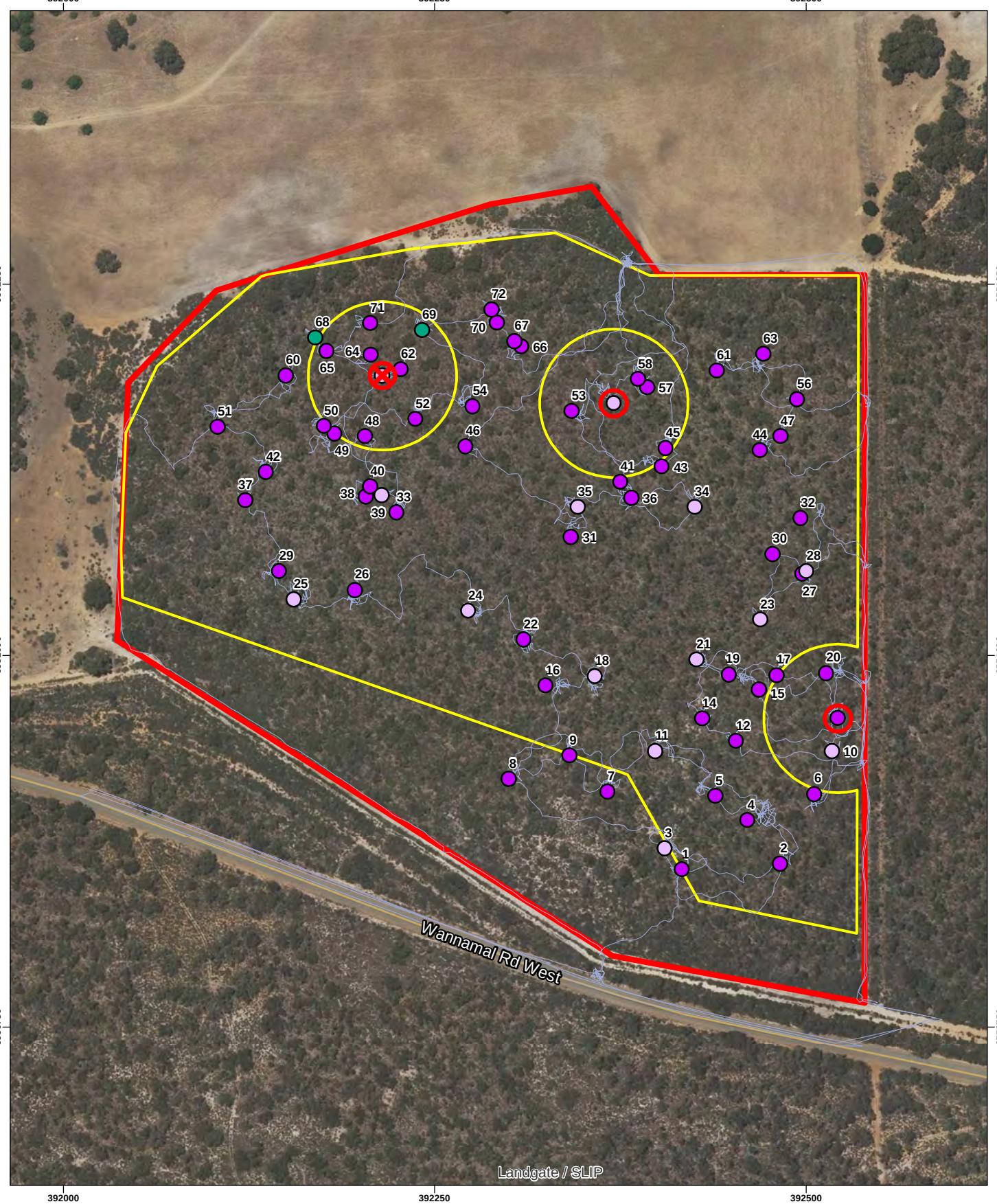

Legend

- Impact Area
- Study Area
- GPS tracks

Black Cockatoo Habitat Trees (over 500mm)

- Jarrah (*Eucalyptus marginata*)
- Marri (*Corymbia calophylla*)
- Stag

- Potential Nest Hollow
- Suitable Hollows

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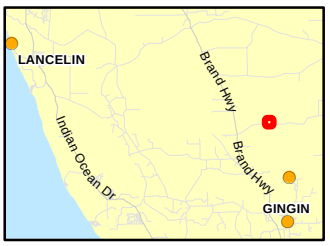

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Figure 9
Black Cockatoo Habitat Trees

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Appendices

Appendix A
Flora and Vegetation Survey Report

360 environmental

Lot 5449 Wannamal Road West,
Mindarra

Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Prepared for

All Track WA

February 2020

people planet professional

Document Reference	Revision	Prepared by	Reviewed by	Admin Review	Submitted to Client	
					Copies	Date
3358AA	Rev 0	C. McDonald E. Webb S. Hummerston	S. Walker	N. Lindroos	-	05/02/2020
3358AA	Rev 1	360 Environmental	All Track WA	-	1 Electronic (email)	07/02/2020

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Executive Summary

All Track commissioned 360 Environmental Pty Ltd to undertake a Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment within Lot 5449 Wannamal Road West, Mindarra located approximately 89 km north northeast of Perth, Western Australia. The Survey Area covered approximately 20.28 hectares. This survey was required to support further environmental approvals and future development.

Detailed Flora and Vegetation Survey

The desktop assessment identified 48 conservation significant species occurring within 10 km of the Survey Area. A likelihood of occurrence assessment was undertaken and determined 16 species as having a high likelihood of occurrence, seven species as having a medium likelihood of occurrence, 23 species as having a low likelihood of occurrence. Two species were recorded within the Survey Area.

The detailed flora and vegetation survey recorded the floristic composition and vegetation types from three quadrats and additional mapping notes. The survey recorded a total of 49 taxa from 37 genera across 17 families.

No Threatened flora species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* and/or gazetted as Threatened/Declared Rare Flora pursuant to the *Biodiversity and Conservation Act 2016* were recorded during the survey. Two Priority flora listed by DBCA in *Lasiopetalum venustum* (P3) and *Synaphea grandis* (P4) were recorded within the Survey Area.

No introduced species were recorded during the survey.

A single vegetation type was identified across the Survey Area, totalling 20.05 ha. The vegetation is broadly described as *Eucalyptus marginata - Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preissii.*

This vegetation type has been determined to have affiliation with FCT SCP S18, which has no listing as a Priority or Threatened Ecological Community by DBCA or listed as Endangered under the EPBC Act.

Black Cockatoo Habitat Assessment

The following conclusions can be drawn from the Black Cockatoo Habitat Assessment:

- A total of 190 trees were identified as potential breeding trees for Black Cockatoos, of which 72 contained hollows that may be suitable for Black Cockatoo breeding
- A total of 20.05 ha of Black Cockatoo foraging habitat was recorded in the Survey Area and evidence of Carnaby's Black Cockatoo foraging was recorded at five locations within the Survey Area
- A Carnaby's Black Cockatoo was sighted 60 m south of the Survey Area.

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1 Introduction

1.1 The Project

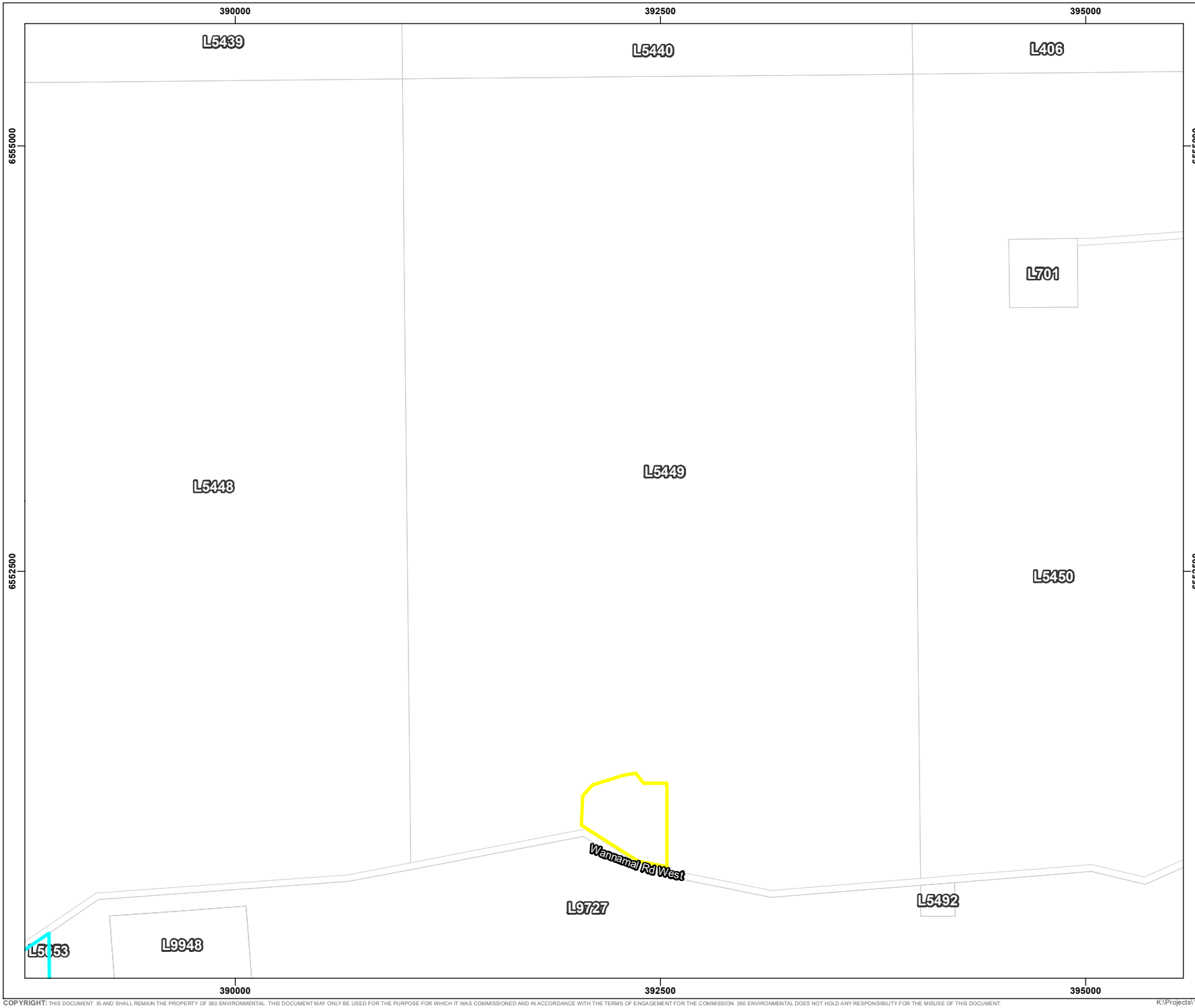
All Track WA (All Track) commissioned 360 Environmental Pty Ltd (360 Environmental) to undertake a Detailed Flora and Vegetation Survey and a Black Cockatoo Habitat Assessment within Lot 5449 Wannamal Road West, Mindarra located approximately 89 km north northeast of Perth, Western Australia hereafter known as the 'Survey Area'. The Survey Area covered approximately 20.28 hectares (ha) (Figure 1). The survey is required to support further environmental approvals and future development.

1.2 Objectives and Scope

The objective of the works is to provide environmental services to support environmental approvals for extractive industry development at this site.

The scope for the survey includes:

- A desktop assessment
- A single season Detailed Flora and Vegetation Survey
- Black Cockatoo Habitat Assessment
- Biological report
- Spatial data.



Legend

- Survey Area (20.28 ha)
- Lot Boundaries

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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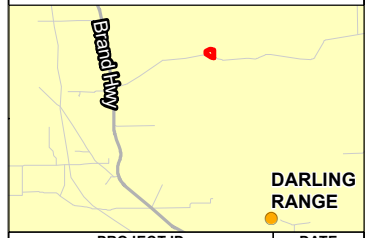

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Wannamal Road West, Mindarra

Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 1
Survey Area

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2 Background

2.1 Protection of Flora, Vegetation and Fauna

Western Australian flora and fauna is protected formally and informally by legislative and non-legislative measures, which are as follows:

Legislative measures:

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

Non-legislative measures:

- WA Department of Biodiversity Conservation and Attractions (DBCA) Priority lists for fauna, flora and ecological communities
- Weeds of National Significance (WoNS)
- Recognition of locally significant populations by DBCA.

2.2 Biophysical Environment

2.2.1 Climate

The most representative long-term official Bureau of Meteorology weather station currently operating near the Survey Area is Gingin Aero (Station Number 9178), located approximately 32.4 km south of the Survey Area.

The Gingin Aero weather station received 526.6 mm of rain in the 12 months prior to the survey (September 2018 – August 2019) (Bureau of Meteorology 2019). This is 115.3 mm below the long-term average rainfall for the same period. For the three months prior to the survey (June – August 2019), the Gingin Aero weather station recorded 398.6 mm of rainfall which is 51.6 mm above the long-term average rainfall for the same period (Figure 2) (Bureau of Meteorology 2019). No rainfall was recorded during the survey (Bureau of Meteorology 2019).

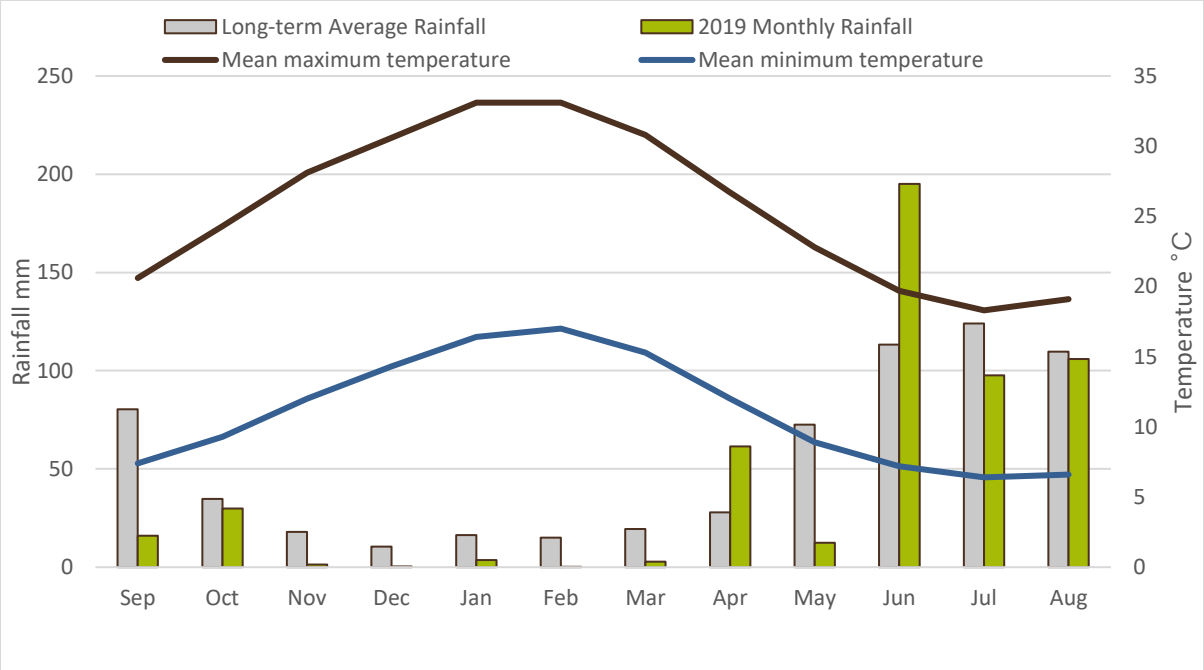


Figure 2: Long-term monthly average rainfall and maximum and minimum temperatures (from 1996 to 2019) as well as monthly rainfall data for the 12 months prior to the survey recorded in Gingin Aero (9178) (Bureau of Meteorology 2019)

2.2.2 Interim Biogeographic Regionalisation of Australia

The Survey Area is located within the Swan Coastal Plain bioregion of the Interim Biogeographic Regionalisation of Australia (IBRA) and within the Dandaragan Plateau (SWA1) subregion. The Dandaragan Plateau subregion is bordered by the Dandaragan and Derby Faults. It is made up of Cretaceous marine sediments mantled by laterites and sands. The vegetation is characterised by Marri woodland, Jarrah and Marri woodland, Banksia low woodland and scrub-heaths on gravelly sandplains and laterite pavement (Desmond 2001).

2.2.3 Soil-Land Systems and Surface Geology

Soil-landscape system mapping of Western Australia describes broad soil and landscape characteristics from regional to local scales. Most of the Survey Area is within the Dandaragan System, characterised as subdued dissected lateritic plateau, undulating low hills and rises with narrow alluvial plains. With variable deep sands and sandy gravels plus minor earths, duplexes and clays and marri woodlands and shrublands (Department of Agriculture and Food WA 2012). The Survey Area is also bordered by the Capitella System characterised as subdued stripped lateritic plateau, undulating to gently undulating low rises with gently undulating plain including dunes with pale and yellow deep sands, sandy gravels, some duplex from sandstones plus alluvial and aeolian deposits (Department of Agriculture and Food WA 2012). The Survey Area is then systematically divided further into two land subsystems (Figure 3):

- **222Da**: Undulating to rolling rises with breakaways. Areas dominated by duricrust (rock outcrop)
- **222Cp:** Drainage depressions and sand rises. Yellow deep sand.

The 1:1,000,000 surface geology mapping indicates the geology of the Survey Area falls within the ferruginous duricrust 38498 surface geology unit, which is characterised by Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite (Geoscience Australia 2008).

2.3 Biological Environment

2.3.1 Broad Vegetation Types

Mapping of the vegetation of the Swan Coastal Plain region which included the Survey Area was completed on a broad scale (1:1,000,000) by (Beard 1981). These vegetation units were later re-assessed by Shepherd, Beeston and Hopkins (2002) to account for clearing in the intensive land use zone, dividing some larger vegetation units into smaller units.

Gingin 1027 is mapped over the entire Survey Area. Gingin 1027 is described as low forest, woodland or low woodland with scattered trees: Jarrah (*Eucalyptus marginata*), Banksia (*Banksia* spp.) or Casuarina (*Allocasuarina* spp.). The vegetation type is described below and its representation across the state, bioregion and local government authority is shown in Table 1.

Table 1: Broad Vegetation Types Within the Survey Area, the State and Regional Representation (Department of Biodiversity Conservation and Attractions 2019a)

Vegetation Type	Pre-European Extent (HA)	Current Extent (HA)	Remaining (%)	Current Extent Managed in DBCA Lands (%)
Vegetation Type in Western Australia				
1027	39,809.21	23,462.16	58.94	21.68
Vegetation Type in Swan Coastal Plain bioregion				
1027	39,534.38	23,367.69	59.11	21.83
Vegetation Type in Dandaragan Plateau subregion				
1027	39,268.58	23,197.04	59.07	21.76
Vegetation Type in the Shire of Gingin				
1027	27,632.97	17,871.98	64.68	24.80

Mapping by Heddle, Loneragan and Havel (1980) used landform-soil units determined by Churchward and McArthur (1978) and has identified Karamal Complex-South occurring across the entire the Survey Area. The delineation of vegetation complexes is based on the concept of a series of plant communities forming regularly repeating complexes associated with a soil unit. Karamal Complex-South is described as an open forest with lateritic uplands.

2.3.2 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared to prevent degradation of important environmental values such as Threatened flora, TECs or significant wetlands. Exemptions contained in

the *Environmental Protection (Clearing of Native vegetation) Regulations 2004* for low impact land clearing do not apply in ESAs and a clearing permit is required.

No ESAs are identified across the Survey Area. The closest ESA is located approximately 1.5 km to the northeast of the Survey Area within the Lot Boundary of lot 5449 (Department of Water and Environmental Regulation 2018) (Figure 4). Two other ESAs are mapped within the Lot boundary to the north northwest of the Survey Area approximately 2.5 km and 3.3 km respectively (Figure 4).

2.3.3 Conservation Areas

The Survey Area is not mapped within a Bush Forever Sites (Department of Planning 2014). There are no Bush Forever Sites within 20 km of the Survey Area.

The Survey Area is located directly north of the Boonanarring Nature Reserve vested under the Conservation Commission of Western Australia for the purpose of Conserving Flora and Fauna (Figure 4) (Department of Biodiversity Conservation and Attractions 2017a).

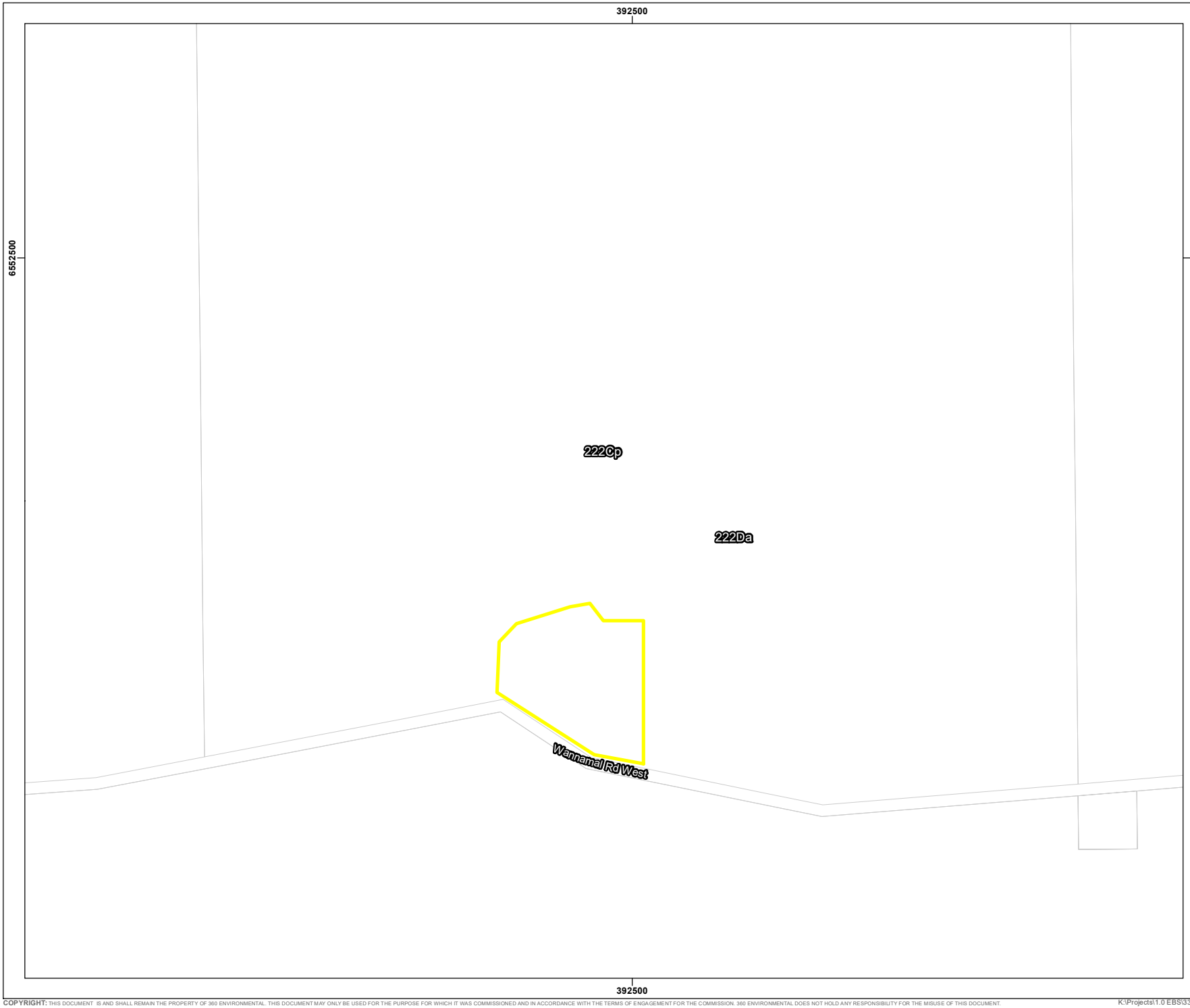
2.3.4 Hydrology and Wetlands

No surface water features are mapped within the Survey Area (Department of Water and Environmental Regulation 2016). The Survey Area is not within a mapped 100 Year ARI Floodplain Area (Department of Water and Environmental Regulation 2016).

A number of minor, non-perennial watercourses, swamps, march areas and earth dams are mapped surrounding the Survey Area to the north and east as shown in Figure 5 (Department of Water and Environmental Regulation 2016).

No geomorphic wetlands are mapped within the Survey Area (Department of Biodiversity Conservation and Attractions 2017b). Lot 5549 contains three Conservation Category Wetlands (CCWs) and three Resource Enhancement Wetlands (REWs). These wetlands and their proximity to the Survey Area are listed below and shown in Figure 12 (Department of Biodiversity Conservation and Attractions 2017b):

- REW (11214) 1.0 km to the east of the Survey Area
- CCW (11212) 1.2 km to the north east of the Survey Area
- REW (11213) 1.4 km to the east of the Survey Area
- CCW (11211) 2.5 km to the north of the Survey Area
- REW (10948) 3.1 km to the northwest of the Survey Area
- CCW (11209) 3.3 km to the northeast of the Survey Area.



Legend

Survey Area (20.28 ha)

Lot Boundaries

Soil Land System

222Cp: subdued stripped lateritic plateau, undulating to gently undulating low rises with gently undulating plain including dunes; pale and yellow deep sands, sandy gravels, some duplex; from sandsto*

222Da: Subdued dissected lateritic plateau, undulating low hills and rises with narrow alluvial plains. Variable deep sands and sandy gravels plus minor earths, duplexes and clays. Marri woodlands an*

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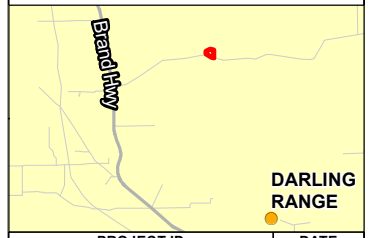

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Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 3
Soils and Land Systems

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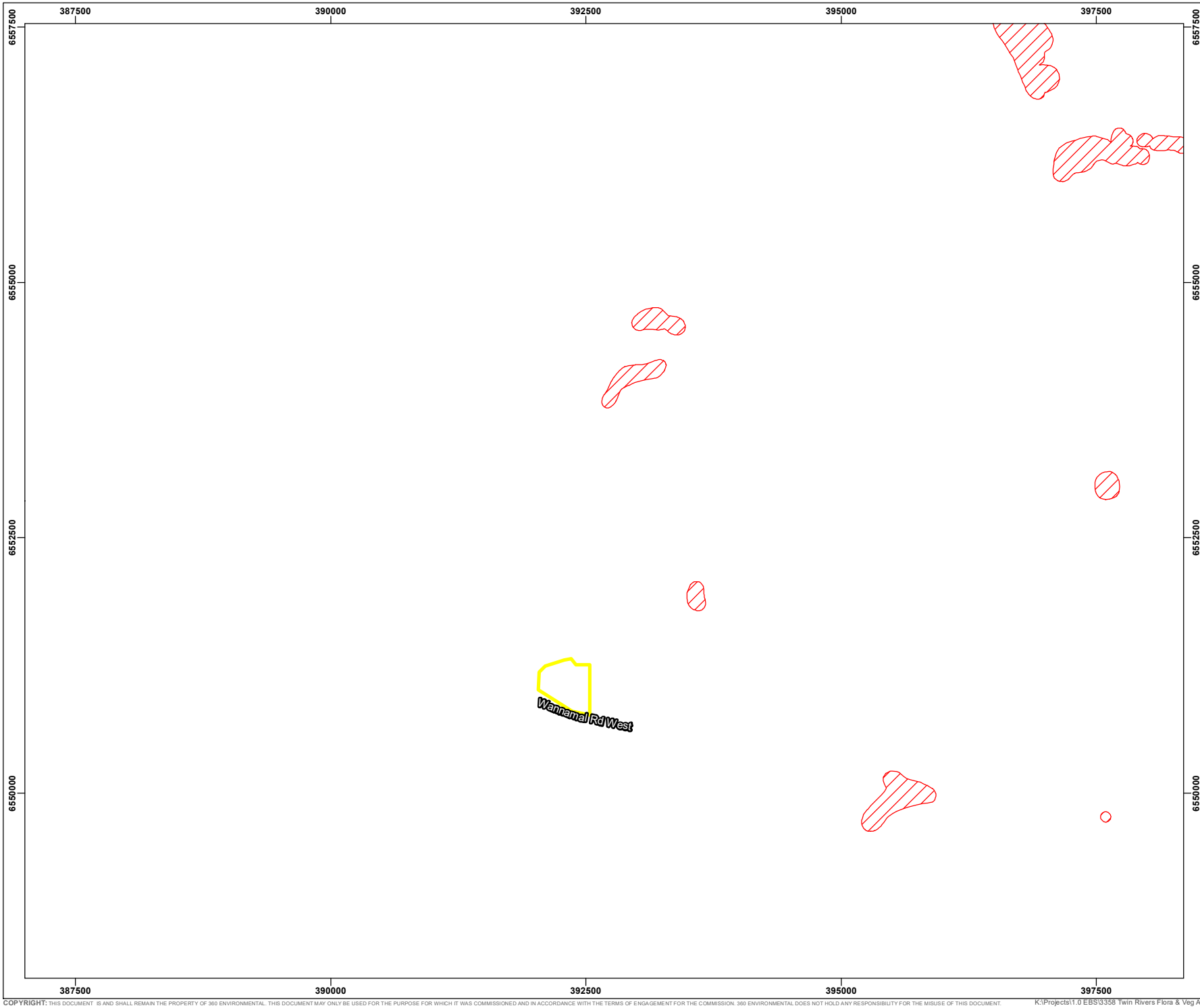

Legend

- Survey Area (20.28 ha)
- Lot Boundaries
- Environmentally Sensitive Areas
- DBCA Managed Lands and Waters

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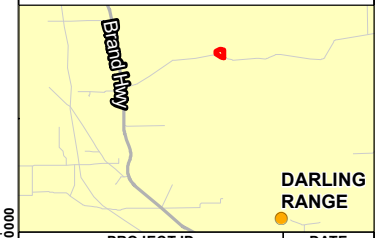

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Wannamal Road West, Mindarra

Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 4 Environmentally Sensitive and Conservation Areas

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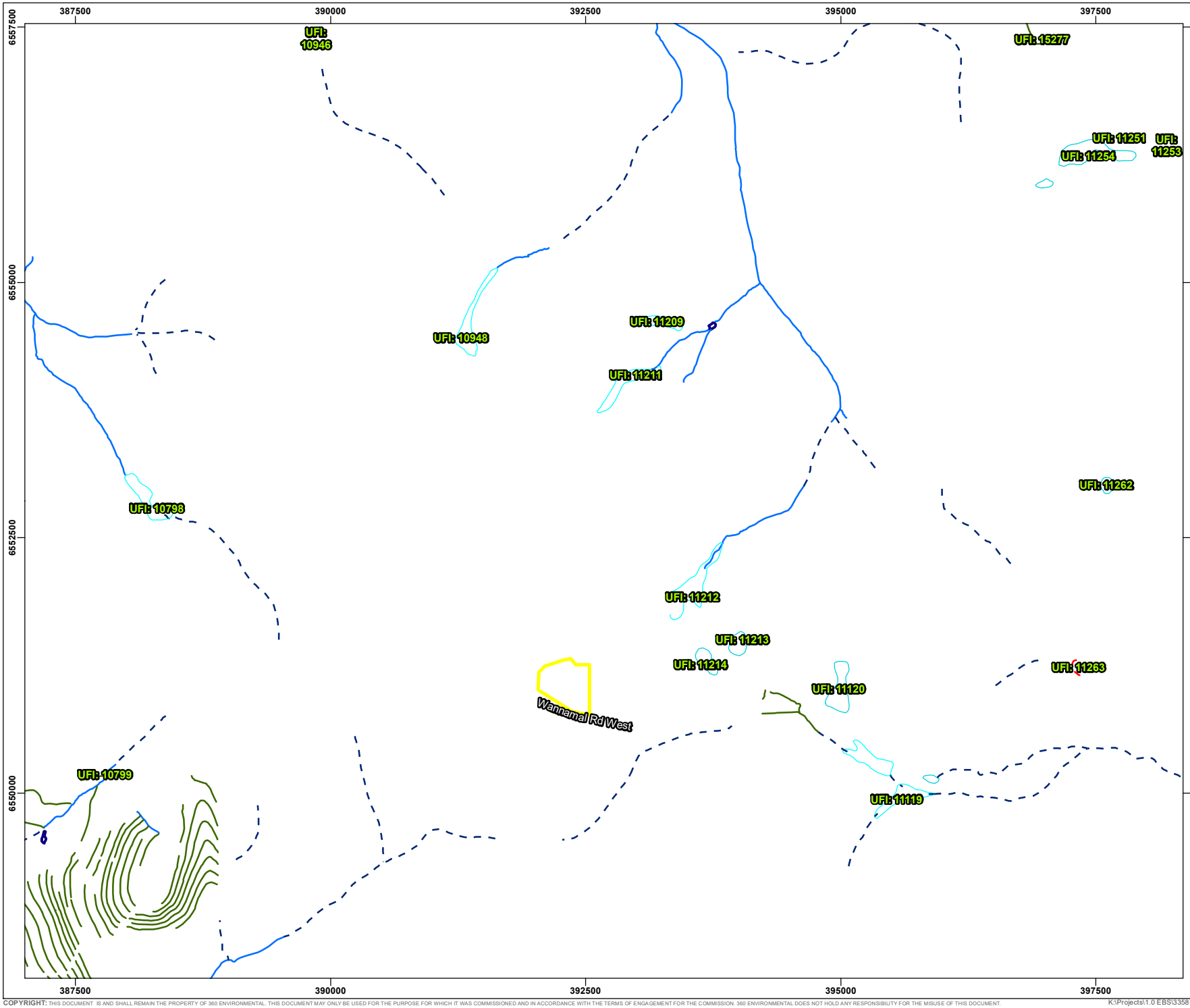

Legend

- Survey Area (20.28 ha)
- Lot Boundaries
- Watercourse - minor
- Watercourse - indefinite
- Drain - minor
- Lake - artificial
- Swamp
- Marsh Area
- Area Subject to Inundation

Geomorphic Wetlands

- Conservation Category
- Resource Enhancement Category
- Multiple Use Category

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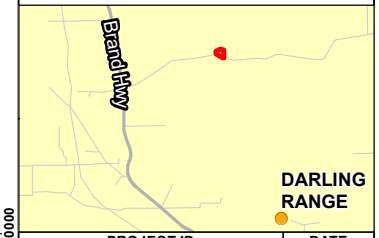

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Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 5
Hydrography and Wetlands

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3 Methods

3.1 Requirements for Flora and Fauna Surveys

This survey has been carried out as per the EPA requirements for environmental surveying and reporting of flora and fauna surveys in Western Australia where relevant, and as documented in:

Western Australia

- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a)
- Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016b)
- Technical Guidance – Terrestrial Fauna Surveys (EPA, 2016c).

Federal

- Matters of National Environmental Significance impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (DoE, 2013)
- EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) *Calyptorhynchus latirostris,* Baudin's Cockatoo (Vulnerable) *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo (Vulnerable) *Calyptorhynchus banksii naso* (DSEWPaC, 2012)
- Survey guidelines for Australia's threatened birds Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (DSEWPaC, 2010).

3.2 Desktop Assessment

3.2.1 Database Searches

Database searches were undertaken to identify potential conservation significant flora and fauna taxa and Ecological Communities within or surrounding the Survey Area. Database search are outlined in Table 2. The search buffer was 10 km.

Priority Ecological Communities (PEC) and Threatened Ecological Communities (TEC) within the Swan Coastal Plain bioregion were examined to determine if any corresponded with the Survey Area (Appendix A). In addition, an EPBC Protected Matters Search (PMST) was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within or surrounding the Survey Area (Department of the Environment and Energy 2019).

Table 2: Database Searches of the Survey Area

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Ecological Communities database (Department of Biodiversity Conservation and Attractions 2019b)	25 July 2019	Listed TECs and PECs	10 km radius

Database Name	Date Received	Search Target	Search Area
Threatened and Priority Flora Database (TPFL) (Department of Biodiversity Conservation and Attractions 2019c)	17 July 2019	Threatened and Priority Flora	10 km radius
Western Australian Herbarium flora (Department of Biodiversity Conservation and Attractions 2019d)	17 July 2019		10 km radius
DBCA Black Cockatoo Records (Department of Biodiversity Conservation and Attractions 2019e)	12 July 2019	Black Cockatoo Records	20 km radius (DBCA recommended)
NatureMap (Department of Biodiversity Conservation and Attractions 2019f)	11 July 2019	Threatened and Priority Flora and Fauna	10 km radius
Protected Matters Search Tool (PMST) (Department of the Environment and Energy 2019)	11 July 2019	Threatened and Priority Flora and Fauna	10 km radius

3.2.2 Likelihood of Assessment

Conservation significant flora and fauna species identified from the desktop assessment were further examined to determine a likelihood of occurrence both prior and post field survey. The assessment was completed based on the likelihood of occurrence criteria presented in Table 3. Only species either recorded within the Survey Area or considered as having a high or medium likelihood of occurrence will be discussed in detail. Species classified as having a low likelihood of occurrence based on the above criteria will not be discussed unless a justification for this classification is required.

Table 3: Likelihood of Occurrence Criteria

Likelihood	Flora
Recorded	Flora and fauna species recorded within the Survey Area during the field survey
High	Previously recorded within Survey Area or within 5 km and suitable habitat potentially occurs in the Survey Area
Medium	Previously recorded within 5 to 10 km of the Survey Area and/or suitable habitat potentially occurs in the Survey Area
Low	No suitable habitat appears to be present in the Survey Area and records are greater than 10 km

3.2.3 Literature Review

A literature review was undertaken to identify any previously completed surveys within the general region. This includes reviewing all publicly available reports to assist with understanding any key biological findings nearby.

3.3 Detailed Flora and Vegetation Survey

3.3.1 Field Survey

A detailed single season flora and vegetation survey was undertaken by Botanist Shenaye Hummerston (Flora Licence FB62000125) on the 6th of September 2019. The field survey included an assessment of three quadrats, mapping notes, vegetation condition notes and mapping, opportunistic flora collections and observations.

A minimum of three quadrats of 10 x 10 m (100 m^2) were installed in each vegetation type found on site. Each quadrat was accurately measured using measuring tapes, and the northwest corner was demarcated with a steel fence dropper and pink flagging tape. At the NW corner of each quadrat, the location was recorded using a Fulcrum mobile data collection device with a photograph.

At each quadrat, the following data was recorded:

- Site code – a unique identifier allocated to each quadrat
- Date and recorder – a record of the date of quadrat sample and a list of the personnel involved in sampling the quadrat
- Location – GPS coordinates (MGA94) measured from the north west corner of the quadrat
- Dimensions – the size and shape of the quadrat
- Landform and soil description – a description of the quadrat habitat
- Additional site descriptors – location information that might be useful in vegetation classification including, slope, aspect, litter cover, bare ground cover and fire history
- Species list – a comprehensive vascular flora species list
- Foliar cover – the estimated total percentage foliar cover for each species recorded
- Height – the average height (in meters) of each species recorded
- Vegetation description – a description of the vegetation according to the National Vegetation Information System (NVIS), Level 5. According to this level, vegetation is classified to 'association', where the dominant growth form, height, cover and species (three species) for the three traditional strata (upper, mid and ground) are described
- Vegetation condition – assessed according to the vegetation condition scale (Environmental Protection Authority 2016a)
- Photographs – a photograph from the north west corner looking toward the south east corner was taken.

3.3.2 Flora of Conservation Significance

The Survey Area was traversed on foot and opportunistic collections were made to identify flora of conservation significance which were listed in the Desktop Assessment.

Specimens were collected for identification and lodgement at the Western Australian Herbarium (WAH) and a Threatened Flora Report form completed.

3.3.3 Taxonomy and Nomenclature

Where field identification of plant taxa was not possible, specimens were collected systematically for later identification using resources of the WAH. Taxonomy was completed by experienced Botanist Shenaye Hummerston and experienced Taxonomist Shibi Chandran at the WA Herbarium.

The finalised species list was checked against FloraBase (Department of Biodiversity Conservation and Attractions 2019g) to determine the species' conservation status and known distribution. Introduced species were compared against the BAM Act Declared Plants list (Department of Primary Industries and Regional Development 2018) and the WONS list to determine their status (Department of the Environment and Energy 2018).

3.3.4 Statistical Analyses

Quadrats were classified on the basis of similarity in species composition using Primer-E version 6.1.5. Species presence/absence quadrat data was pre-treated and transformed and then computed using Bray-Curtis similarity analysis.

A Bray-Curtis similarity analysis was undertaken on the floristic composition of the quadrats recorded during the survey with weed and native flora quadrat data compiled between 1990 - 1996 for the Southern Swan Coastal Plain (Gibson et al. 1994). The Gibson *et al.* (1994) data set combines a total of 1,098 sites from numerous studies on the Swan Coastal Plain.

The purpose of the similarity analysis was to help clarify the assignment of Floristic Community Type (FCT) to the quadrat sites recorded during the current survey. The end assignment of FCTs to the survey quadrats was made by the nearest neighbour method. The nearest neighbour method involved determination of sites most similar from the Gibson *et al.* (1994) data set to quadrats recorded during this survey.

3.4 Black Cockatoo Habitat Assessment

3.4.1 Field Survey

The Black Cockatoo Habitat Assessment was undertaken on 6 and 13 September 2019 by Ecologist Evan Webb. The entire Survey Area was traversed on foot.

3.4.2 Breeding Habitat

Any trees meeting the following criteria for potential breeding were recorded using the Fulcrum mobile data-collection application:

- Native trees (e.g. Jarrah, Tuart, Marri, Wandoo and Salmon Gum)
- Diameter at breast height (DBH) of greater than 500 mm (greater than 300 mm for Wandoo and Salmon Gum) regardless of the presence or absence of hollows (DBH is measured approximately 1.3 metres from the ground)
- Any trees containing hollows (observed from the ground), which were then categorised as:
    - Hollows with an estimated opening diameter of less than 120 mm
    - Hollows with an estimated opening diameter of greater than 120 mm and therefore have the potential to be used by Black Cockatoos for breeding.

Trees with multiple stems, swellings or forking/branching at breast height were measured separately. In these instances, the diameter was measured just above breast height to gain a more accurate measurement of diameter.

3.4.3 Foraging Habitat

The Black Cockatoo assessment involved assessing the habitat for tree and shrub species known to be important dietary items e.g. Marri and *Banksia* sp. as outlined within the referral and revised draft referral guidelines. It also included looking for:

- Evidence of feeding (chewed cones, seed and nut material)
- Opportunistic observations of Black Cockatoos foraging or utilising the Survey Area.

3.4.4 Roosting Habitat

While undertaking the assessment any evidence of roosting or areas identified as having high roosting potential were identified, recorded and mapped.

4 Results

4.1 Limitations and Constraints

Survey limitations and constraints of the flora and vegetation assessment are detailed in Table 4.

Table 4: Limitations and Constraints Associated with the Survey

Variable	Degree of Limitation	Impact on Survey Outcomes
Access	Not a limitation	The Survey Area was accessed on foot and thoroughly traversed.
Experience	Not a limitation	The flora and vegetation survey was undertaken by Botanist Shenaye Hummerston. Shenaye has seven years' experience conducting surveys of similar scope throughout the southwest region.. The Black Cockatoo habitat assessment was undertaken by Ecologist Evan Webb. Evan has three years' experience undertaking fauna surveys and Black Cockatoo Habitat Assessment throughout Western Australia, including extensive fauna experience throughout the Swan Coastal Plain region.
Timing, weather, season	Not a limitation	The survey was conducted during September which is within the recommended flora survey period for the South-West province (Spring, September - November). For the three months prior to the survey, the Gingin Aero weather station (station 009178) recorded 398.6mm of rainfall which is 47.2 mm above the long-term average rainfall for the same period (refer to Section 2.1.1). Flora composition changes with time, particularly seasonally as a result of changes in conditions such as rainfall. Therefore, botanical surveys completed at different times of the year will often produce varying results.
Scope: Life forms sampled	Low limitation	Quadrats and opportunistic collections were used to collect data on the species present within the Survey Area. Many flora species were flowering and fruiting and annual species present. Of the 49 flora taxa collected, nine (18%), were unable to be identified to species level due to the absence of identifiable features such as fruit and flowers. Therefore, this is considered a low limitation of the survey.
Sources of information	Not a limitation	Relevant DBCA and EPBC searches were undertaken for the Survey Area and are listed in (Excluding GPS coordinates). In addition, previous flora survey reports for the area were sourced proving sufficient information to accurately undertake the survey.
Completeness		The survey was considered complete for a detailed flora and vegetation survey, all vegetation types were surveyed and delineated within the Survey Area. The Survey was considered complete and adequately surveyed for Black Cockatoo habitat assessment.

4.2 Literature Review

Black Cockatoo Habitat Assessment – 115 Rig Road, Red Gully (360 Environmental Pty Ltd 2017)

A Black Cockatoo Assessment was undertaken in 2017, located approximately 7 km north west from the current Survey Area. The key findings included:

- A total of 73 trees with a DBH of more than 500 mm were recorded.

- Two observable nesting hollows were recorded from the ground in these trees; however one was full of debris and the second was worn with possibly a sighted Galah inhabiting the hollow.
- The foraging habitat present consisted of *Corymbia calophylla, E. todtiana, Banksia menziesii, B. attenuata* and *Hakea prostrata*.

Mogumber Poultry Farm II Development Flora, Vegetation, Fauna and Black Cockatoo Assessment (360 Environmental Pty Ltd 2018a)

A Detailed Flora and Vegetation, Fauna and Black Cockatoo Assessment was undertaken approximately 20 km north from the current Survey Area. The key findings included:

- One Threatened flora species and six Priority species were recorded or potentially recorded during the survey, *Banksia mimica* (EN), *Banksia chamaephyton* (P4), *Banksia dallanneyi* subsp. *pollosta* (P3), *Banksia pteridifolia* subsp. *vernalis* (P3), *Isopogon drummondii* (P3), *Stylidium nonscandens* (P3) and *Synaphea* ? *sparsiflora* (P2).
- Three Vegetation Types were recorded
- A total of 5.84 ha of Black Cockatoo foraging habitat was identified during the survey consisting of *Banksia attenuata* and *B. menziesii* heath, isolated Marri (*Corymbia calophylla*) trees isolated *Eucalyptus todtiana* trees. Potential evidence of Carnaby's Black Cockatoo foraging within the survey area.
- A total of 29 trees that met the criteria to be classed as potential breeding trees were recorded. Three of these potential breeding trees were observed as containing a hollow greater than 120 mm. Of these three hollows, two were occupied by feral bees and one appeared to be too decomposed within the hollow itself to be of use to Black Cockatoos.

Mogumber Road West and Wandena-Great Northern Hwy Targeted Priority Flora Survey (360 Environmental Pty Ltd 2018b)

A Targeted Priority Flora Survey was undertaken approximately 21 km north from the current Survey Area. The key findings included:

- One Priority 3 species (*Arnocrinum drummondii*) was recorded during the survey.
- The survey area was delineated into the following broad vegetation types:
  - Areas of Low *Banksia* Woodland species over mixed shrubs
  - Small isolated areas of low-lying depressions consisting of *Melaleuca* spp., sedges and rushes
  - Areas of *Eucalyptus marginata*, *E. wandoo* and *Corymbia calophylla* over mixed shrubs
  - Isolated *Banksia attenuata* over mixed shrub species
  - Areas of pastoral cleared land.

4.3 Flora and Vegetation

4.3.1 Desktop Assessment

The desktop assessment identified populations of 48 conservation significant species occurring within 10 km of the Survey Area, which was comprised of:

- 17 Threatened Flora species
- One Priority 1 species
- Seven Priority 2 species
- 14 Priority 3 species
- Nine Priority 4 species.

Two species were recorded during the survey.

Sixteen species were considered to have a high likelihood of occurrence:

- *Banksia mimica* (T, EN)
- *Goodenia arthrotricha* (T, EN)
- *Goodenia xanthotricha* (P2)
- *Hibbertia glomerata subsp. ginginensis* (P2)
- *Loxocarya gigas* (P2)
- *Tetratheca hirsuta subsp. boonanarring* (P2)
- *Acacia cummingiana* (P3)
- *Acacia drummondii subsp. affinis* (P3)
- *Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)* (P3)
- *Banksia kippistiana var. paenepeccata* (P3)
- *Banksia pteridifolia subsp. vernalis* (P3)
- *Persoonia rudis* (P3)
- *Styphelia filifolia* (P3)
- *Banksia chamaephyton* (P4)
- *Caladenia speciosa* (P4)
- *Grevillea saccata* (P4).

Seven species were considered to have a high likelihood of occurrence:

- *Thelymitra stellata* (T, EN)
- *Calectasia elegans* (P2)
- *Beaufortia eriocephala* (P3)
- *Isopogon drummondii* (P3)
- *Leucopogon allittii* (P3)
- *Platysace ramosissima* (P3)

- *Thysanotus glaucus* (P4).

The remaining 23 are were considered to have a low likelihood of occurrence in the Survey Area.

All conservation significant species and communities identified in the desktop assessment are provided in Appendix A and the DBCA Threatened and Priority Flora records are mapped in Figure 6.

The desktop assessment identified three Threatened Ecological Communities as likely to occur within the Survey Area (Figure 7):

- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Banksia WL SCP)
- Swan Coastal Plain *Banksia attenuata - Banksia menziesii* woodlands (SCP23b)
- *Banksia ilicifolia* woodlands (SCP22).

4.3.2 Flora

The survey recorded a total of 49 taxa from 19 families across 37 genera. The most dominant families were Orchidaceae (eight species) and Fabaceae (six species). The most dominant genus was and *Hibbertia* (four species). A full species inventory is detailed in Appendix B.

A specimen was collected for all species recorded within the Survey Area. A proportion of flora, nine taxa (18%), were unable to be identified confidently to species level. This was mainly due to the specimens being sterile with no flowering material or fruit present.

4.3.3 Flora of Conservation Significance

No Threatened flora species pursuant to the EPBC Act 1999 and/or gazetted as Threatened/Declared Rare Flora pursuant to the BC Act 2016 were recorded during the survey.

Two Priority species as listed by DBCA *Lasiopetalum venustum* (P3) and *Synaphea grandis* (P4) were recorded within the Survey Area. The coordinates and a population estimate of these species are detailed in Table 5. The targeted flora survey focused on areas of suitable habitat for species with a medium or high likelihood of occurrence within the Survey Area (Table 6).

Table 5: Conservation Significant Species Recorded within the Survey Area

Species	Number of Individuals	Collection	Latitude	Longitude
Lasiopetalum venustum (P3)	1	Quadrat TRQ03	-31.16901120	115.87109800
Lasiopetalum venustum (P3)	1	Opportunistic	-31.16981190	115.87138180
Lasiopetalum venustum (P3)	2	Opportunistic	-31.16874250	115.87115800
Lasiopetalum venustum (P3)	9	Opportunistic	-31.16998310	115.86964650
Lasiopetalum venustum (P3)	10	Opportunistic	-31.17029570	115.86972480
Lasiopetalum venustum (P3)	1	Opportunistic	-31.17023840	115.86973590
Synaphea grandis (P4)	1	Quadrat TRQ01	-31.17157910	115.87158390
Synaphea grandis (P4)	1	Quadrat TRQ02	-31.16891890	115.86856600

Assessment of the Likelihood of Occurrence of Threatened and Priority Flora (as per DBCA and EPBC Database Searches) in the Survey Area

Closest record to Survey Area based on DBCA 2019. High = Suitable habitat present and records less than 5 km from the Survey Area, Medium = Suitable habitat present and records between 5 km and 10 km from the Survey Area, and Low = No suitable habitat present and/or records greater than 10 km from the Survey Area. CR = Listed as Critically Endangered under the EPBC Act, EN = Listed as Endangered under the EBPC Act, VU = Listed as Vulnerable under the EPBC Act

Species	Conservation Status		Source			Distance to Nearest Record (km)	Flowering Period	Prefered Habitat	Habitat occurs within the Survey Area	Likelihood of Occurrence
	DBCA	EPBC	Nature Map	PMST	DBCA					
Andersonia gracilis	T	EN		X		10.3	Sep to Nov	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	No	Low
Banksia mimica	T	EN	X	X	X	3.5	Dec or Jan to Feb	White or grey sand over laterite, sandy loam.	Yes	High
Chamelaucium sp. Gingin (N.G.Marchant 6)	T	EN		X		-	Aug - Oct	White, grey or yellow sands with gravel, over laterite.	Yes	Low
Conospermum densiflorum subsp. unicephalatum	T	EN		X		19.3	Sep to Nov	Clay soils. Low-lying areas.	Yes	Low
Drakaea elastica	T	EN		X		11.3	Oct to Nov	White or grey sand. Low-lying situations adjoining winter-wet swamps.	No	Low
Eucalyptus leprophloia	T	EN		X		102.8	Aug to Oct	White or grey sand over laterite. Valley slopes.	Yes	Low
Eucalyptus recta	T	EN		X		54.3	May	Sandy laterite.	Yes	Low
Eucalyptus x balanites	T	EN		X		97.2	Oct to Dec or Jan to Feb	Sandy soils with lateritic gravel	Yes	Low
Goodenia arthrotricha	T	EN	X	X	X	2.9	Oct to Nov	Gravel. Granite rocks, slopes.	Yes	High
Grevillea curviloba subsp. incurva	T	EN		X		31.7	Aug to Sep	Sand, sandy loam. Winter-wet heath	No	Low
Paracaleana dixonii	T	EN		X		18.4	Oct to Dec or Jan	Grey sand over granite	Yes	Low
Thelymitra dedmaniarum	T	EN	X	X	X	8.8	Nov to Dec or Jan	Granite	No	Low
Thelymitra stellata	T	EN	X	X	X	8.3	Oct to Nov	Sand, gravel, lateritic loam	Yes	Medium
Anigozanthos viridis subsp. terraspectans	T	VU		X	X	10.4	Aug to Sep	Grey sand, clay loam. Winter-wet depressions	No	Low
Diuris drummondii	T	VU		X		13.3	Nov to Dec or Jan	Low-lying depressions, swamps	No	Low
Eleocharis keigheryi	T	VU		X		16.5	Aug to Nov	Clay, sandy loam. Emergent in freshwater: creeks, claypans	No	Low
Ptychosema pusillum	T	VU		X		13.3	Aug to Oct	Sand. Rises	Yes	Low
Stylidium diplectroglossum	P1	-	X			9.6	Oct to Dec	Loamy sands. Low bushland, plains.	No	Low
Calectasia elegans	P2	-	X		X	5.4	Nov to Feb	Sandy soils. Gravelly hills.	Yes	Medium
Goodenia xanthotricha	P2	-	X		X	2.6	Nov to Feb	Sandy soils. Gravelly hills.	Yes	High
Haloragis aculeolata	P2	-			X	14.2	Sep or Dec	Black sand or clay over limestone. Winter-wet areas.	No	Low
Hibbertia glomerata subsp. ginginensis	P2	-	X		X	0.2	Jul to Sep	Sand, brown clay, laterite. Near roadsides.	Yes	High
Loxocarya gigas	P2	-	X		X	4.1		Sandy gravelly lateritic soils. Low hills & ridges, sandplains.	Yes	High
Tetraria sp. Chandala (G.J. Keighery 17055)	P2	-	X		X	3.1	-	Grey brown peaty soil in a swamp.	No	Low
Tetratheca hirsuta subsp. boonanarring	P2	-	X		X	0.5	-	Lateritic substrate with a southern aspect. Brown sand.	Yes	High
Acacia cummingiana	P3	-	X		X	2.6	May to Jun or Aug	Grey or yellow sand, lateritic gravel. Sandplains, lateritic breakaways.	Yes	High
Acacia drummondii subsp. affinis	P3	-	X		X	3.3	Jul to Aug	Lateritic gravelly soils.	Yes	High
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	P3	-	X		X	1.7	Jul to Sep	Sandy loam or sandy clay over laterite. Woodland	Yes	High
Austrostipa sp. Cairn Hill	P3	-	X		X	6.0	-	Pale yellow over brown sandy soil.	No	Low
Banksia kippistiana var. paenepeccata	P3	-	X		X	3.1	Oct to Nov	Lateritic gravelly soils.	Yes	High

Species	Conservation Status			Source		Distance to Nearest Record (km)	Flowering Period	Prefered Habitat	Habitat occurs within the Survey Area	Likelihood of Occurrence
	DBCA	EPBC	Nature Map	PMST	DBCA					
Banksia pteridifolia subsp. vernalis	P3	-	X		X	4.6	Sep to Oct	White/grey sand over laterite	Yes	High
Beaufortia eriocephala	P3	-	X		X	8.2	Sep to Nov	Lateritic sandy soils. Slopes.	Yes	Medium
Dillwynia dillwynioides	P3	-	X		X	4.9	Aug to Dec	Sandy soils. Winter-wet depressions.	No	Low
Isopogon drummondii	P3	-	X		X	5.1	Feb - Apr	Yellow/grey sand	Yes	Medium
Lasiopetalum venustum	P3	-	X		X	0.2	Sep to Jan	lateritic soils, slopes, sandy clay	Yes	Recorded
Leucopogon allittii	P3	-	X		X	7.0	Mar to Apr	Sand over gravel	Yes	Medium
Persoonia rudis	P3	-	X		X	0.4	Sep to Jan	White, grey or yellow sand, often over laterite.	Yes	High
Platysace ramosissima	P3	-	X		X	5.6	Oct to Nov	Sandy soils	Yes	Medium
Styphelia filifolia	P3	-	X		X	0.9	-	Yellow/grey sand.	Yes	High
Banksia chamaephyton	P4	-	X		X	4.0	Oct to Dec	Grey or white sand over laterite	Yes	High
Caladenia speciosa	P4	-	X		X	1.3	Sep to Oct	White, grey or black sand.	Yes	High
Grevillea saccata	P4	-	X		X	3.1	Apr or Jun to Nov	Yellow or brown sand, often with lateritic gravel.	Yes	High
Hypolaena robusta	P4	-	X		X	1.7	Sep to Oct	White sand. Sandplains.	No	Low
Lepidobolus densus	P4	-	X		X	6.2	-	Yellow lateritic sand, lateritic gravel. Dry kwongan.	No	Low
Synaphea grandis	P4	-	X		X	0.5	Oct to Nov	Laterite	Yes	Recorded
Thysanotus glaucus	P4	-	X		X	8.5	Dec - Jan	Grey Sand	Yes	Medium
Verticordia lindleyi subsp. lindleyi	P4	-	X		X	4.00	May or Nov to Dec or Jan	Sand, sandy clay. Winter-wet depressions.	No	Low
Verticordia paludosa	P4	-	X		X	2.3	Jan to May	White/grey sand. Winter-wet flats	No	Low

4.3.4 Introduced Flora

No introduced flora species were recorded within the Survey Area.

4.3.5 Vegetation Types

One vegetation type was identified to occur across the Survey Area, covering 20.05 ha (Figure 8). EmBsXp is described as *Eucalyptus marginata - Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preissii.* Detailed site sheets for each quadrat are provided in Appendix C.

4.3.6 Floristic Community Types Analysis

The results of the floristic analysis on the quadrats are presented in Table 7. This includes the three most similar sites (nearest neighbour method). Statistical analysis (multivariate analysis) and data interpretation identified two Floristic Community Types (FCTs) represented by the vegetation in the Survey Area (Table 7).

Table 7: Floristic Community Type Analysis

Quadrat	Nearest Neighbour Analysis			Notes	FCT Comparison
	Similarity %	Site	FCT		
TRQ01	35.29	BNR11	S18	Based on dominant and similarity is species, soils and land systems, nearest quadrats, statistical analysis the occurrence of the FCT in nearby bushland remnant the vegetation is likely to represent **FCT SCP S18.**	**FCT SCP S18:** *Eucalyptus marginata/ Corymbia calophylla* woodlands on laterites
	33.33	BNR12	S18		
	32.65	BNR16	S18		
	40.00	CH059ASH	S18		
TRQ02	27.59	cas02	21a		
	24.49	CH059ASH	S18		
	25.00	KEME-3	21c		
	26.92	PLINE-3	21a		
TRQ03	28.00	CH059ASH	S18		
	24.56	ELE05	S02		
	26.22	TRIG-4	28		

4.3.7 Threatened and Priority Ecological Communities

Vegetation association EmBsXp has been determined to have affiliation with FCT SCP S18 which is not listed as a PEC or a TEC by DBCA or listed under the EPBC Act

4.3.8 Vegetation Condition

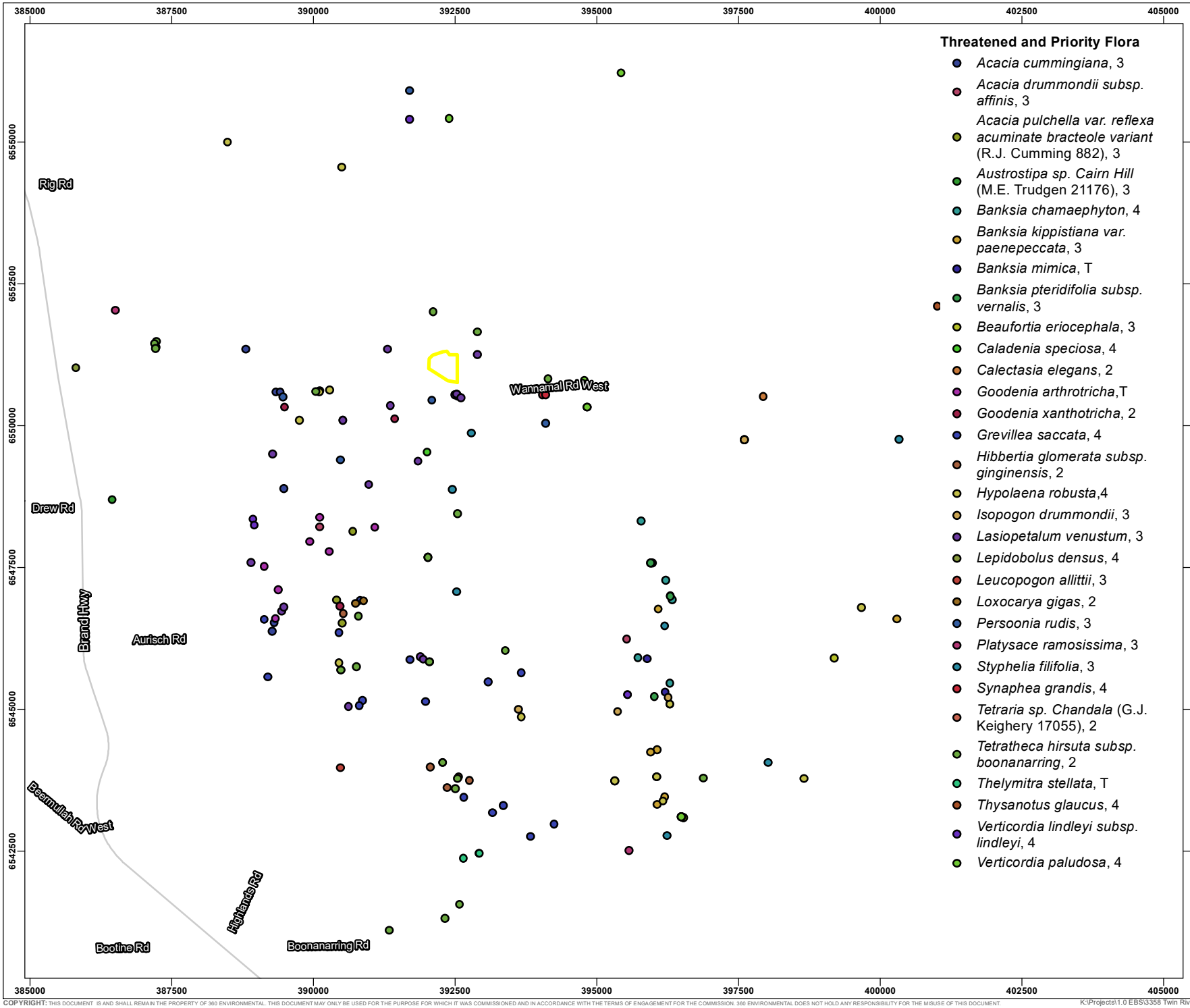
The vegetation within the Survey Area ranges from Completely Degraded to Very Good (Figure 9). The majority of the Survey Area was in Good condition (91%). Disturbances included historic logging and burning. In summary, condition across the Survey Area consisted of:

- Very Good: 1.65 ha, 8%
- Good: 18.40 ha, 91%

- Completely Degraded: 0.23 ha, 1%

4.3.9 Regional Representation

Vegetation mapping units described in the Survey Area were correlated with the Beard (1976) and Shepherd *et al.* (2002) broad vegetation types by examining similarities in vegetation descriptions. Differences exist with the terminology used in the descriptions as they are based on different methods of categorising and characterising vegetation types, and the different spatial scale of the analysis (i.e. region vs. local scale) as well as differences in vegetation condition. Vegetation type EmBsXp is representative of the Karamal Complex-South vegetation type which is described as Open forest of *Eucalyptus marginata – Corymbia calophylla* with a second storey of *Banksia grandis*.



Legend

Survey Area (20.28 ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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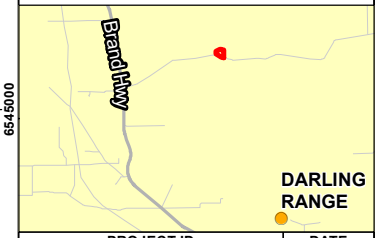
LOCALITY MAP



PROJECT ID	DATE
3339	13/12/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	CM	SW	0

All Track WA
Wannamal Road West, Mindarra

Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 6 DBCA Threatened and Priority Flora

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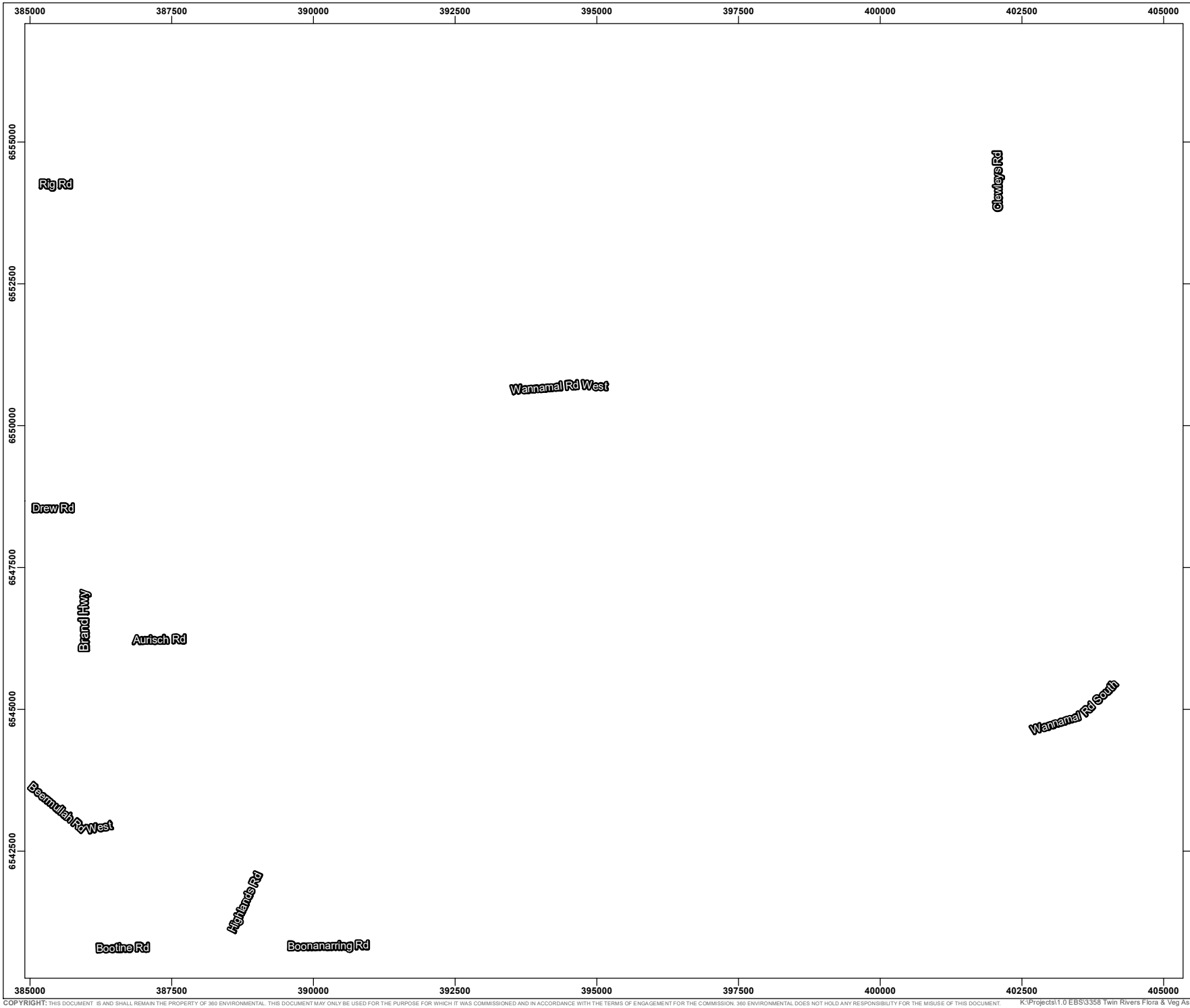

Legend

Survey Area (20.28 ha)

DBCA Threatened and Priority Ecological Communities

- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region
- Banksia ilicifolia woodlands
- Swan Coastal Plain Banksia attenuata - Banksia menziesii woodlands

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
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0 600 1,200 1,800 2,400
Meters
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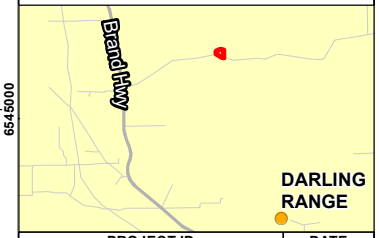
LOCALITY MAP



PROJECT ID	DATE
3339	13/12/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
LF	CM	SW	0

All Track WA
Wannamal Road West, Mindarra

Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 7 DBCA Threatened and Priority Ecological Communities

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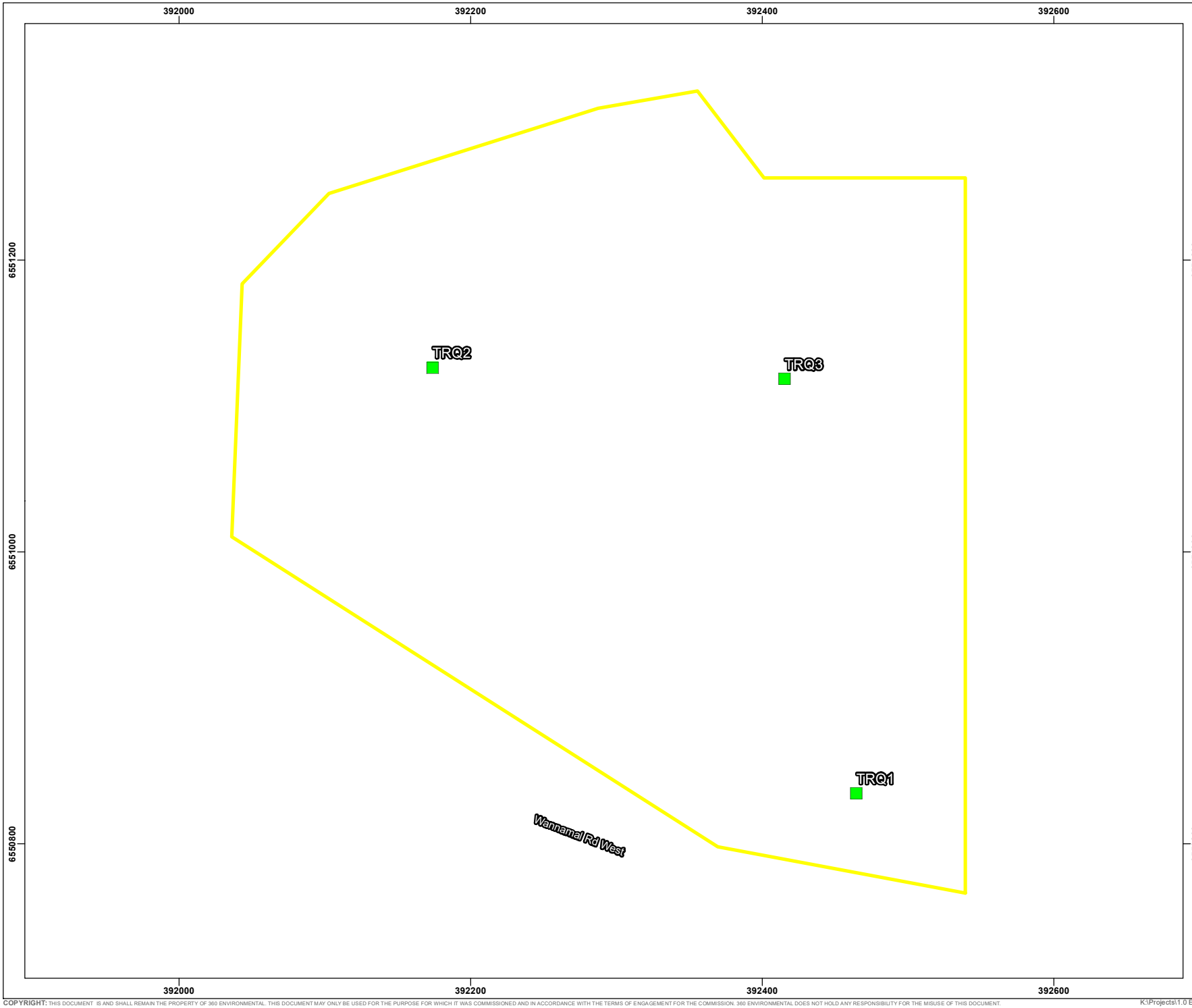

Legend

- Survey Area (20.28 ha)
- Quadrat Location

VegetationType

- EmBsXp

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
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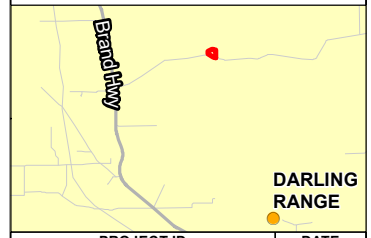

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LF	CM	SW	0

All Track WA
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Figure 8 **Vegetation Types**

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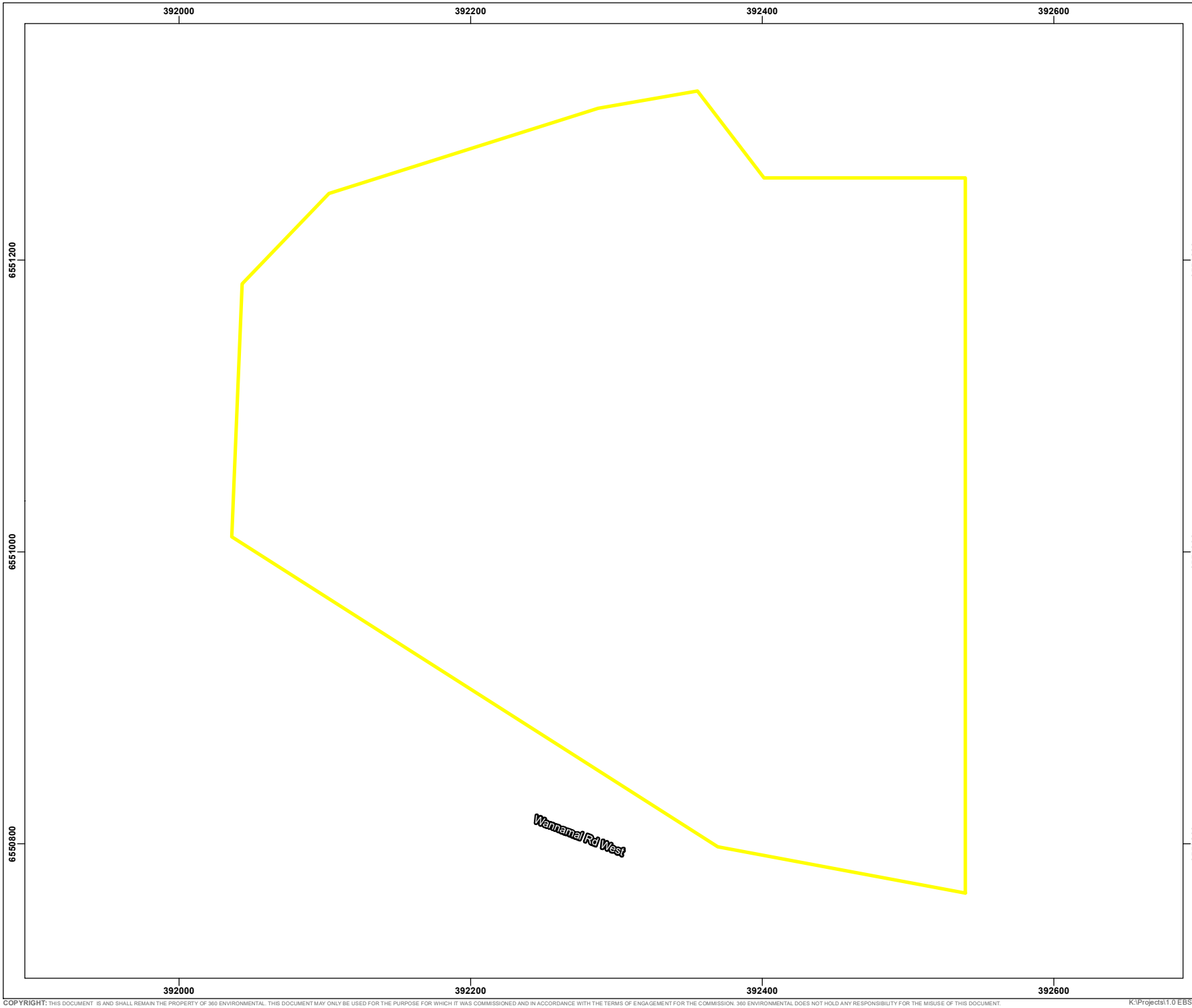

Legend

Survey Area (20.28 ha)

VegetationCondition

- VeryGood
- Good
- Completely Degraded

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- OTHER DATA SOURCED LANDGATE 2018
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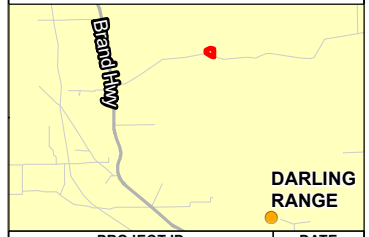

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Figure 9 **Vegetation Condition**

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4.4 Black Cockatoo Habitat Assessment

4.4.1 Desktop Assessment

The Survey Area occurs within the known breeding distribution of the Carnaby's Black Cockatoo (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017). The DBCA database search returned 110 records of the species within a 20 km radius of the Survey Area, 96 of which occurred in the past decade (Department of Biodiversity Conservation and Attractions 2019e). Confirmed Carnaby's breeding areas occur approximately 12 km northwest of the Survey Area and 25 km southeast of the Survey area (Department of Biodiversity Conservation and Attractions 2019e). There was one confirmed Carnaby's roost site, which occurs approximately 20 km south of the Survey Area (Department of Biodiversity Conservation and Attractions 2019e).

The Survey Area occurs approximately 15 km north of the modelled distribution of the Forest Red-tailed Black Cockatoo (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017). Given the mobility of the species, it may potentially occur within the Survey Area. The DBCA database search returned one record of the species within a 20 km radius of the Survey Area which occurred in the past decade (Department of Biodiversity Conservation and Attractions 2019e).

The Baudin's Black Cockatoo is unlikely to occur within the Survey Area based on modelled distribution (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017). The DBCA database search did not return any records of the species (Department of Biodiversity Conservation and Attractions 2019e).

The results of the desktop assessment are displayed in Figure 10.

4.4.2 Field Survey

4.4.2.1 Breeding Habitat

The field survey identified 190 Black Cockatoo potential breeding trees with a DBH of greater than 500 mm within the Survey Area (Figure 11). The trees comprised of 134 Jarrah trees (*Eucalyptus marginata*), 52 Marri trees (*Corymbia calophylla*), and four stags (dead trees). Raw data is presented in Appendix D.

A total of 306 hollows were recorded within 101 trees (some trees contained multiple hollows). Of these, 162 hollows with a diameter greater than 120 mm were recorded within 72 trees.

No evidence hollows currently being used for Black Cockatoo breeding was observed within the Survey Area.

4.4.2.2 Foraging Habitat

The Black Cockatoo foraging assessment identified a total of 20.05 ha of Black Cockatoo foraging habitat (Figure 12), consisting of Marri and Jarrah woodland over a midstorey of *Banksia sessilis*.

Evidence of Carnaby's Black Cockatoo foraging was recorded at five locations within the Survey Area, all of which were chewed Marri nuts (Plate 1). Foraging evidence locations are displayed in Figure 12 and raw data is presented in Appendix E.

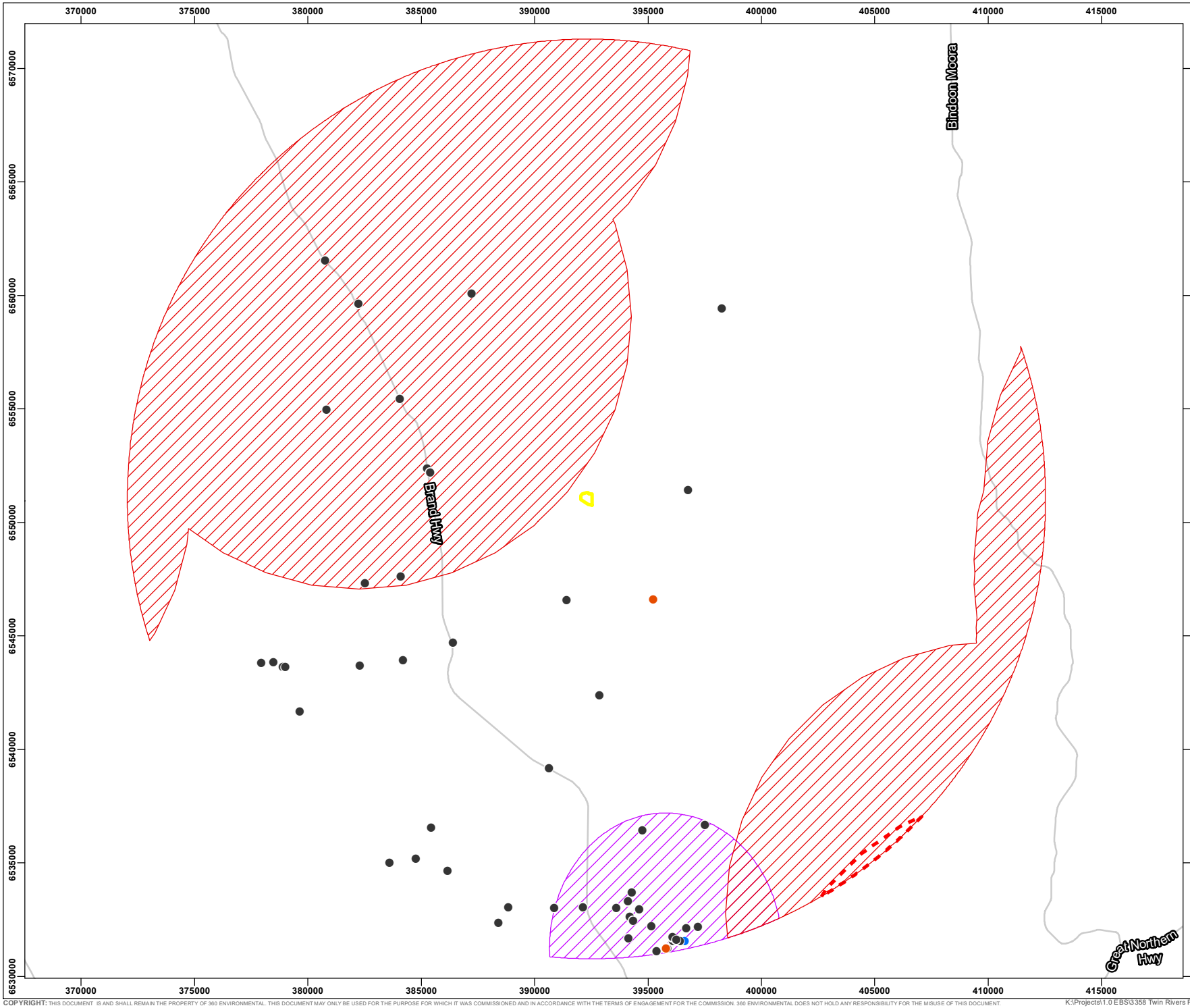
4.4.3 Roosting Habitat

No evidence of Black Cockatoo roosting was observed within the Survey Area. The Jarrah and Marri within the Survey Area is considered suitable roosting habitat.

Plate 1: Carnaby's Black Cockatoo Foraging Evidence

4.4.4 Sightings

There were no sightings of Carnaby's Black Cockatoos within the Survey Area, however one was sighted 60 m south of the Survey Area. The location of the sighted individual is displayed in Figure 12 and Appendix E.



Legend

Survey Area (20.28 ha)

Black Cockatoo

- Carnaby's cockatoo
- Forest red-tailed black cockatoo
- White-tailed black cockatoo

Black Cockatoo Breeding Habitat

- Breeding Area - Confirmed
- Breeding Area - Possible
- Roost Areas Confirmed - Buffered 6km

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
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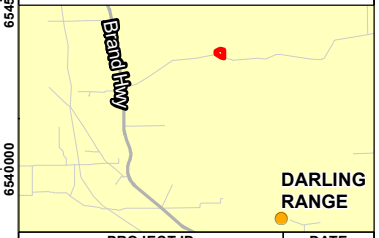

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Figure 10 **DBCA Black Cockatoo Desktop Results**

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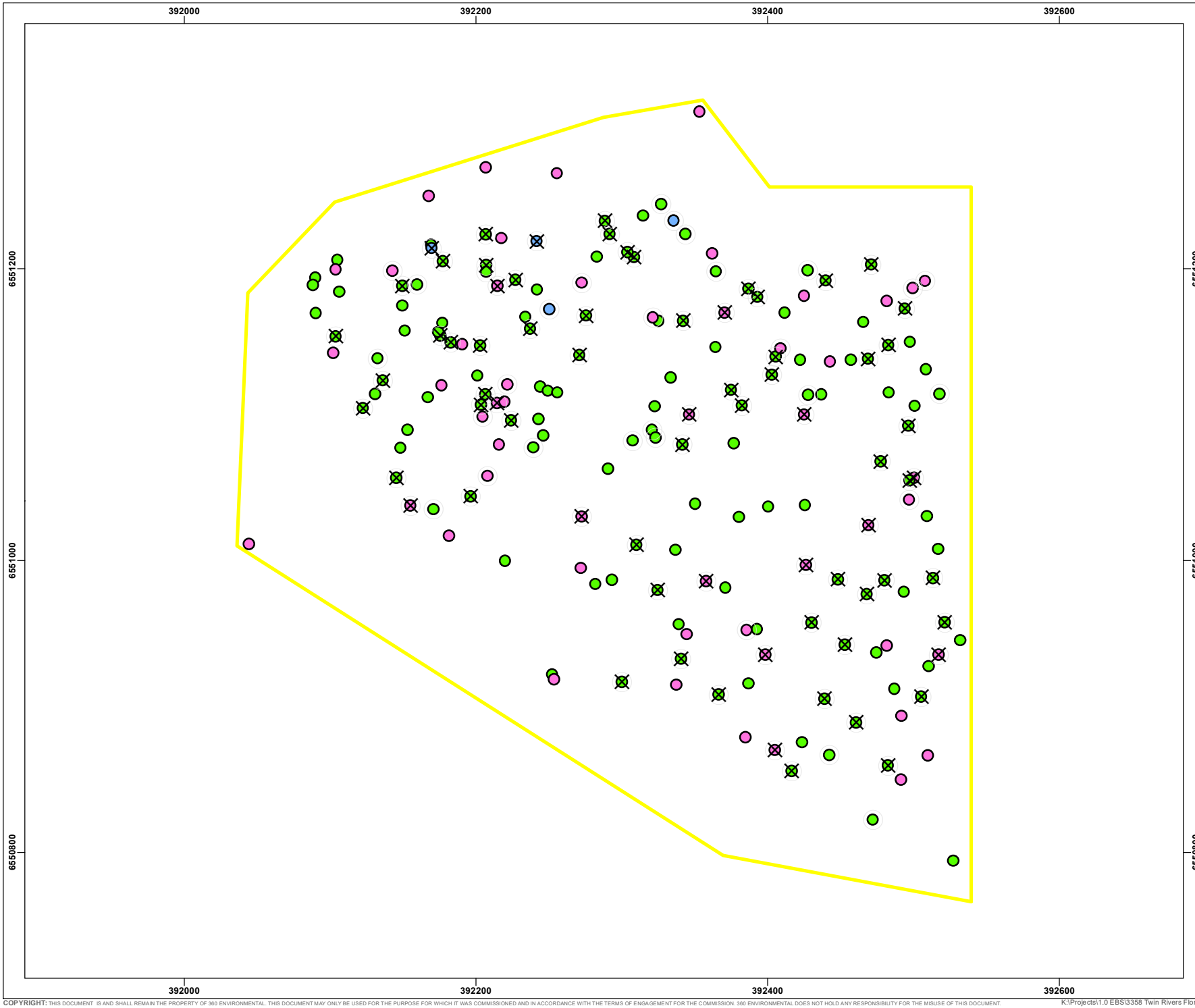

Legend

Survey Area (20.28 ha)

Trees >500mm diameter

- Jarrah (*Eucalyptus marginata*)
- Marri (*Corymbia calophylla*)
- Stag
- Trees >500mm diameter
- Trees >500mm diameter with hollows >120mm

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
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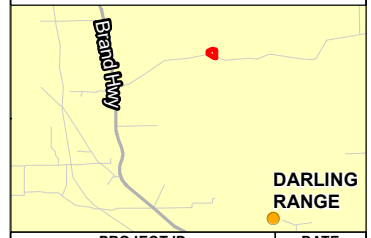
LOCALITY MAP



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Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 11 Black Cockatoo Potential Breeding Trees

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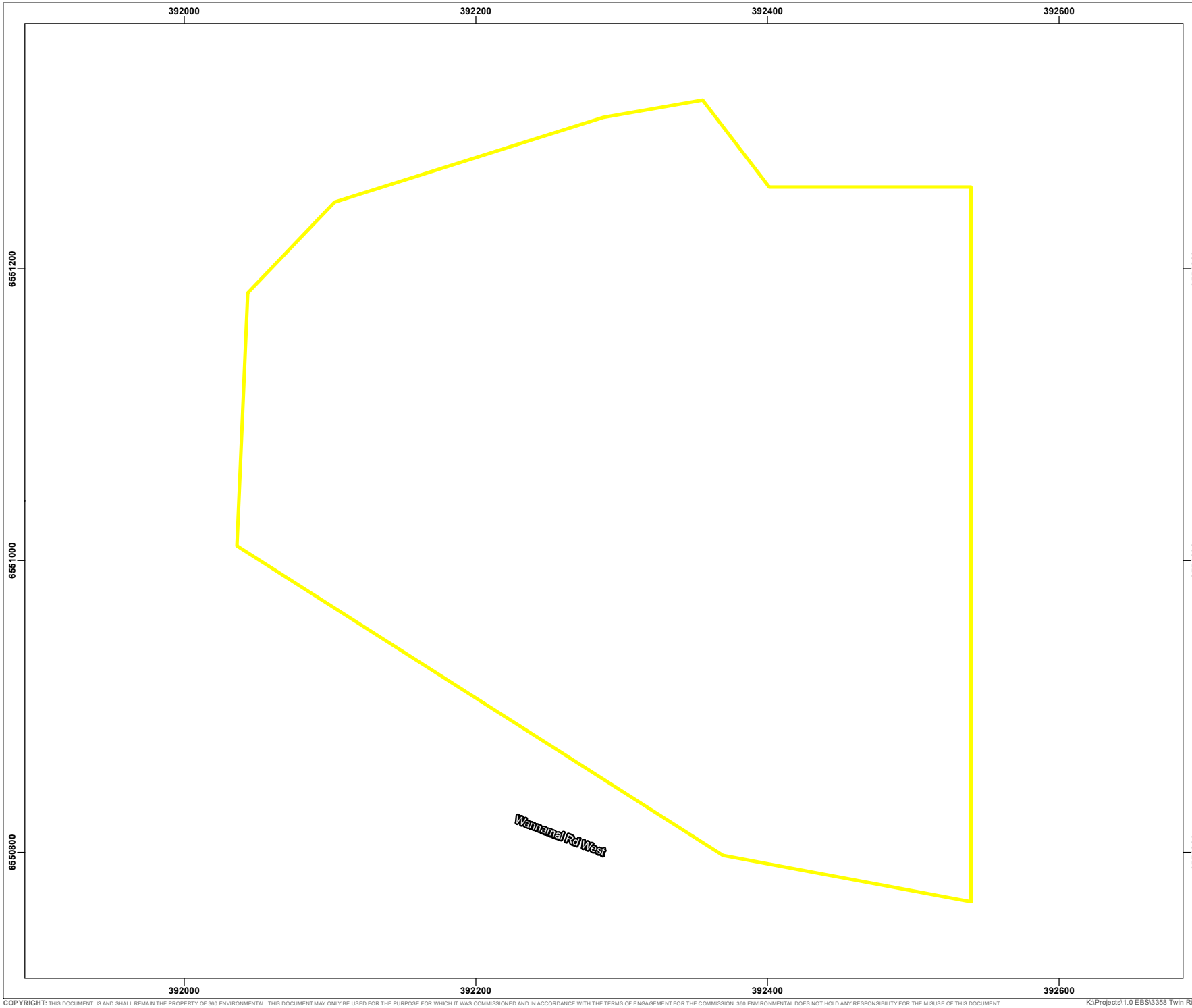

Legend

- Survey Area (20.28 ha)
- Black Cockatoo Foraging Habitat

Black Cockatoo Evidence

- Foraging
- Sighting

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- OTHER DATA SOURCED LANDGATE 2018
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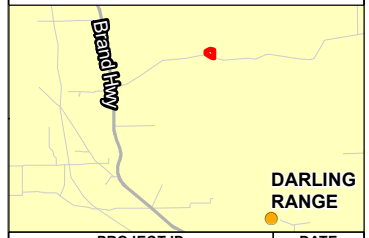
LOCALITY MAP



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Detailed Flora and Vegetation Survey and Black Cockatoo Habitat Assessment

Figure 12
Black Cockatoo Foraging Habitat

K:\Projects\1.0 EBS\3358 Twin Rivers Flora & Veg Assessment\3358 F12 Black Cockatoo Foraging Habitat.mxd

5 Discussion

5.1 Flora and Vegetation

5.1.1 Flora

The suite of flora taxa recorded during the survey is considered representative of pre-European vegetation (Beard 1981) and the vegetation complex mapping (Heddle *et al*. 1980). The floristic diversity was considered within the expected range for the bioregion and the timing of when the survey undertaken.

5.1.2 Flora of Conservation Significance

Conservation significant flora species identified in the desktop assessment with a medium and high likelihood of occurrence were targeted during the survey.

No Threatened flora species pursuant to the EPBC Act 1999 and/or gazetted as Threatened/Declared Rare Flora pursuant to the BC Act 2016 were recorded during the survey.

Two priority flora species listed by DBCA were recorded during the survey. These are as follows:

- ***Lasiopetalum venustum*** **(P3)** was recorded both opportunistically and within the one quadrat. There are 21 records of the *L. venustum* within 10 km of the Survey Area of which the majority are located to the south within the Boonanarring Nature Reserve. Due to the numerous records of this species within the surrounding areas is considered present throughout the Survey Area.
- ***Synaphea grandis*** **(P4)** was recorded in two quadrats. There are 27 records of the *S. grandis* records within 10 km of the Survey Area of which the majority are located to the south within the Boonanarring Nature Reserve. Due to the numerous records of this species within the surrounding areas is considered present throughout the Survey Area.

The presence of a Priority taxa does not form a statutory constraint for the Survey Area. There is no written policy on how to respond to the presence of Priority flora species within proposed development sites. The presence of the species is dealt with by DWER and DBCA on a case-by-case basis.

Based on the habitat type present and known distribution, sixteen species have a high likelihood of occurrence within the Survey Area, these are as follows:

- ***Banksia mimica*** **(T, EN)** is known as the Sumer Honey Pot and is a prostrate, lignotuberous shrub, ranging from 0.15 to 0.4 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow-brown and occur December to February (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 3.5 km (Department of Biodiversity Conservation and Attractions 2019c) and there are ten records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its distinct nature as a Banksia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.

- ***Goodenia arthrotricha* (T, EN)** is an erect perennial, herb ranging up to 0.4 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are blue and occur October to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 2.9 km (Department of Biodiversity Conservation and Attractions 2019c) and there are 12 records within 10 km. As the survey was undertaken outside of the flowering period and due to its indistinct nature as herb species it is considered the species still has the potential to occur within the Survey Area.
- ***Goodenia xanthotricha* (P2)** is an erect perennial, herb ranging up to 0.4 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are blue and occur October to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 2.9 km (Department of Biodiversity Conservation and Attractions 2019c) and there are 12 records within 10 km. As the survey was undertaken outside of the flowering period and due to its indistinct nature as herb species it is considered the species still has the potential to occur within the Survey Area.
- ***Hibbertia glomerata subsp. ginginensis* (P2)** is an erect shrub ranging up to 0.5 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow and occur July to September (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 0.2 km (Department of Biodiversity Conservation and Attractions 2019c) and there are nine records within 10 km. As the survey was undertaken within of the flowering period it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Loxocarya gigas* (P2)** is a clumped perennial, sedge ranging from 0.8 to 2 m high (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 4.1 km (Department of Biodiversity Conservation and Attractions 2019c) and there are two records within 10 km. Although there is limited flowering information for the species due to its distinct size and perennial nature it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Tetratheca hirsuta subsp. boonanarring* (P2)** is a sprawling perennial sub-shrub ranging up to 0.6 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are pink and occur September to October (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 0.5 km (Department of Biodiversity Conservation and Attractions 2019c) and there are 25 records within 10 km. As the survey was undertaken within of the flowering period it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Acacia cummingiana* (P3)** is a sprawling, straggly, rush-like shrub ranging between 0.3 to 0.5 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow and occur May to August (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 2.6 km (Department of Biodiversity Conservation and Attractions 2019c) and there are ten records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its distinct nature

as Acacia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.

- ***Acacia drummondii subsp. affinis*** **(P3)** is an erect shrub ranging between 0.3 to 1.0 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow and occur July to August (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 3.3 km (Department of Biodiversity Conservation and Attractions 2019c) and there are five records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its distinct nature as Acacia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)*** **(P3)** is a shrub ranging between 0.3 to 1.0 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow and occur July to September (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 1.7 km (Department of Biodiversity Conservation and Attractions 2019c) and there are seven records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its distinct nature as Acacia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Banksia kippistiana var. paenepeccata*** **(P3)** is an erect, prickly, lignotuberous shrub ranging between 0.3 and 1.2 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow-cream and occur October to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 3.1 km (Department of Biodiversity Conservation and Attractions 2019c) and there are seven records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its distinct nature as Banksia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Banksia pteridifolia subsp. vernalis*** **(P3)** is a prostrate, lignotuberous shrub ranging up to 0.4 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are cream-white and yellow and occur September to October (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 4.6 km (Department of Biodiversity Conservation and Attractions 2019c) and there are five records within 10 km. As the survey was undertaken within the flowering period and its distinct nature as a Banksia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Persoonia rudis*** **(P3)** is an erect, often spreading shrub prostrate, shrub ranging from 0.2 to 1.0 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow and occur September to January (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 0.9 km (Department of Biodiversity Conservation and Attractions 2019c) and there are seven records within 10 km. As the survey was undertaken within the flowering period it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.

- ***Styphelia filifolia* (P3)** is a shrub species with white flowers occurring between February and June (Department of Biodiversity Conservation and Attractions 2019g). Flowers are white and occur between February and June (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 0.4 km (Department of Biodiversity Conservation and Attractions 2019c) and there are five records within 10 km. As the survey was outside the flowering period it is considered the species still has the potential to occur within the Survey Area.
- ***Banksia chamaephyton* (P4)** is a low, lignotuberous shrub ranging up to 0.4 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are cream and brown, occurring October to December (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 4.0 km (Department of Biodiversity Conservation and Attractions 2019c) and there are six records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its distinct nature as Banksia it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Caladenia speciosa* (P4)** is a tuberous, perennial, herb, ranging from 0.35 to 0.6 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are white-pink, occurring September to October (Department of Biodiversity Conservation and Attractions 2019g). The closest and only record of this species within 10km to the Survey Area is 1.3 km (Department of Biodiversity Conservation and Attractions 2019c). As the survey was undertaken within the flowering period of the species it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Grevillea saccata* (P4)** is a trailing shrub ranging from 0.25 to 0.5 m high and 1 to 2 m wide (Department of Biodiversity Conservation and Attractions 2019g). Flowers are red, occurring April or June to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 3.1 km (Department of Biodiversity Conservation and Attractions 2019c) and there are 27 records within 10 km. As the survey was undertaken within the flowering period, due to its distinct nature as a Grevillea, it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.

Based on the habitat type present and known distribution, seven species have a medium likelihood of occurrence within the Survey Area, these are as follows:

- ***Thelymitra stellata* (T, EN)** is a tuberous, perennial, herb ranging between 0.15 to 0.25 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are yellow and brown and occur October to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 8.3 km (Department of Biodiversity Conservation and Attractions 2019c) and there are three records within 10 km. As the survey was undertaken outside of the flowering period and due to its indistinct nature as herb species it is considered the species still has the potential to occur within the Survey Area.

- ***Calectasia elegans*** **(P2)** is a small compact shrub ranging up to 0.3 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are purple and occur November to February (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 8.3 km (Department of Biodiversity Conservation and Attractions 2019c) and there are three records within 10 km. As the survey was undertaken outside of the flowering period and due to its indistinct nature, it is considered the species still has the potential to occur within the Survey Area.
- ***Beaufortia eriocephala*** **(P3)** is an erect, compact shrub ranging from 0.3 to 0.6 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are red, occurring September to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 8.2 km (Department of Biodiversity Conservation and Attractions 2019c) and there is one record within 10 km. As the survey was undertaken within the flowering period, and its distinct nature, it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Isopogon drummondii*** **(P3)** is a shrub ranging from 0.5 to 1.0 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are cream or yellow and occur February to April (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 8.2 km (Department of Biodiversity Conservation and Attractions 2019c) and there are four records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its perennial nature and size it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Leucopogon allittii*** **(P3)** is an erect, single stemmed shrub ranging between 0.3 to 1.0 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are white and occur March to April (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 7.0 km (Department of Biodiversity Conservation and Attractions 2019c) and there are two records within 10 km. Although, the survey was undertaken outside of the flowering period, due to its perennial nature and size it is considered that if the species were to exist within the Survey Area it would have likely been identified during the survey.
- ***Platysace ramosissima*** **(P3)** is a perennial herb ranging up to 0.3 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are white-cream and occur October to November (Department of Biodiversity Conservation and Attractions 2019g). The closest record of this species to the Survey Area is 5.6 km (Department of Biodiversity Conservation and Attractions 2019c) and there are four records within 10 km. As the survey was undertaken outside of the flowering period and due to its indistinct nature as herb species it is considered the species still has the potential to occur within the Survey Area.
- ***Thysanotus glaucus*** **(P4)** is a perennial herb ranging up to 0.2 m high (Department of Biodiversity Conservation and Attractions 2019g). Flowers are purple and occur October through to January (Department of Biodiversity Conservation and Attractions 2019g). There is

one record of the species within 10 km from the Survey Area (Department of Biodiversity Conservation and Attractions 2019c). As the survey was undertaken outside of the flowering period and due to its indistinct nature as herb species it is considered the species still has the potential to occur within the Survey Area.

The potential presence of Priority taxa does not form a statutory constraint for the Survey Area. The presence of Priority flora species within proposed development sites is dealt with by DWER and DBCA on a case-by-case basis.

5.1.3 Vegetation

The vegetation within the survey area has been mapped as one vegetation type – *Eucalyptus marginata - Corymbia calophylla* woodland over shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preissii* (EmBsXp). This vegetation type is consistent with the broadscale vegetation complex mapping for the area - Karamal Complex-South vegetation complex (Department of Parks and Wildlife 2016) which is described as Open forest of *Eucalyptus marginata – Corymbia calophylla* with a second storey of *Banksia grandis*.

Is not considered to be representative of a Threatened or Priority Ecological Community.

5.2 Black Cockatoo Habitat Assessment

The Survey Area contains 190 native trees that meet the criteria to be considered potential breeding trees, 72 of which contain hollows with an opening diameter greater than 12mm and are therefore potentially of a suitable size to be used for breeding by Black Cockatoo species (Saunders, Smith & Rowley 1982). The potential breeding trees which do not currently contain suitable hollows may develop them in the future. Maintaining the long-term supply of trees of a certain size with suitable nest hollows is crucial in woodland stands that are known to support Black Cockatoo breeding (Department of Sustainability Environment Water Population and Communities 2012).

Evidence of Black Cockatoo breeding was not recorded during the field survey, however the Survey Area occurs within the known breeding range of the Carnaby's Black Cockatoo (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017) and is approximately 12 km of a confirmed Carnaby's Black Cockatoo breeding location (Department of Biodiversity Conservation and Attractions 2019h) and may be used for breeding in future. The Survey Area occurs approximately 15 km north of the modelled distribution of the Forest Red-tailed Black Cockatoo (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017), however, given the mobility of the species it may use the Survey Area for breeding in future. The Survey Area occurs well outside the Baudin's Black Cockatoo breeding range (Department of Sustainability Environment Water Population and Communities 2012; Department of the Environment and Energy 2017), therefore the species is unlikely to breed within the Survey Area.

The dominant flora species recorded within the Survey Area are known and are likely to be used as foraging species for the Carnaby Black Cockatoo. These include Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and Parrot Bush (*Banksia sessilis*). Marri and Parrot Bush are considered high

quality foraging species for the Carnaby's Black Cockatoo. The total Eucalyptus woodland habitat (20.36 ha) is considered high quality foraging habitat.

Although no evidence of roosting was observed within the Survey Area, any large trees have the potential to be used for roosting by Black Cockatoos.

6 Conclusions

Flora and Vegetation

In summary, the following conclusions on the existing flora and vegetation are made:

- No Threatened flora species pursuant to the EPBC Act 1999 and/or gazetted as Threatened/Declared Rare Flora pursuant to the BC Act 2016 were recorded during the survey
- Two Priority species listed by the DBCA were recorded during the Survey Area - *Lasiopetalum venustum* (P3) and *Synaphea grandis* (P4). The presence of Priority flora species is unlikely to be a statutory constraint for the Survey Area and is dealt with by DWER and DBCA on a case by case basis.
- One vegetation type was mapped within the Survey Area. This vegetation type is consistent with the broadscale vegetation complex mapping for the area. The vegetation present across the Survey Area is not considered to be representative of a Threatened or Priority Ecological Community.

Black Cockatoo Habitat Assessment

The following conclusions can be drawn from the Black Cockatoo Habitat Assessment:

- A total of 190 trees were identified as potential breeding trees for Black Cockatoos, of which 72 contained hollows that may be suitable for Black Cockatoo breeding
- A total of 20.05 ha of Black Cockatoo foraging habitat was recorded in the Survey Area and evidence of Carnaby's Black Cockatoo foraging was recorded at five locations within the Survey Area
- A Carnaby's Black Cockatoo was sighted 60 m south of the Survey Area.

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8 Report Disclaimer

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

Appendices

Appendix A
Database Searches

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Colleen McDonald on 11/07/2019

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 52' 12" E,31° 10' 11" S
Buffer 10km
Group By Family

Family	Species	Records
Amaranthaceae	1	1
Anarthriaceae	2	4
Apiaceae	5	12
Araliaceae	1	2
Asparagaceae	13	17
Asteraceae	26	45
Boryaceae	2	2
Brassicaceae	2	3
Campanulaceae	3	4
Cannabaceae	1	1
Caryophyllaceae	2	2
Casuarinaceae	1	1
Celastraceae	2	3
Centrolepidaceae	1	1
Colchicaceae	1	1
Cupressaceae	1	2
Cyperaceae	23	39
Dasypogonaceae	2	3
Dilleniaceae	14	53
Droseraceae	11	24
Ecdeiocoleaceae	1	1
Elaeocarpaceae	3	28
Ericaceae	23	84
Euphorbiaceae	1	2
Fabaceae	52	146
Geraniaceae	2	3
Goodeniaceae	19	50
Gyrostemonaceae	1	7
Haemodoraceae	18	43
Haloragaceae	1	1
Hemerocallidaceae	5	16
Hypoxidaceae	2	2
Iridaceae	5	9
Lamiaceae	6	8
Lauraceae	2	2
Lentibulariaceae	1	3
Loganiaceae	1	6
Macarthuriaceae	2	3
Malvaceae	4	25
Myrtaceae	65	171
Olacaceae	1	6
Orchidaceae	31	39
Papaveraceae	1	1
Phyllanthaceae	2	3
Pittosporaceae	2	5
Poaceae	12	12
Polygalaceae	5	8
Primulaceae	1	1
Proteaceae	69	235
Pteridaceae	1	1
Ranunculaceae	1	1
Restionaceae	11	44
Rhamnaceae	10	17
Rubiaceae	3	4
Rutaceae	6	12
Santalaceae	2	2
Schizaeaceae	1	1
Solanaceae	1	1
Stylidiaceae	25	123
Thymelaeaceae	4	5
Violaceae	1	1
Xanthorrhoeaceae	1	2
Zamiaceae	1	1
TOTAL	**520**	**1355**

Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area

Amaranthaceae

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
Anarthriaceae					
2.	1097	*Lyginia barbata*			
3.	18049	*Lyginia imberbis*			
Apiaceae					
4.	6255	*Platysace juncea*			
5.	11132	*Platysace ramosissima*		P3	
6.	6263	*Schoenolaena juncea*			
7.	6285	*Xanthosia ciliata*			
8.	6289	*Xanthosia huegelii*			
Araliaceae					
9.	6280	*Trachymene pilosa (Native Parsnip)*			
Asparagaceae					
10.	1208	*Acanthocarpus preissii*			
11.	20797	*Acanthocarpus sp. Ajana (C.A. Gardner 8596)*			
12.	1305	*Laxmannia omnifertilis*			
13.	1308	*Laxmannia sessiliflora (Nodding Lily)*			
14.	11464	*Laxmannia sessiliflora subsp. australis*			
15.	1309	*Laxmannia squarrosa*			
16.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
17.	1239	*Lomandra preissii*			
18.	1243	*Lomandra sericea (Silky Mat Rush)*			
19.	1320	*Thysanotus asper (Hairy Fringe Lily)*			
20.	1334	*Thysanotus glaucus*		P4	
21.	1338	*Thysanotus manglesianus (Fringed Lily)*			
22.	1351	*Thysanotus sparteus*			
Asteraceae					
23.	7856	*Blennospora drummondii*			
24.	7878	*Brachyscome iberidifolia*			
25.	7902	*Calotis erinacea (Tangled Burr-daisy)*			
26.	8002	*Gnephosis tenuissima*			
27.	12741	*Hyalosperma cotula*			
28.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
29.	18585	*Lagenophora huegelii*			
30.	8106	*Millotia tenuifolia (Soft Millotia)*			
31.	14344	*Millotia tenuifolia var. tenuifolia (Soft Millotia)*			
32.	8143	*Olearia paucidentata (Autumn Scrub Daisy)*			
33.	8149	*Olearia rudis (Rough Daisybush)*			
34.	18353	*Pithocarpa pulchella var. pulchella*			
35.	8175	*Podolepis gracilis (Slender Podolepis)*			
36.	8182	*Podotheca angustifolia (Sticky Longheads)*			
37.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
38.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
39.	13255	*Pterochaeta paniculata*			
40.	8195	*Quinetia urvillei*			
41.	13234	*Rhodanthe manglesii*			
42.	8224	*Siloxerus filifolius*			
43.	8230	*Sonchus asper (Rough Sowthistle)*	Y		
44.	8248	*Tolpis barbata (Yellow Hawkweed)*	Y		
45.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
46.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
47.	8281	*Waitzia podolepis*			
48.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
Boryaceae					
49.	1267	*Borya constricta*			
50.	1273	*Borya sphaerocephala (Pincushions)*			
Brassicaceae					
51.	11187	*Brassica barrelieri subsp. oxyrrhina (Smooth-stem Turnip)*	Y		
52.	19403	*Stenopetalum gracile*			
Campanulaceae					
53.	7396	*Isotoma hypocrateriformis (Woodbridge Poison)*			
54.	7406	*Lobelia rhombifolia (Tufted Lobelia)*			
55.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
Cannabaceae					
56.	18134	*Cannabis sativa*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Caryophyllaceae					
57.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
58.	15972	*Silene gallica var. gallica*	Y		
Casuarinaceae					
59.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
Celastraceae					
60.	9069	*Stackhousia huegelii*			
61.	9070	*Stackhousia pubescens (Downy Stackhousia)*			
Centrolepidaceae					
62.	1134	*Centrolepis polygyna (Wiry Centrolepis)*			
Colchicaceae					
63.	1394	*Wurmbea dioica (Early Nancy)*			
Cupressaceae					
64.	36600	*Callitris pyramidalis (Swamp Cypress)*			
Cyperaceae					
65.	760	*Caustis dioica*			
66.	20199	*Isolepis cernua var. cernua*			
67.	912	*Isolepis cyperoides*			
68.	917	*Isolepis marginata (Coarse Club-rush)*			
69.	924	*Isolepis stellata (Star Club-rush)*			
70.	42741	*Lepidosperma apricola*			
71.	41620	*Lepidosperma asperatum*			
72.	936	*Lepidosperma leptostachyum*			
73.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
74.	940	*Lepidosperma pubisquameum*			
75.		*Lepidosperma sp.*			
76.	945	*Lepidosperma squamatum*			
77.	946	*Lepidosperma striatum*			
78.	953	*Mesomelaena graciliceps*			
79.	955	*Mesomelaena pseudostygia*			
80.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
81.	973	*Schoenus asperocarpus (Poison Sedge)*			
82.	975	*Schoenus bifidus*			
83.	979	*Schoenus caespititius*			
84.	984	*Schoenus curvifolius*			
85.	997	*Schoenus lanatus (Woolly Bog-rush)*			
86.	1009	*Schoenus pleiostemoneus*			
87.	35581	*Tetraria sp. Chandala (G.J. Keighery 17055)*		P2	
Dasypogonaceae					
88.	45757	*Calectasia elegans (Elegant Tinsel Lily)*		P2	
89.	19309	*Calectasia narragara*			
Dilleniaceae					
90.	5108	*Hibbertia acerosa (Needle Leaved Guinea Flower)*			
91.	5112	*Hibbertia aurea*			
92.	5116	*Hibbertia crassifolia*			
93.	19778	*Hibbertia glomerata subsp. darlingensis*			
94.	19775	*Hibbertia glomerata subsp. ginginensis*		P2	
95.	20046	*Hibbertia hibbertioides var. hibbertioides*			
96.	5134	*Hibbertia huegelii*			
97.	45534	*Hibbertia hypericoides subsp. hypericoides*			
98.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
99.	43280	*Hibbertia sericosepala*			
100.	5172	*Hibbertia stellaris (Orange Stars)*			
101.	48381	*Hibbertia striata*			
102.	5173	*Hibbertia subvaginata*			
103.	5176	*Hibbertia vaginata*			
Droseraceae					
104.	3090	*Drosera barbigera*			
105.	13381	*Drosera citrina*			
106.	13203	*Drosera closterostigma*			
107.	48751	*Drosera drummondii*			
108.	13201	*Drosera eneabba*			
109.	3106	*Drosera macrantha (Bridal Rainbow)*			
110.	48710	*Drosera micrantha*			
111.	15710	*Drosera miniata (Orange Sundew)*			
112.	48709	*Drosera minutiflora*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
113.	3118	*Drosera pallida (Pale Rainbow)*			
114.	3131	*Drosera stolonifera (Leafy Sundew)*			
Ecdeiocoleaceae					
115.	1066	*Ecdeiocolea monostachya*			
Elaeocarpaceae					
116.	4528	*Tetratheca confertifolia*			
117.	4535	*Tetratheca hirsuta (Black Eyed Susan)*			
118.	48340	*Tetratheca hirsuta subsp. boonanarring*		P2	
Ericaceae					
119.	6314	*Andersonia lehmanniana*			
120.	6328	*Astroloma glaucescens*			
121.	6330	*Astroloma macrocalyx (Swan Berry)*			
122.	6334	*Astroloma pallidum (Kick Bush)*			
123.	6337	*Astroloma stomarrhena (Red Swamp Cranberry)*			
124.	6339	*Astroloma xerophyllum*			
125.	6347	*Conostephium minus (Pink-tipped Pearl flower)*			
126.	6348	*Conostephium pendulum (Pearl Flower)*			
127.	6349	*Conostephium preissii*			
128.	13527	*Croninia kingiana*			
129.	6354	*Leucopogon allittii*		P3	
130.	6360	*Leucopogon australis (Spiked Beard-heath)*			
131.	6374	*Leucopogon conostephioides*			
132.	6400	*Leucopogon gracillimus*			
133.	6421	*Leucopogon oliganthus*			
134.	6436	*Leucopogon propinquus*			
135.	20086	*Leucopogon sp. Northern Scarp (M. Hislop 2233)*			
136.	6444	*Leucopogon sprengelioides*			
137.	6458	*Lysinema elegans*			
138.	34736	*Lysinema pentapetalum*			
139.	48293	*Styphelia ciliosa*			
140.	48297	*Styphelia filifolia*		P3	
141.	6476	*Styphelia tenuiflora (Common Pinheath)*			
Euphorbiaceae					
142.	20537	*Stachystemon virgatus*			
Fabaceae					
143.	15466	*Acacia applanata*			
144.	15470	*Acacia barbinervis subsp. borealis*			
145.	14061	*Acacia clydonophora*			
146.	14066	*Acacia cummingiana*		P3	
147.	11229	*Acacia drummondii subsp. affinis*		P3	
148.	11661	*Acacia drummondii subsp. drummondii*			
149.	11192	*Acacia drummondii subsp. elegans*			
150.	3374	*Acacia huegelii*			
151.	11611	*Acacia lasiocarpa var. lasiocarpa*			
152.	15483	*Acacia pulchella var. pulchella*			
153.	15480	*Acacia pulchella var. reflexa*			
154.	14927	*Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)*		P3	
155.	30033	*Acacia saligna subsp. lindleyi*			
156.	3550	*Acacia sphacelata*			
157.	15484	*Acacia sphacelata subsp. sphacelata*			
158.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
159.	3602	*Acacia willdenowiana (Grass Wattle)*			
160.	3688	*Aotus gracillima*			
161.	3692	*Aotus procumbens*			
162.	48782	*Bossiaea angustifolia*			
163.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
164.	3793	*Daviesia angulata*			
165.	19747	*Daviesia decurrens subsp. decurrens*			
166.	18560	*Daviesia divaricata subsp. divaricata*			
167.	15505	*Daviesia incrassata subsp. incrassata*			
168.	16585	*Daviesia nudiflora subsp. nudiflora*			
169.	3845	*Daviesia triflora*			
170.	3863	*Dillwynia dillwynioides*		P3	
171.	20367	*Dillwynia laxiflora*			
172.	3887	*Gastrolobium acutum*			
173.	3894	*Gastrolobium callistachys (Rock Poison)*			
174.	20483	*Gastrolobium linearifolium*			
175.	10909	*Gompholobium confertum*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
176.	3950	*Gompholobium knightianum*			
177.	3955	*Gompholobium preissii*			
178.	11083	*Gompholobium scabrum*			
179.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
180.	3966	*Hovea pungens (Devil's Pins, Puyenak)*			
181.	3967	*Hovea stricta*			
182.	3968	*Hovea trisperma (Common Hovea)*			
183.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
184.	4010	*Jacksonia floribunda (Holly Pea)*			
185.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
186.	4044	*Kennedia prostrata (Scarlet Runner)*			
187.	4100	*Mirbelia spinosa*			
188.	4104	*Mirbelia trichocalyx*			
189.	4141	*Phyllota gracilis*			
190.	17551	*Sphaerolobium drummondii*			
191.	4207	*Sphaerolobium medium*			
192.	17145	*Trifolium angustifolium var. angustifolium*	Y		
193.	4293	*Trifolium cernuum (Drooping Flower Clover)*	Y		
194.	4295	*Trifolium dubium (Suckling Clover)*	Y		
Geraniaceae					
195.	4333	*Erodium cicutarium (Common Storksbill)*	Y		
196.	4346	*Pelargonium littorale*			
Goodeniaceae					
197.	7449	*Dampiera juncea (Rush-like Dampiera)*			
198.	7453	*Dampiera lindleyi*			
199.	7454	*Dampiera linearis (Common Dampiera)*			
200.	7459	*Dampiera oligophylla (Sparse-leaved Dampiera)*			
201.	7491	*Goodenia arthrotricha*		T	
202.	7495	*Goodenia berardiana*			
203.	29362	*Goodenia coerulea*			
204.	12516	*Goodenia convexa*			
205.	12520	*Goodenia fasciculata*			
206.	7566	*Goodenia xanthotricha (Yellow-haired Goodenia)*		P2	
207.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
208.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
209.	7586	*Lechenaultia stenosepala (Narrow-sepaled Leschenaultia)*			
210.	7603	*Scaevola canescens (Grey Scaevola)*			
211.	7613	*Scaevola glandulifera (Viscid Hand-flower)*			
212.	7634	*Scaevola phlebopetala (Velvet Fanflower)*			
213.	13182	*Scaevola repens var. repens*			
214.	7646	*Scaevola striata (Royal Robe)*			
215.	7666	*Verreauxia reinwardtii (Common Verreauxia)*			
Gyrostemonaceae					
216.	2788	*Gyrostemon subnudus*			
Haemodoraceae					
217.	1409	*Anigozanthos humilis (Catspaw)*			
218.	11434	*Anigozanthos humilis subsp. humilis*			
219.	1414	*Anigozanthos pulcherrimus (Yellow Kangaroo Paw)*			
220.	29436	*Anigozanthos viridis subsp. Cataby (S.D. Hopper 1786)*			
221.	1417	*Blancoa canescens (Winter Bell)*			
222.	1418	*Conostylis aculeata (Prickly Conostylis)*			
223.	11826	*Conostylis aculeata subsp. aculeata*			
224.	11552	*Conostylis aculeata subsp. bromelioides*			
225.	1423	*Conostylis aurea (Golden Conostylis)*			
226.	1436	*Conostylis juncea*			
227.	1446	*Conostylis prolifera (Mat Cottonheads)*			
228.	1454	*Conostylis setigera (Bristly Cottonhead)*			
229.		*Conostylis sp.*			
230.	11543	*Conostylis teretifolia subsp. planescens*			
231.	11870	*Conostylis teretifolia subsp. teretifolia*			
232.	1458	*Conostylis teretiuscula*			
233.	1478	*Phlebocarya ciliata*			
234.	1479	*Phlebocarya filifolia*			
Haloragaceae					
235.	6161	*Gonocarpus pithyoides*			
Hemerocallidaceae					
236.	1277	*Caesia occidentalis*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
237.	11283	*Corynotheca micrantha var. micrantha*			
238.	19632	*Johnsonia pubescens subsp. pubescens*			
239.	1260	*Stypandra glauca (Blind Grass)*			
240.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
Hypoxidaceae					
241.	43763	*Pauridia glabella*			
242.	43762	*Pauridia occidentalis var. quadriloba*			
Iridaceae					
243.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
244.	11749	*Orthrosanthus laxus var. laxus (Morning Iris)*			
245.	1546	*Patersonia juncea (Rush Leaved Patersonia)*			
246.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
247.	30472	*Patersonia occidentalis var. occidentalis*			
Lamiaceae					
248.	6838	*Hemiandra linearis (Speckled Snakebush)*			
249.	6839	*Hemiandra pungens (Snakebush)*			
250.	6855	*Hemigenia humilis*			
251.	6856	*Hemigenia incana (Silky Hemigenia)*			
252.	41020	*Hemiphora bartlingii (Woolly Dragon)*			
253.	41042	*Hemiphora uncinata*			
Lauraceae					
254.	2956	*Cassytha pomiformis (Dodder Laurel)*			
255.	2957	*Cassytha racemosa (Dodder Laurel)*			
Lentibulariaceae					
256.	7148	*Utricularia multifida*			
Loganiaceae					
257.	46254	*Orianthera spermacocea*			
Macarthuriaceae					
258.	2838	*Macarthuria apetala*			
259.	2839	*Macarthuria australis*			
Malvaceae					
260.	5014	*Guichenotia sarotes*			
261.	45083	*Lasiopetalum venustum*		P3	
262.	5080	*Thomasia foliosa*			
263.	5105	*Thomasia triphylla*			
Myrtaceae					
264.	20283	*Astartea scoparia (Common Astartea)*			
265.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			
266.	45416	*Babingtonia grandiflora (Large-flowered Babingtonia)*			
267.	45403	*Babingtonia pelloeae (Pelloe's Babingtonia)*			
268.	16815	*Baeckea sp. Mingenew (M.E. Trudgen 12029)*			
269.	5382	*Beaufortia elegans (Elegant Beaufortia)*			
270.	5384	*Beaufortia eriocephala (Woolly Bottlebrush, Woolly Beaufortia)*		P3	
271.	5393	*Beaufortia squarrosa (Sand Beaufortia, Sand Bottlebrush, Puno)*			
272.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
273.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower, Pindak)*			
274.	5439	*Calytrix angulata (Yellow Starflower)*			
275.	48450	*Calytrix cravenii*			
276.	5458	*Calytrix flavescens (Summer Starflower)*			
277.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
278.	5465	*Calytrix leschenaultii*			
279.	5476	*Calytrix sapphirina*			
280.	5479	*Calytrix strigosa*			
281.	5481	*Calytrix sylvana*			
282.	5485	*Calytrix variabilis*			
283.	5518	*Darwinia neildiana (Fringed Bell)*			
284.	13949	*Eremaea asterocarpa*			
285.	5541	*Eremaea pauciflora*			
286.	14103	*Eremaea pauciflora var. calyptra*			
287.	14104	*Eremaea pauciflora var. pauciflora*			
288.	5542	*Eremaea purpurea*			
289.	5616	*Eucalyptus decurva (Slender Mallee)*			
290.	5690	*Eucalyptus lane-poolei (Salmon White Gum)*			
291.	13548	*Eucalyptus marginata subsp. thalassica (Blue-leaved Jarrah)*			
292.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
293.	12906	*Eucalyptus wandoo subsp. wandoo*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
294.	5816	*Homalospermum firmum*			
295.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
296.	5829	*Hypocalymma xanthopetalum*			
297.	15498	*Kunzea glabrescens (Spearwood)*			
298.	5835	*Kunzea micrantha*			
299.	17785	*Kunzea micrantha subsp. petiolata*			
300.	5847	*Leptospermum erubescens (Roadside Teatree)*			
301.	5857	*Leptospermum spinescens*			
302.	37580	*Melaleuca acutifolia*			
303.	5888	*Melaleuca ciliosa*			
304.	19387	*Melaleuca clavifolia*			
305.	5893	*Melaleuca concreta*			
306.	5920	*Melaleuca huegelii (Chenille Honeymyrtle)*			
307.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
308.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
309.	5978	*Melaleuca teretifolia (Banbar)*			
310.	5983	*Melaleuca trichophylla*			
311.	5986	*Melaleuca urceolaris*			
312.	16477	*Pericalymma ellipticum var. ellipticum*			
313.	6009	*Pileanthus filifolius (Summer Coppercups)*			
314.	6012	*Regelia ciliata*			
315.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
316.	6039	*Scholtzia teretifolia*			
317.	20135	*Taxandria linearifolia*			
318.	6060	*Thryptomene mucronulata*			
319.	15431	*Verticordia acerosa var. acerosa*			
320.	12388	*Verticordia acerosa var. preissii*			
321.	15432	*Verticordia densiflora var. densiflora*			
322.	14714	*Verticordia lindleyi subsp. lindleyi*		P4	
323.	12439	*Verticordia lindleyi subsp. purpurea*			
324.	6101	*Verticordia nitens (Morrison Featherflower, Kodjeningara)*			
325.	10822	*Verticordia nobilis*			
326.	12446	*Verticordia paludosa*		P4	
327.	12449	*Verticordia plumosa var. brachyphylla*			
328.	12458	*Verticordia serrata var. ciliata*			
Olacaceae					
329.	2367	*Olax scalariformis*			
Orchidaceae					
330.	11136	*Caladenia denticulata*			
331.	44900	*Caladenia denticulata subsp. rubella*			
332.	15348	*Caladenia flava subsp. flava*			
333.	15360	*Caladenia longicauda subsp. borealis*			
334.	15363	*Caladenia longicauda subsp. eminens*			
335.	15503	*Caladenia paludosa*			
336.		*Caladenia sp.*			
337.	13862	*Caladenia speciosa*		P4	
338.	15404	*Cyanicula sericea*			
339.	19649	*Disa bracteata*	Y		
340.	11049	*Diuris corymbosa*			
341.	42228	*Diuris septentrionalis*			
342.	44162	*Diuris tinkeri*			
343.	1640	*Drakaea glyptodon (King-in-his-carriage)*			
344.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
345.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
346.	15418	*Leptoceras menziesii*			
347.	15419	*Microtis media subsp. media*			
348.	1667	*Paracaleana nigrita (Flying Duck Orchid)*			
349.	48677	*Pterostylis ectypha*			
350.	48674	*Pterostylis orbiculata*			
351.	45343	*Pterostylis platypetala*			
352.	1693	*Pterostylis recurva (Jug Orchid)*			
353.	45344	*Pterostylis scitula*			
354.	49034	*Pterostylis sp. Bloated snail orchid (W. Jackson BJ 486)*			
355.	18655	*Pterostylis sp. crinkled leaf (G.J. Keighery 13426)*			
356.	16367	*Pyrorchis nigricans (Red beaks, Elephants ears)*			
357.	10856	*Thelymitra benthamiana (Leopard Orchid)*			
358.	13687	*Thelymitra dedmaniarum (Cinnamon Sun Orchid, Bronze Orchid)*		T	
359.	11053	*Thelymitra macrophylla*			
360.	10862	*Thelymitra stellata (Star Orchid)*		T	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Papaveraceae					
361.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		
Phyllanthaceae					
362.	4675	*Phyllanthus calycinus (False Boronia)*			
363.	4689	*Poranthera ericoides (Heath Poranthera)*			
Pittosporaceae					
364.	25788	*Billardiera fraseri (Elegant Pronaya)*			
365.	3169	*Cheiranthera preissiana*			
Poaceae					
366.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
367.	17244	*Austrostipa macalpinei*			
368.	19959	*Austrostipa sp. Cairn Hill (M.E. Trudgen 21176)*		P3	
369.	33437	*Corynephorus fasciculatus*	Y		
370.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
371.	376	*Eragrostis curvula (African Lovegrass)*	Y		
372.	415	*Eriachne ovata*			
373.	485	*Microlaena stipoides (Weeping Grass)*			
374.	40422	*Pentameris pallida*	Y		
375.	573	*Poa drummondiana (Knotted Poa)*			
376.	583	*Polypogon tenellus*			
377.	40426	*Rytidosperma occidentale*			
Polygalaceae					
378.	4549	*Comesperma acerosum*			
379.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
380.	4551	*Comesperma ciliatum*			
381.	4552	*Comesperma confertum*			
382.	4564	*Comesperma virgatum (Milkwort)*			
Primulaceae					
383.	36375	*Lysimachia arvensis (Pimpernel)*	Y		
Proteaceae					
384.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
385.	32679	*Banksia bipinnatifida subsp. multifida*			
386.	1809	*Banksia candolleana (Propeller Banksia)*			
387.	32623	*Banksia carlinoides (Pink Dryandra)*			
388.	1810	*Banksia chamaephyton (Fishbone Banksia)*		P4	
389.	32576	*Banksia dallanneyi (Couch Honeypot)*			
390.	32580	*Banksia dallanneyi subsp. dallanneyi var. dallanneyi*			
391.	32577	*Banksia dallanneyi subsp. dallanneyi var. mellicula*			
392.	32556	*Banksia echinata*			
393.	32214	*Banksia kippistiana*			
394.	32216	*Banksia kippistiana var. paenepeccata*		P3	
395.	1826	*Banksia laricina (Rose Banksia)*			
396.	1834	*Banksia menziesii (Firewood Banksia)*			
397.	32211	*Banksia mimica (Summer Honeypot)*		T	
398.	32202	*Banksia nivea (Honeypot Dryandra, Pudjarn)*			
399.	32163	*Banksia platycarpa*			
400.	32159	*Banksia polycephala (Many-headed Dryandra)*			
401.	32138	*Banksia pteridifolia subsp. vernalis*		P3	
402.	32074	*Banksia shuttleworthiana (Bearded Dryandra)*			
403.	12111	*Banksia sphaerocarpa var. sphaerocarpa (Fox Banksia)*			
404.	1857	*Conospermum acerosum (Needle-leaved Smokebush)*			
405.	15607	*Conospermum acerosum subsp. acerosum*			
406.	1874	*Conospermum glumaceum (Hooded Smokebush)*			
407.	1876	*Conospermum incurvum (Plume Smokebush)*			
408.	1880	*Conospermum polycephalum*			
409.	1882	*Conospermum stoechadis (Common Smokebush)*			
410.	15520	*Conospermum stoechadis subsp. sclerophyllum*			
411.	15611	*Conospermum stoechadis subsp. stoechadis (Common Smokebush)*			
412.	1885	*Conospermum triplinervium (Tree Smokebush)*			
413.	2001	*Grevillea eriostachya (Flame Grevillea, Kaliny-kalinypa)*			
414.	2066	*Grevillea pilulifera (Woolly-flowered Grevillea)*			
415.	2087	*Grevillea saccata (Pouched Grevillea)*		P4	
416.	14420	*Grevillea synapheae subsp. pachyphylla*			
417.	14421	*Grevillea synapheae subsp. synapheae*			
418.	2143	*Hakea conchifolia (Shell-leaved Hakea)*			
419.	2146	*Hakea costata (Ribbed Hakea)*			
420.	2166	*Hakea incrassata (Marble Hakea)*			

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421.	2175	*Hakea lissocarpha (Honey Bush)*			
422.	45333	*Hakea neospathulata*			
423.	2197	*Hakea prostrata (Harsh Hakea)*			
424.	12233	*Hakea psilorrhyncha*			
425.	2203	*Hakea ruscifolia (Candle Hakea)*			
426.	2205	*Hakea smilacifolia*			
427.	2206	*Hakea stenocarpa (Narrow-fruited Hakea)*			
428.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
429.	2219	*Isopogon adenanthoides (Spider Coneflower)*			
430.	2227	*Isopogon divergens (Spreading Coneflower)*			
431.	29775	*Isopogon drummondii*		P3	
432.	2232	*Isopogon linearis*			
433.	19996	*Isopogon sp. Darling Range (F. Hort 1662)*			
434.	14083	*Lambertia multiflora var. darlingensis*			
435.	15528	*Lambertia multiflora var. multiflora*			
436.	2258	*Persoonia comata*			
437.	2262	*Persoonia elliptica (Spreading Snottygobble)*			
438.	2271	*Persoonia rudis*		P3	
439.	15632	*Persoonia stricta*			
440.	2286	*Petrophile brevifolia*			
441.	2299	*Petrophile linearis (Pixie Mops)*			
442.	2301	*Petrophile macrostachya*			
443.	16874	*Petrophile recurva*			
444.	10784	*Petrophile scabriuscula*			
445.	2308	*Petrophile seminuda*			
446.	2309	*Petrophile serruriae*			
447.	2310	*Petrophile shuttleworthiana*			
448.	2312	*Petrophile striata*			
449.	2316	*Stirlingia latifolia (Blueboy)*			
450.	16867	*Synaphea grandis*		P4	
451.	2329	*Synaphea spinulosa*			
452.	15532	*Synaphea spinulosa subsp. spinulosa*			
Pteridaceae					
453.	31	*Cheilanthes austrotenuifolia*			
Ranunculaceae					
454.	2929	*Clematis pubescens (Common Clematis)*			
Restionaceae					
455.	1056	*Alexgeorgea nitens*			
456.	17833	*Chordifex microcodon*			
457.	17706	*Chordifex sinuosus*			
458.	16595	*Desmocladus flexuosus*			
459.	17662	*Desmocladus lateriticus*			
460.	1070	*Hypolaena exsulca*			
461.	17622	*Hypolaena robusta*		P4	
462.	13774	*Lepidobolus densus*		P4	
463.	1075	*Lepidobolus preissianus*			
464.	1077	*Leptocarpus canus (Hoary Twine-rush)*			
465.	17837	*Loxocarya gigas*		P2	
Rhamnaceae					
466.	13470	*Cryptandra arbutiflora var. arbutiflora*			
467.	9076	*Cryptandra myriantha*			
468.	4804	*Cryptandra nutans*			
469.	4809	*Cryptandra pungens*			
470.	4810	*Cryptandra scoparia*			
471.	4828	*Spyridium globulosum (Basket Bush)*			
472.	16197	*Stenanthemum emarginatum*			
473.	13475	*Stenanthemum humile*			
474.	4839	*Trymalium angustifolium*			
475.	13479	*Trymalium ledifolium var. rosmarinifolium*			
Rubiaceae					
476.	7321	*Galium divaricatum*	Y		
477.	7323	*Galium murale (Small Goosegrass)*	Y		
478.	18255	*Opercularia vaginata (Dog Weed)*			
Rutaceae					
479.	17665	*Boronia purdieana subsp. purdieana*			
480.	11381	*Boronia ramosa subsp. anethifolia*			
481.	11564	*Boronia ramosa subsp. ramosa*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
482.	16639	*Boronia scabra subsp. scabra*			
483.	4443	*Boronia subsessilis*			
484.	18529	*Philotheca spicata (Pepper and Salt)*			
Santalaceae					
485.	2350	*Leptomeria pauciflora (Sparse-flowered Currant Bush)*			
486.	2356	*Santalum acuminatum (Quandong, Warnga)*			
Schizaeaceae					
487.	24	*Schizaea fistulosa (Narrow Comb Fern)*			
Solanaceae					
488.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
Stylidiaceae					
489.	7677	*Levenhookia stipitata (Common Stylewort)*			
490.	7679	*Stylidium adpressum (Trigger-on-stilts)*			
491.	12846	*Stylidium albolilacinum*			
492.	30278	*Stylidium androsaceum*			
493.	30276	*Stylidium bicolor*			
494.	12845	*Stylidium carlquistii*			
495.	7710	*Stylidium cygnorum*			
496.	7713	*Stylidium dichotomum (Pins-and-needles)*			
497.	19211	*Stylidium diplectroglossum*		P1	
498.	7716	*Stylidium diuroides (Donkey Triggerplant)*			
499.	11808	*Stylidium diuroides subsp. diuroides*			
500.	7719	*Stylidium ecorne (Foot Triggerplant)*			
501.	19251	*Stylidium eriopodum*			
502.	7762	*Stylidium miniatum (Pink Butterfly Triggerplant)*			
503.	25829	*Stylidium neurophyllum (Coastal Plain Triggerplant)*			
504.	7768	*Stylidium obtusatum (Pinafore Triggerplant)*			
505.	7773	*Stylidium petiolare (Horn Triggerplant)*			
506.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
507.	48472	*Stylidium ponticulus*			
508.	25837	*Stylidium purpureum (Purple Fountain Triggerplant)*			
509.	20521	*Stylidium rigidulum*			
510.	25806	*Stylidium scariosum*			
511.	7798	*Stylidium schoenoides (Cow Kicks)*			
512.		*Stylidium sp.*			
513.	20608	*Stylidium stenosepalum*			
Thymelaeaceae					
514.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
515.	5244	*Pimelea floribunda*			
516.	11404	*Pimelea imbricata var. major*			
517.	12041	*Pimelea suaveolens subsp. suaveolens*			
Violaceae					
518.	5216	*Hybanthus calycinus (Wild Violet)*			
Xanthorrhoeaceae					
519.	11299	*Chamaescilla corymbosa var. corymbosa*			
Zamiaceae					
520.	18119	*Macrozamia fraseri*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Colleen McDonald on 11/07/2019

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 52' 12" E,31° 10' 11" S
Buffer 10km
Group By Family

Family	Species	Records
Acanthizidae	6	93
Accipitridae	6	24
Actinopodidae	1	1
Agamidae	2	24
Anatidae	10	66
Anhingidae	1	5
Ardeidae	5	9
Artamidae	2	15
Boidae	1	1
Bothriuridae	1	1
Cacatuidae	1	11
Campephagidae	2	19
Casuariidae	1	3
Charadriidae	2	7
Columbidae	4	16
Corvidae	1	26
Cracticidae	3	24
Cuculidae	1	1
Dasyuridae	4	20
Dicaeidae	1	1
Dicruridae	4	65
Diplodactylidae	5	5
Elapidae	6	11
Falconidae	4	13
Gekkonidae	1	1
Halcyonidae	2	14
Hirundinidae	3	29
Ixodidae	1	1
Laridae	3	3
Limnodynastidae	1	2
Lycosidae	1	1
Macropodidae	1	2
Maluridae	3	42
Meliphagidae	11	110
Meropidae	1	8
Muridae	2	25
Myobatrachidae	1	6
Neosittidae	2	7
Pachycephalidae	3	39
Pardalotidae	2	19
Pelecanidae	1	5
Petroicidae	3	18
Phalacrocoracidae	4	13
Podicipedidae	4	8
Psittacidae	9	63
Pygopodidae	5	11
Rallidae	6	14
Recurvirostridae	2	6
Scincidae	10	47
Scolopacidae	1	3
Scolopendridae	1	1
Scutigeridae	1	1
Sylviidae	2	3
Tarsipedidae	1	20
Tetragnathidae	1	1
Theridiidae	1	1
Threskiornithidae	2	13
Urodacidae	1	1
Varanidae	1	2
Vespertilionidae	3	3
Zosteropidae	1	24
TOTAL	**172**	**1028**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
2.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
3.	24262	*Acanthiza inornata (Western Thornbill)*			
4.	25530	*Gerygone fusca (Western Gerygone)*			
5.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
6.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
7.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
8.	25536	*Accipiter fasciatus (Brown Goshawk)*			
9.	24285	*Aquila audax (Wedge-tailed Eagle)*			
10.		*Elanus axillaris*			
11.	24295	*Haliastur sphenurus (Whistling Kite)*			
12.	47965	*Hieraaetus morphnoides (Little Eagle)*			
Actinopodidae					
13.		*Missulena occatoria*			
Agamidae					
14.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
15.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
Anatidae					
16.	24312	*Anas gracilis (Grey Teal)*			
17.	24313	*Anas platyrhynchos (Mallard)*			
18.	24315	*Anas rhynchotis (Australasian Shoveler)*			
19.	24316	*Anas superciliosa (Pacific Black Duck)*			
20.	24318	*Aythya australis (Hardhead)*			
21.	24319	*Biziura lobata (Musk Duck)*			
22.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
23.	24322	*Cygnus atratus (Black Swan)*			
24.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
25.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
Anhingidae					
26.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
Ardeidae					
27.	41324	*Ardea modesta (great egret, white egret)*			
28.	24340	*Ardea novaehollandiae (White-faced Heron)*			
29.	24341	*Ardea pacifica (White-necked Heron)*			
30.		*Egretta novaehollandiae*			
31.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
Artamidae					
32.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
33.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
Boidae					
34.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*			
Bothriuridae					
35.		*Cercophonius sulcatus*			
Cacatuidae					
36.		*Eolophus roseicapillus*			
Campephagidae					
37.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
38.	24367	*Lalage tricolor (White-winged Triller)*			
Casuariidae					
39.	24470	*Dromaius novaehollandiae (Emu)*			
Charadriidae					
40.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
41.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
Columbidae					
42.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
43.	24409	*Phaps chalcoptera (Common Bronzewing)*			
44.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
45.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
Corvidae					
46.	25592	*Corvus coronoides (Australian Raven)*			
Cracticidae					
47.	25595	*Cracticus tibicen (Australian Magpie)*			
48.	25596	*Cracticus torquatus (Grey Butcherbird)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
49.	25597	*Strepera versicolor (Grey Currawong)*			
Cuculidae					
50.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
Dasyuridae					
51.	25449	*Antechinus flavipes (Yellow-footed Antechinus)*			
52.	24109	*Sminthopsis dolichura (Little long-tailed Dunnart)*			
53.	24111	*Sminthopsis gilberti (Gilbert's Dunnart)*			
54.	25515	*Sminthopsis griseoventer (Grey-bellied Dunnart)*			
Dicaeidae					
55.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
Dicruridae					
56.	24443	*Grallina cyanoleuca (Magpie-lark)*			
57.	25610	*Myiagra inquieta (Restless Flycatcher)*			
58.	48096	*Rhipidura albiscapa (Grey Fantail)*			
59.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Diplodactylidae					
60.	25456	*Crenadactylus ocellatus (Clawless Gecko)*			
61.	24918	*Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)*			
62.	25518	*Strophurus spinigerus*			
63.	24943	*Strophurus spinigerus subsp. inornatus*			
64.	24942	*Strophurus spinigerus subsp. spinigerus*			
Elapidae					
65.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
66.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
67.	25251	*Echiopsis curta (Bardick)*			
68.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
69.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
70.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
Falconidae					
71.	25621	*Falco berigora (Brown Falcon)*			
72.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
73.	25623	*Falco longipennis (Australian Hobby)*			
74.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
Gekkonidae					
75.	24980	*Christinus marmoratus (Marbled Gecko)*			
Halcyonidae					
76.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
77.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
Hirundinidae					
78.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
79.	24491	*Hirundo neoxena (Welcome Swallow)*			
80.	48061	*Petrochelidon nigricans (Tree Martin)*			
Ixodidae					
81.		*Amblyomma triguttatum*			
Laridae					
82.		*Chroicocephalus novaehollandiae*			
83.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
84.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
Limnodynastidae					
85.	25410	*Heleioporus eyrei (Moaning Frog)*			
Lycosidae					
86.		*Kangarosa properipes*			
Macropodidae					
87.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
Maluridae					
88.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
89.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
90.	25654	*Malurus splendens (Splendid Fairy-wren)*			
Meliphagidae					
91.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
92.	24561	*Anthochaera carunculata (Red Wattlebird)*			
93.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
94.	24567	*Epthianura albifrons (White-fronted Chat)*			
95.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
96.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
97.	25661	*Lichmera indistincta (Brown Honeyeater)*			
98.	24583	*Manorina flavigula (Yellow-throated Miner)*			
99.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
100.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
101.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Meropidae					
102.	24598	*Merops ornatus (Rainbow Bee-eater)*			
Muridae					
103.	24223	*Mus musculus (House Mouse)*	Y		
104.	24230	*Pseudomys albocinereus (Ash-grey Mouse)*			
Myobatrachidae					
105.	25420	*Myobatrachus gouldii (Turtle Frog)*			
Neosittidae					
106.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
107.	24606	*Daphoenositta chrysoptera subsp. pileata (Varied Sittella, Black-capped Sitella)*			
Pachycephalidae					
108.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
109.	24618	*Oreoica gutturalis (Crested Bellbird)*			
110.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
Pardalotidae					
111.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
112.	25682	*Pardalotus striatus (Striated Pardalote)*			
Pelecanidae					
113.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Petroicidae					
114.	47997	*Melanodryas cucullata (Hooded Robin)*			
115.	48066	*Petroica boodang (Scarlet Robin)*			
116.	24659	*Petroica goodenovii (Red-capped Robin)*			
Phalacrocoracidae					
117.		*Microcarbo melanoleucos*			
118.	25697	*Phalacrocorax carbo (Great Cormorant)*			
119.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
120.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
Podicipedidae					
121.	25704	*Podiceps cristatus (Great Crested Grebe)*			
122.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
123.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
124.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
Psittacidae					
125.		*Barnardius zonarius*			
126.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
127.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
128.	25720	*Platycercus icterotis (Western Rosella)*			
129.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
130.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
131.	25722	*Polytelis anthopeplus (Regent Parrot)*			
132.		*Purpureicephalus spurius*			
133.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
Pygopodidae					
134.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
135.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
136.	25005	*Lialis burtonis*			
137.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
138.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
Rallidae					
139.	25727	*Fulica atra (Eurasian Coot)*			
140.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
141.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
142.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
143.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
144.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
Recurvirostridae					
145.	25734	*Himantopus himantopus (Black-winged Stilt)*			
146.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
Scincidae					
147.	30893	*Cryptoblepharus buchananii*			
148.	25039	*Ctenotus fallens*			
149.	25074	*Ctenotus schomburgkii*			
150.	25128	*Lerista christinae*			
151.	25131	*Lerista distinguenda*			
152.	25133	*Lerista elegans*			
153.	25165	*Lerista praepedita*			
154.	25184	*Menetia greyii*			
155.	25192	*Morethia obscura*			
156.	25519	*Tiliqua rugosa*			
Scolopacidae					
157.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
Scolopendridae					
158.		*Scolopendra morsitans*			
Scutigeridae					
159.		*Allothereua maculata*			
Sylviidae					
160.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
161.	25758	*Megalurus gramineus (Little Grassbird)*			
Tarsipedidae					
162.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
Tetragnathidae					
163.		*Pinkfloydia harveii*			
Theridiidae					
164.		*Latrodectus hasseltii*			
Threskiornithidae					
165.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
166.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Urodacidae					
167.		*Urodacus novaehollandiae*			
Varanidae					
168.	25227	*Varanus tristis subsp. tristis (Racehorse Monitor)*			
Vespertilionidae					
169.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
170.	24195	*Nyctophilus gouldi (Gould's Long-eared Bat)*			
171.	24206	*Vespadelus regulus (Southern Forest Bat)*			
Zosteropidae					
172.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Australian Government
Department of the Environment and Energy

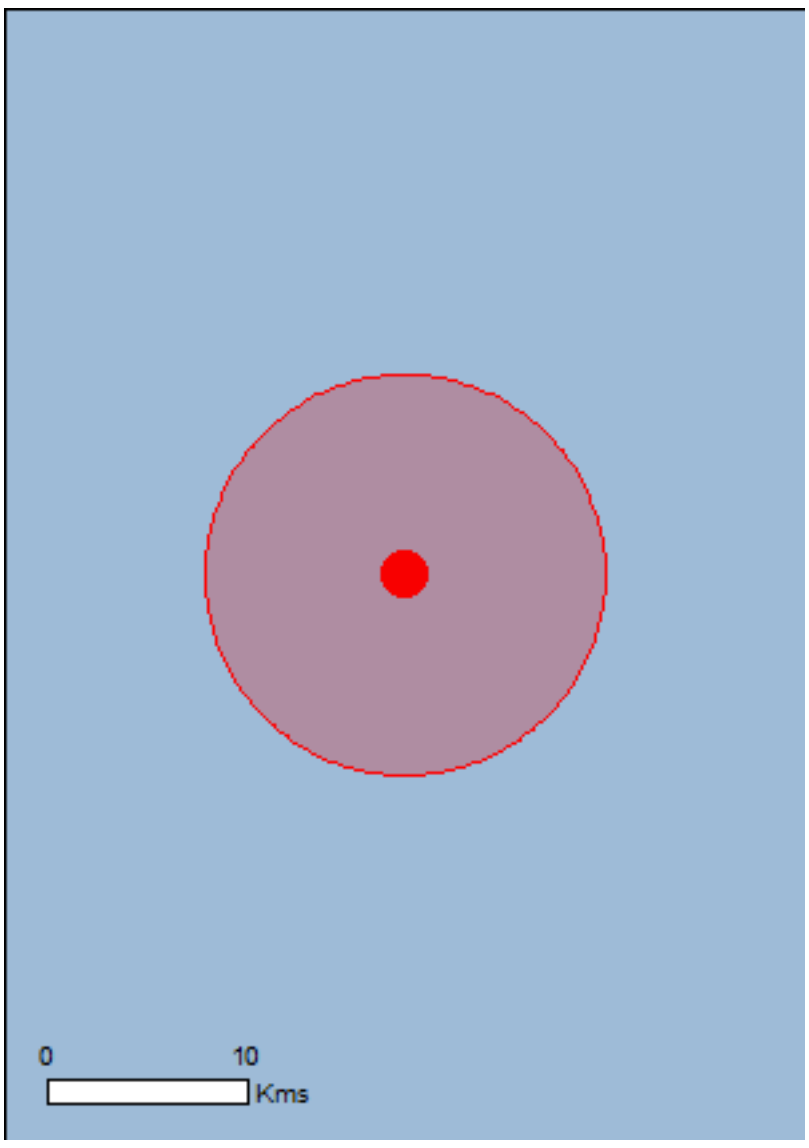
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 11/07/19 17:19:09



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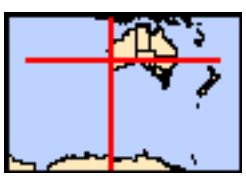

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	25
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	22
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat may occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat known to occur within area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [88881]	Endangered	Species or species habitat likely to occur within area
Conospermum densiflorum subsp. unicephalatum One-headed Smokebush [64871]	Endangered	Species or species habitat may occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat may occur within area
Eucalyptus recta Silver Mallet [56430]	Endangered	Species or species habitat likely to occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area
Goodenia arthrotricha [12448]	Endangered	Species or species habitat known to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area
Paracaleana dixonii Sandplain Duck Orchid [86882]	Endangered	Species or species habitat likely to occur within area
Ptychosema pusillum Dwarf Pea [11268]	Vulnerable	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat known to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Bartletts Well	WA
Boonanarring	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur

Name	Status	Type of Presence within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.16971 115.86998

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

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

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Taxon	Cons_Code	Plant Desc	Vegetation	Frequency	Notes	Locality	Precision	Date
Acacia cummingiana	3	Rush-like shrub, 0.5 m high x 0.6 m wide.	Low heath. Associated species: Corymbia calophylla, Synaphea grandis, Banksia echinata, Goodenia arthrotricha, Xanthorrhoea, Hakea gilbertii, Melaleuca urceolaris.	50+.		Boonanarring Nature Reserve (C41805), on hill near western boundary	1	29/11/2011
Acacia cummingiana	3	A low sprawling wiry, rush-like shrub draping over and through the plants around it. Flowers bright yellow.	Closed heath Hakea, Xanthorrhoea preissii and Macrozamia reidlei.	fairly common.		4 km [E] from Brand Highway on West Wannamal Road	3	25/05/1979
Acacia cummingiana	3		The upper stratum was Low Woodland A to Open Low Woodland A to 15 m tall, dominated by Corymbia calophylla and Eucalyptus marginata: over Low Woodland B to 5 m tall dominated by Banksia attenuata: over Low Scrub A and B and Dwarf Scrub C dominated by Hak			Site Gs 5D, 2 km N of Boonanarring Hill, Boonanarring Nature Reserve	3	13/09/1993
Acacia cummingiana	3		Mixed low heath, with Xanthorrhoea drummondii, Hibbertia hypericoides, Melaleuca urceolaris, Goodenia arthrotricha, Calothamnus sanguineus.		Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Acacia cummingiana	3		Mixed Jarrah - Marri woodland, with Xanthorrhoea preissii, Hibbertia hypericoides, Dryandra sessilis, Bossiaea eriocarpa.	uncommon.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	5/06/2007
Acacia cummingiana	3		Eucalyptus wandoo woodland, with Thomasia foliosa, Gastrolobium callistachys.	uncommon.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	6/06/2007
Acacia cummingiana	3	Sprawling, wiry, small shrub.	Open Woodland of Corymbia calophylla over Low Woodland of Banksia attenuata (50% dead stags), Nuytsia floribunda, Banksia menziesii over Tall Open Shrubland of Adenanthos cygnorum, Banksia grandis, B. sessilis over Shrubland of Allocasuarina humilis, Pet	9 plants in 0.1 ha area surveyed.	All plants were in bud at the time of the survey. When juvenile and/or not flowering, plants could be confused with sterile Daviesia triflora, which also occurs in the habitat.	S road reserve of Wannamal Road West. Ca. 4 km W of Brand Highway and ca. 10-15 m S into bushland. No fence separates road reserve from Boonanarring Nature Reserve	1	16/01/2018
Acacia cummingiana	3	Sprawling, wiry, small shrub.	Open Woodland of Corymbia calophylla over Low Woodland of Banksia attenuata (50% dead stags), Nuytsia floribunda, Banksia menziesii over Tall Open Shrubland of Adenanthos cygnorum, Banksia grandis, B. sessilis over Shrubland of Allocasuarina humilis, Pet	11 plants in 0.1 ha surveyed.	All plants were in bud at the time of the survey. When juvenile and/or not flowering, plants could be confused with sterile Daviesia triflora, which also occurs in the habitat.	Boonanarring Nature Reserve. Ca. 4 km W on Wannamal Road West from Brand Highway and ca. 20-25 m S into bushland. Plants continue into the road reserve with no separating fence	1	16/01/2018
Acacia drummondii subsp. affinis	3					62 mile post on Geraldton Highway [15 km N of Gingin]	3	7/08/1970
Acacia drummondii subsp. affinis	3					61 mile post on Geraldton Highway [14 km N of Gingin]	3	26/08/1971
Acacia drummondii subsp. affinis	3		Jarrah.			61 mile peg Perth-Geraldton Highway [14 km NNW of Gingin]	3	2/08/1957
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3	Leafy, few stemmed shrub to 70 cm. Flowers reddish/orange (old).	Open woodland.	Common.	Abundance: Common.	Boonanarring Brook (proposed Nature Reserve), off Wannamal W Road, Gingin, Quadrat 7	0	13/08/1986
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3	Leafy shrubs to 1 m. Flowers bright yellow.	Open Jarrah/Marri woodland over low heath.	common in patches.		Boonanarring Brook (proposed Nature Reserve), off Wannamal W Road, Gingin, Quadrat 5	0	13/08/1986
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3		Mixed low heath, with Xanthorrhoea preissii, Hibbertia hypericoids, Calothamnus sanguineus, Allocasuarina humilis.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	5/06/2007
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3		Mixed Jarrah - Marri woodland, with Xanthorrhoea preissii, Hibbertia hypericoides.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3		Mixed low heath, with Xanthorrhoea preissii, Hibbertia hypericoides, Calothanmus sanguineus, Allocasuarina humilis, Daviesia nudiflora.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3		Mixed Jarrah - Marri woodland, with Xanthorrhoea preissii, Hibbertia hypericoides, Hakea lissocarpha, Dampiera lindleyi, Petrophile striata.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	7/08/2007
Austrostipa sp. Cairn Hill (M.E. Trudgen 21176)	3	Grass, 40 cm high.	Pasture paddocks of Austrostipa sp. Cairn Hill, Hordeum sp., Vulpia sp., Lolium sp., Petrorhagia dubia.			C. 100 m SE of Wannamal Road West and Brand Highway intersections, c. 19 km NW of Brand Highway and Dewars Road intersection, 4 km W of Gingin	1	19/11/2012
Banksia chamaephyton	4		(Muir's): Heath with scattered Banksia and Eucalyptus todtiana. Associated species: Lambertia multiflorus, Hakea conchifolia, Stirlingia latifolia, Allocas humilis, Petrophile sp., Leucopogon aff. sprengelioides.		Condition of population: healthy/moderate/poor.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 1.5 km N. The population is 500 m NW at 310 degrees,	1	20/08/2001
Banksia chamaephyton	4		(Muir's) Heath land mostly 0.3 m - 1.2 m high with Hakea psilorrhyncha, Lambertia multiflorus, Stirlingia latifolia, Xanthorrhoea preissii, Hibbertia hypericoides, Dryandra mimica.	7 mature plants.		Boonanarring Nature Reserve, Boonanarring Road, 4.2 km E of Brand Highway then take the track N for 5.2 km, E for 3.65 km then S for 1.1 km. The population is ca 170 m ENE towards the eastern edge of the heath land,	1	26/07/2001
Banksia chamaephyton	4		(Muir's): Banksia and Eucalyptus todtiana in heath land. Associated species: Adenanthos cygnorum, Synaphea spinulosa, Stirlingia latiflia, Leucopogon sprengelioides, Calothamnus sanguineus, Dryandra mimica.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km, then E for 3.65 km and then N again for 0.8 km. The population is ca 150 m E,	1	2/08/2001
Banksia chamaephyton	4		(Muir's): Heath. Associated species: Nuytsia floribunda, Lambertia multiflorus, Hibbertia hypericoides, Stirlingia latifolia, Leucopogon sprengelioides, Synaphea spinulosa.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km, E for 3.65 km then 0.5 km S. The plants are ca 500 m at 273 degrees W on the southern slope of the hill top heath land,	1	31/07/2001

Banksia chamaephyton	4		(Muir's): Heath with scattered Banksia and Eucalyptus todtiana. Associated species: Lambertia multiflorus, Calothamnus sanguineus, Leucopogon sprengelioides, Xanthorrhoea preissii, Isopogon sp.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km then E for 3.65 km then N again for 450 m. The plants grow in scattered clonal clumps over the heath land to the east of the track,	1	31/07/2001
Banksia chamaephyton	4		Low heath with Melaleuca ciliosa, M. urceolaris, Hakea conchifolia, H. incrassata, Lambertia multiflorus, Isopogon drummondii, Dryandra mimica.	7 mature plants in an area 60 x 30 m.	Condition of population: healthy - moderate - poor; some new growth evident.	c. 1 km SSW (at 197 degrees) of Wannamal West Road, 12.7 km E of Brand Highway, Boonanarring Nature Reserve, Gingin, Swan Coastal District (Map/Site Ref: Mindarra 2035-1),	1	20/11/2001
Banksia kippistiana var. paenepeccata	3	Erect shrub, 1.2 m tall. Old dead flowers.	Low heath emergent Eucaluptus.		Abundance: common.	Boonanarring Brook (proposed nature reserve) off Wannamal West Road, Gingin, Quadrant 6	3	13/08/1986
Banksia kippistiana var. paenepeccata	3		(Muir's): Scattered Nuytsia floribunda on heath land. Associated species: Allocas humilis, Hakea ruscifolia, Isopogon linearis, Synaphea spinulosa, Calothamnus sanguineus, Daviesia sp.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 3.1 km S. The population is ca 100 m W on the heath land. Reserve No: 41805,	1	14/10/2001
Banksia kippistiana var. paenepeccata	3		(Muir's): Scatterd Nuytsia floribunda on heath land. Associated species: Allocas humilis, Hakea ruscifolia, Isopogon linearis, Synaphea spinulosa, Calothamnus sanguineus, Daviesia sp.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 3.1 km S. The population is ca 100 m W on the heath land,	1	26/08/2001
Banksia kippistiana var. paenepeccata	3		(Muir's): Heath with scattered Eucalyptus todtiana. Associated species: Lambertia multiflorus, Synaphea spinulosa, Calothamnus sanguineus, Leucopogon sprengelioides, Hakea ruscifolia, H. stenocarpa.		Condition of population: healthy/moderate/poor.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 0.5 km N. The population is ca 100 m E in the heath land,	1	22/08/2001
Banksia kippistiana var. paenepeccata	3		(Muir's): Heath. Associated species: Hibbertia hypericoides, Hakea lissocarpha, H. stenocarpa, Leucopogon aff. gracillimus, Synaphea spinulosa, Xanthorrhoea preissii.		Condition of population: healthy/moderate/poor.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 2.2 km S. The population is 150 m W in the heath land,	1	10/08/2001
Banksia kippistiana var. paenepeccata	3		Heathland with Hakea lissocarpha, Hakea stenocarpa, Hibbertia hypericoides, Leucopogon sp., Synaphea sp., Xanthorrhoea preissii.	hundreds.		Boonanarring NR, take Boonanarring Road for 4.2 km E of Brand Highway then the initernal tracks for 5.2 km N, 3.65 km E and 2.2 km S, the population is 150 m W in the heathland (Population F. Hort 1378)	1	27/08/2002
Banksia kippistiana var. paenepeccata	3		Dense heath. Melaleuca urceolaris, Dryandra echinata, Hakea spathulata, Lambertia multiflorus, Synaphea spinulosa.	140 mature plants.		Boonanarring Nature Reserve. On eastern boundary ca 4.8 km S of Wannamal West Road, Gingin,	1	24/09/2001
Banksia mimica	T	Clonal.	Low heath with Melaleuca ciliosa, M. urceolaris, Hakea conchifolia, H. incrassata, Lambertia multiflorus, Isopogon drummondii, Banksia chamaephyton.	9 mature plants in an area 30 x 30 m.	Condition of population: moderate - poor.	c. 1 km SSW (at 197 degrees) of Wannamal West Road, 12.7 km E of Brand Highway, Boonanarring Nature Reserve, Gingin, Swan Coastal District (Map/Site Ref: Mindarra 2035-1),	1	20/11/2001
Banksia mimica	T		(Muir's): Scatterd Banksia and Eucalyptus todtiana. Associated species: Adenanthos cygnorum, Synaphea spinulosa, Phyllota gracilis, Leucopogon spp., Stirlingia latifolia, Hibbertia hypericoides, Jacksonia sp. The population is W of the track in the heath		Condition of population: healthy/moderate/poor.	Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km, E for 3.65 km and N for 1 km. The population is W of the track at 1.1 km N of the last crossroads,	1	2/08/2001
Banksia mimica	T		(Muirs) Scattered Eucalyptus todtiana, Nuytsia floribunda and Banksia sp. in low open heath land fringed by Banksia open woodland. Stirlingia latifolia, Hibbertia hypericoides, Leucopogon spp., Sedges, Calothamnus sanguineus, Adenanthos cygnorum.	ca 1772 mature plants over 400 m NS to 300 m EW.		Boonanarring Nature Reserve, Boonanarring Road 4.2 km E of Brand High- way then track 5.2 km N, 3.65 km E and 1.1 km S to the population which is in heathland 100 m E, Shire of Gingin,	1	26/07/2001
Banksia mimica	T		(Muir's): Open heath on fringe of Banksia and Eucalyptus todtiana open woodland. Associated species: Lambertia multiflorus, Stirlingia latifolia, Isopogon sp., Petrophile sp., Hibbertia hypericoides, Leucopogon sprengelioides, Xanthorrhoea preissii.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then tracks N for 5.2 km, E for 3.65 km then S for 500 m. The population is 300 m W at 267 degrees on the southern edge of the heath land,	1	31/07/2001
Banksia pteridifolia subsp. vernalis	3	Spreading shrub to 30 cm high, flowers on ground, probably lignotuber habit.	Banksia menziesii and Eucalyptus todtiana scattered in shrubland with Adenanthos cygnorum, Hakea trifurcata, Melaleuca.	more than 20 plants.	Plants were in poor condition - flowers dried off. Ref: PERTH 05871557, F. Hort 1347, 2 August 2001.	Boonanrring Nature Reserve, Wannamal West Road, Gingin	1	6/10/2012
Banksia pteridifolia subsp. vernalis	3			(Muir's): Heath land with scattered Eucalytpus todtiana and Nuytsia floribunda. Associated species: Xanth preeissii, Allocas humilis, Isopogon linearis, Synaphea spinulosa, Daviesia sps, Calothamnus sanguineus.	Condition of population:Healthy/moderate/poor.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track S for 0.3 km. Follow the southern boundary E-N-E for a total of 5.5 km. Then the track N for 2.6 km. The plants grow ca 150 m W of the track	1	10/09/2001
Banksia pteridifolia subsp. vernalis	3		(Muir's): Heath with scattered Banksia and Eucalyptus todtiana. Associated species: Lambertia multiflorus, Synaphea spinulosa, Dryandra lindleyana, Stirlingia latifolia, Xanthorrhoea preissii.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km, then E for 3.65 km and then N again for 450 m. The plants grow in the heath land ca 150 m to the E,	1	31/07/2001
Banksia pteridifolia subsp. vernalis	3		(Muir's): Heath with scattered Banksia and Eucalyptus todtiana. Associated sspecies: Adenanthoa cygnorum, Hakea trifurcata, Melaleuca sp.		Condition of population:poor.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km, then E for 3.65 km and then N again for 1.1 km. The plants grow ca 150 m W,	1	2/08/2001

Banksia pteridifolia subsp. vernalis	3	Spreading shrub to 60 cm high, flowers at ground, probably lignotuber habit.	Banksia menziesii and Eucalyptus todtiana scattered with Lambertia multiflorus, Synaphea spinulosa, Banksia dallanneyi, Stirlingia latifolia, Banksia kippistiana var. paenepeccata.	more than 20 plants.	Ref: PERTH 05871549, F. Hort 1346, 31 July 2001. A few flowers still available. Plants in good condition.	Boonanarring Nature Reserve, Wannamal West Road, Gingin	1	6/10/2012
Beaufortia eriocephala	3	Compact and erect 0.4-0.5 m. Red coloured flowers.	Eucalyptus todtiana, Adenanthos cygnorum type country.	occasional, only 1 bush.		Boonanarring Nature Reserve (1st E-W firebreak - 1 km W of Reserves Eastern boundary). Map. 1:50,000 Sheet: Mindarra	0	1/12/1993
Caladenia speciosa	4	Erect tuberous herb to 60 cm high. Flowers creamy-white.				2.1 km SSW of Wannamal West road on edge of Gingin Scarp,	3	18/09/1986
Calectasia elegans	2	Erect perennial subshrub to c. 40 cm high. Typical purple flower with red anthers; reddish stilt roots present; plants in full flower.	Low Woodland A over Low Heath C over very open herbs (Muirs). Associated species: Banksia attenuata, Xanthorrhoea preissii, Stirlingia latifolia, Daviesia nudiflora, Eremaea pauciflora, Hibbertia acerosa, Patersonia occidentalis, Philotheca spicata, Cale	1 plant only located.	Plant located in a small unburnt section of vegetation with the surrounding vegetation burnt by prescribed burn in Spring 2007.	215 m S of Wannamal West Road, 4.4 km W of junction of Wannamal West and Clewleys Road, Boonanarring Nature Reserve	1	28/10/2008
Goodenia arthrotricha	T	Herb 0.4 m x 0.2 m.	Low open heath. With Corymbia calophylla, Synaphea grandis, Banksia echinata, Goodenia arthrotricha, Xanthorrhoea, Hakea gilbertii, Melaleuca urceolaris, Thomasia sp. Gingin.	300+.	Found only on large hill near western boundary of Boonanarring Nature Reserve, 5 km S of Wannamal West Road. Excellent condition.	Boonanarring Nature Reserve (C41805), on hill near western boundary	1	28/11/2011
Goodenia arthrotricha	T		Mixed Jarrah - Marri woodland, with Xanthorrhoea preissii, Hakea stenocarpa.	about 10 plants, near edge of track.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	22/02/2008
Goodenia arthrotricha	T		Mixed low heath, with Xanthorrhoea drummondii, Hibbertia hypericoides, Melaleuca urceolaris, Goodenia arthrotricha, Calothamnus sanguineus.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Goodenia arthrotricha	T		Mixed low heath, with Xanthorrhoea drummondii, Hibbertia hypericoides, Melaleuca urceolaris, Goodenia arthrotricha, Calothamnus sanguineus.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Goodenia arthrotricha	T		Mixed low heath, with Xanthorrhoea drummondii, Hibbertia hypericoides, Melaleuca urceolaris, Goodenia arthrotricha, Calothamnus sanguineus.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	13/11/2007
Goodenia xanthotricha	2	Erect shrub, to 90 cm high x to 90 cm wide. Flowers blue.	Jarrah and marri open woodland with Synaphea grandis, Thomasia sp. Gingin, Hibbertia glomerata subsp. ginginensis, Acacia pulchella, Xanthorrhoea preissii.	366 mature plants and 10 dead.	Plants in fair condition.Area 200 m NS x 40 m EW.	Boonanarring Nature Reserve, Wannamal West Road, Red Gully (Gingin): take Wannamal West Road for 2.3 km E of the NW cnr of Boonanarring NR then the gravel pit for 0.7 km SSE. The plants grow on the western fringe of an active gravel mine site	1	7/03/2012
Goodenia xanthotricha	2	Erect shrub with blue flowers. To 80 cm high, to 75 cm wide.	Jarrah and marri open woodland with Banksia sessilis, Adenanthos cygnorum, Synaphea, Hibbertia and Petrophile.	15 mature, 25 seedlings and 4 dead.	Plants generally in poor condition.	Gravel Reserve R 36629/9948, Wannamal West Road, Red Gully (Gingin): Take Wannamal West Road for 620 m E of the NW corner of Boonanarring Nature Reserve, then the gravel pit road for 260 m S	1	7/03/2012
Goodenia xanthotricha	2		Mixed Jarrah - Marri woodland, with Xanthorrhoea preissii.	relatively common, large population.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	12/11/2007
Grevillea saccata	4	Low spreading shrub, 0.6 m x 0.7 m.	Jarrah-marri woodland. Associated species: Eucalyptus marginata, Corymbia calophylla, Hakea ruscifolia, Hibbertia hypericoides, Stirlingia latifolia, Jacksonia sternbergiana, Diplopeltis huegelii, Phyllanthus calycina, Clematis pubescens.	4		Boonanarring Nature Reserve (C41805), on hill near western boundary, southern slope	1	29/11/2011
Grevillea saccata	4	Shrubs to 50 cm.				Boonanarring Nature Reserve, N of Gingin.	3	18/09/1986
Grevillea saccata	4	In bud, flower.	Banksia attenuata, menziesii, Hakea prostrata, Hakea trifurcata, Allocas. humilis, Conospermum stoechadis, Dryandra nivea. Undisturbed.		Abundance: 8 plants only.	Boonanarring Hills VCL, 500 metres N of NW corner of Loc 3869.	3	2/07/1990
Grevillea saccata	4		Open vegetation with scattered Eucalyptus lane-poolei/todtiana, Banksia attenuata/menziesii. Associated with Hakea trifurcata, Stirlingia latifolia, Blackboys, Petrophile ericifolia, Hibbertia hypericoides, Astroloma sp., Jacksonia furcellata, Hakea sten		Abundance: 24 plants.	Boonanarring Nature Reserve	0	15/07/1993
Grevillea saccata	4	Low shrubs, 25 cm high, flowers red.	Open shrubland.	occasional.		Boonanarring Brook (proposed N.R.) 8 km S of Wannamal W Road on western fenceline,	3	13/08/1986
Grevillea saccata	4	Dwarf shrub. Red flowers.	Heathland. Myrtaceous heath spp., Petrophile sp., Conospermum spp., Acacia pulchella, Adenanthos sp., Xanthorrhoea sp.	1000+ plants.		Boonanarring Nature Reserve, 100 m NW of NW corner of private property (Population 5B)	1	25/11/2002
Grevillea saccata	4		The upper stratum was Low Woodland A to Open Low Woodland A to 15 m tall, dominated by Corymbia calophylla and Eucalyptus marginata: over Low Woodland B to 5 m tall dominated by Banksia attenuata: over Low Scrub A and B and Dwarf Scrub C dominated by Hak			Site Gs 5D, 2 km N of Boonanarring Hill, Boonanarring Nature Reserve	3	13/09/1993
Grevillea saccata	4		Muir's: Jarrah and Marri open woodland. Stirlingia latifolia, Hibbertia hypericoides, Calothamnus sanguineus, Synaphea spinulosa.	ca 630 plants.		Boonanarring Nature Reserve, Boonanarring Road, 4.2 km E of Brand Highway then 4.05 km N, then trek ca 1 km E to the eastern edge of the large heath land,	1	23/07/2001
Grevillea saccata	4		(Muir's): Heath land with scatterd Nuytsia floribunda. Associated species: Calothamnous sanguineus, Hibbertia hypericoides, Isopogon sp., Hakea ruscifolia, H. trifurcata, H. costata, Dryandra lindleyana, D. echinata.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 1 km E. The population is SSE - ca 650 m aeronautical distance - on the large hillside heath land,	1	20/08/2001
Grevillea saccata	4		Very open stunted Jarrah/Marri, assoc. with Blackboys, Gastrolobium calycinum, Hakea lissocarpha, H. stenocarpha, Dryandra nivea, Calothamnus sp., Acacia drummondii, Conostephium sp.		Abundance: 47 plants seen, in flower & buds, over 50 x 40 m area.	Boonanarring Nature Reserve, 460 m & 90 degrees from 410 m point of Line 6 - population no. 6a	0	16/07/1993

Grevillea saccata	4		Very open Banksia attenuata/menziesii woodland, Petrophile ericifolia Blackboys, Hibbertia hypericoides, Conospermum stoechadis, Calothamnus sp. Conostephium sp., Leptocarpus sp.		Abundance: 5 plants	Boonanarring Nature Reserve 41805, 150 m W from NE corner of Loc. 3869, N down fireline fro 370 m and W 100 m	0	8/07/1992
Grevillea saccata	4		Odd Jarrah/Marri very open flats, moderate on slope. Nuytsia floribunda, Banksia's grandis/menziesii/attenuata, Adenanthos cygnorum, Black-boys, Petrophile ericifolia, Conostephium, Acacia sp.		Abundance: 76 plants	Boonanarring Nature Reserve 41805, 530 m N along Rserves W bdy fireline from NW corner Loc. 3869, 4.6 km E on fireline both side of track	0	26/06/1992
Grevillea saccata	4		Completely open, treeless, scrubby flat, bordered by Banksia woodland and open Jarrah/Marri. Blackboys, Allocas. humilus, Hakea trifurcata, Petrophile ericifolia, Calytrix sylvana, Acacia pulchella, Hibbertia		hypericoides, Dryandra nivea, Eremaea sp. Abundance: c. 1800 plants.	100 m N from NW corner of Loc 4372 to SW corner, Boonanarring Nature Reserve No 41805	0	24/07/1992
Hibbertia glomerata subsp. ginginensis	2		Low heath. Associated Species: Cryptandra and Tetratheca species.	5+ mature plants.	Condition of Population: Healthy.	Boonanarring Nature Reserve, S side, on ridge N of track which runs E of road at gravel pits	3	25/08/1996
Hibbertia glomerata subsp. ginginensis	2		Mixed Jarrah - Marri woodland.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	5/06/2007
Hibbertia glomerata subsp. ginginensis	2	Erect-spreading shrub to ca 45 cm high. Yellow flowers.	Jarrah and Marri woodland with Xanthorrhoea preissii, Daviesia, Stylidium carlquistii, Banksia sessilis, Thomasia sp. Gingin (F. & J. Hort 1511).	dense population in an area 150 m NS x 100+m EW. Counted 200 plants in 100 sq m. Calculated 150 quads at 20/quad. Number of plants probably >3000.		Boonanarring Nature Reserve, Wannamal West Road, Red Gully, Gingin, ca 7.5 km E of Brand Highway then the NS access track for 100 to 250 m S	1	11/10/2012
Hibbertia glomerata subsp. ginginensis	2	Erect branching small shrub to ca 50 cm with yellow flowers. Early flowering stage.	Characteristic species: Jarrah and marri open woodland with Dryandra sessilis, Stylidium carlquistii, Synaphea grandis.	plentiful.		Boonanarring Nature Reserve, Gingin. Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 3 km,	1	14/09/2001
Hibbertia glomerata subsp. ginginensis	2		Scattered Jarrah, Marri and Banksia grandis. Dryandra sessilis, Melaleuca urceolaris, Hakea trifurcata, Tetratheca sp.	8000+ plants over 800 m N-S x ca 200 m E-W.		Boonanarring Nature Reserve. Red Gully, take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 3 km to the top of the slope	1	25/09/2006
Hibbertia glomerata subsp. ginginensis	2	Short erect shrub to 50 cm high. Flowers yellow.	Heathland. Associated species: Calytrix sp.(yellow), Gompholobium sp., Bossiaea sp., Acacia sp., Xanthorrhoea preissii, Dryandra sessilis, Acacia clydonophora, Corymbia calophylla.	100's.		Boonanarring Nature Reserve, ca 7 km S of Wannamal West Road on track ca 7.3 km E of the Brand Highway	1	9/12/2002
Hypolaena robusta	4	Sedge 0.5 m high.	Open Banksia woodland with Adenanthos shrubland. With B. attenuata, Adenanthos cygnorum, Hibbertia hypericoides, Beaufortia sp., Patersonia sp., Nuytsia floribunda, Thysanotus sp., Eremaea pauciflora, Calothamnus quadrifidus.	2		Private property ca 5 km N of Wannamal Road	1	20/11/2011
Hypolaena robusta	4	Sedge 0.5 m.	Open Banksia woodland. With B. attenuata, B. menziesii, Adenanthos cygnorum, Melaleuca urceolaris, Nuytsia floribunda, Xanthorrhoea preissii.	5		Private property ca 5 km N of Wannamal Road	1	20/11/2011
Hypolaena robusta	4	Sedge to 50 cm, brown flowers.	Banksia woodland with scattered Eucalyptus todtiana.			Site 3, Boonanarring Nature Reserve, N of Gingin	3	18/09/1986
Hypolaena robusta	4		Woodland over heath/sedgeland with Allocasuarina humilis, Banksia sp., Calytrix sp., Eremaea sp., Eucalyptus todtiana, Hibbertia sp., Restionaceae spp.	hundreds.		Boonanarring NR, c. 4.8 km E of the Brand Highway on Wannamal West Road (Population F. Hort 1590)	1	9/10/2002
Hypolaena robusta	4		Low woodland with Banksia attenuata, B. menziesii, Eucalyptus todtiana. Synaphea spinulosa, Daviesia spp., Hibbertia vaginata, Conostephium pendulum.	110 mature plants.		Boonanarring Nature Reserve. Take Boonanarring Road from 4.2 km E of Brand Highway thent the tracks for 5.2 km N, 3.65 km E, 2.65 km S and 2.7 km E to 6A. 6B is further 2.3 km E to the track junction then 1.6 km N, Gingin,	1	24/09/2001
Hypolaena robusta	4		Heathland with Eucalyptus todtiana and Nuytsia floribunda. Associated species: Jacksonia sp., Synaphea spinulosa, Stylidium brunonium, S. cygnorum, Pimelea sp., Calothamnus sanguineus, Leucopogon sprengeloides.	150 plants.	Condition of population: healthy/moderate.	Boonanarring Nature Reserve, Gingin: take Boonanarring Road for 4.2 km E of Brand Highway then the tracks N for 5.2 km and E for 0.8 km	1	8/10/2001
Hypolaena robusta	4	Female.	(Muir's): Heath land with Banksia menziesii, B. attenuata and Eucalyptus todtiana. Associated species: Hibbertia vaginata, Synaphea spinulosa, Stirlingia latifolia, Calothamnus sanguineus, Calytrix sp., Leucopogon sprengelioides.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the tracks for 0.3 km S, 1.55 km E, 1.8 km N, 2.1 km E and 1.1 km N. The plants grow in the heath land on the W side of the road for up to 200 m N then 300 m W through	1	28/08/2001
Hypolaena robusta	4	Male.	(Muir's): Heath land with Banksia menziesii, B. attenuata and Eucalyptus todtiana. Associated species: Hibbertia vaginata, Synaphea spinulosa, Stirlingia latifolia, Calothamnus sanguineus, Calytrix sp., Leucopogon sprengelioides.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the tracks for 0.3 km S, 1.55 km E, 1.8 km N, 2.1 km E and 1.1 km N. The plants grow in the heath land on the W side of the road for up to 200 m N then 300 m W through	1	28/08/2001
Hypolaena robusta	4	Female.	(Muir's): Heath land with scattered Banksia attenuata and Eucalyptus todtiana. Associated species: Hibbertia hypericoides, H. subvaginata, Stirlingia latifolia, Conostephium pendulum, C. minus, Leucopogon sprengelioides.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 0.3 km S, 1.55 km E, 1.8 km N, 2.1 km E, 1.1 km N and 0.9 km W. Population A fringes the large heathland which is mostly S of the track,	1	30/08/2001
Hypolaena robusta	4	Male.	(Muir's): Heath land with scattered Banksia attenuata and Eucalyptus todtiana. Associated species: Hibbertia hypericoides, H. subvaginata, Stirlingia latifolia, Conostephium pendulum, C. minus, Leucopogon sprengelioides.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 0.3 km S, 1.55 km E, 1.8 km N, 2.1 km E, 1.1 km N and 0.9 km W. Population A fringes the large heathland which is mostly S of the track,	1	30/08/2001
Hypolaena robusta	4		Eucalyptus todtiana and Banksia attenuata on SW fringe of heathland with Allocasuarina humilis, Adenanthos cygnorum, Lambertia multiflorus, Hibbertia enervis, Stirlingia latifolia.	c. 20 mature plants in an area 20 m NS by 20 m EW.	Condition of population: moderate - healthy.	Boonanarring Nature Reserve, c. 4.75 km S of Wannamal West Road on E boundary track, then 0.7 km along track to the W, then walk c. 100 m NNE. Gingin Shire (Map/Site Ref: Mindarra 2035-1),	1	31/10/2001

Hypolaena robusta	4	(Male and Female).	(Muir's): Low woodland with Banksia menziesii, B. attenuata, Eucalyptus todtiana and Nuytsia floribunda fringing heath land.	120 mature plants.	Condition of population: healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road fro 4.2 km E of Brand Highway then the tracks for 0.3 km S, 1.55 km E, 1.8 km N, 2.1 km E and 0.7 km N. The population grows W of the track fringing the eastern, northern and N-W edges of the heath land	1	28/08/2001
Hypolaena robusta	4		Low open woodland of Banksia menziesii, B. attenuata and Eucalyptus todtiana with Stirlingia latifolia, Calothamnus sanguines, Allocasuarina humilis, Baeckea grandiflora, Hibbertia enervia, Xanthorrhoea preissii.	c. 16225 mature plants in an area 900-1100 m EW x 172-490 m NS.	Condition of population: moderate - healthy.	Boonanarring Nature Reserve. The populations NW corner is on Wannamal West Road, 4.8 km E of Brand Highway or 1.3 km E of the reserve's NW corner. Gingin Shire (Map/Site Ref: Mindarra 2035-1),	1	31/10/2001
Hypolaena robusta	4		Mixed Banksia attenuata - B. menziesii woodland, with Xanthorrhoea preissii, Melaleuca trichophylla, Hibbertia hypericoides, Daviesia triflora, Eucalyptus todtiana.	uncommon.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	28/08/2007
Hypolaena robusta	4		Mixed Banksia attenuata - B. menziesii woodland, with Xanthorrhoea preissii, Melaleuca trichophylla, Hibbertia hypericoides, Eremaea pauciflora, Eucalyptus todtiana.	uncommon.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	6/06/2007
Hypolaena robusta	4	Male.	(Muir's) Heath land merging with Eucalyptus todtiana and Banksia low woodland. Associated species: Stirlingia latifolia, Synaphea spinulosa, Allocasuarina humilis, Hibbertia spp., Bossiaea eriocarpa.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: take Boonanarring Road for 4.2 km E of Brand Highway then the track S for 0.3 km. Follow the southern boundary ENE for a total of 5.5 km. Then the track N for 2.3 km,	1	10/09/2001
Hypolaena robusta	4	Female.	(Muir's) Heath land mergin with Eucalyptus todtiana and Banksia low woodland. Associated species: Stirlingia latifolia, Synaphea spinulosa, Allocasuarina humilis, Hibbertia spp., Bossiaea eriocarpa.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: take Boonanarring Road for 4.2 km E of Brand Highway then the track S for 0.3 km. Follow the southern boundary ENE for a total of 5.5 km. Then the track N for 2.3 km,	1	10/09/2001
Isopogon drummondii	3		Muir's. Scattered small Marri clumps, Banksia sp., Nuytsia floribunda in heath to ca 1.2 m. Associated species: Calothamnus sanguineus, Hibbertia hypericoides, Leucopogon sp., Stirlingia latifolia, Acacia pulchella.	ca. 266 mature plants.		Boonanarring Road 4.2 km E of Brand Highway then track N for 4.05 km then trek ca 0.8 km due E to the large heath land, Boonanarring Nature Reserve	1	23/07/2001
Isopogon drummondii	3		Muir's. Heath ca 0.3 m - 1.2 m high. Jacksonia sp., Dryandra mimica, Stirlingia latifolia, Conostephium minus, Hibbertia hypericoides, Xanthorrhoea preissii.	36 mature plants.		Boonanarring Road, 4.2 km E of Brand Highway then track N for 5.2 km, E for 3.65 km and S for 1.2 km, ca 150 m E of the track, Boonanarring Nature Reserve	1	26/07/2001
Isopogon drummondii	3		(Muir's): Heath with scattered Banksia and Eucalyptus todtiana. Associated species: Nuytsia floribunda, Jacksonia sp., Synaphea spinulosa, Leucopogon sprengelioides, Lambertia multiflorus, Stirlingia latifolia.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the internal tracks for 5.2 km N, 3.65 km E and 1.3 km S. The plants grow in the SE sector of the heath 850 m W at 260 degrees	1	10/08/2001
Isopogon drummondii	3		Low heath with Melaleuca ciliosa, M. urceolaris, Hakea conchifolia, H. incrassata, Lambertia multiflorus, Banksia chamaephyton, Dryandra mimica.	40 mature plants in an area 60 m NS x 60 m EW.	Condition of population: moderate - poor.	c. 1 km SSW (at 197 degrees) of Wannamal West Road, 12.7 km E of Brand Highway, Boonanarring Nature Reserve, Gingin, Swan Coastal District (Map/Site Ref: Mindarra 2035-1)	1	20/11/2001
Lasiopetalum venustum	3	Straggly shrub to 1.5 m. Pink flowers with dark mauve centre. Cross shaped leaf.	Jarrah/Marri forest with low heath C. Banksia grandis, Corymbia calophylla, Daviesia sp., Dryandra sessilis, Eucalyptus marginata, Hakea trifurcata, Hibbertia sp., Synaphea sp., Xanthorrhoea preissii.	at least 50.		7.1 km E of the Brand Highway on Wannamal Road then S 200 m along track into Boonanarring NR	1	1/12/2005
Lasiopetalum venustum	3	Erect, spindly, single stemmed, few branching plant with pink flowers. Height to 1.5 m. Mid flowering stage.	Characteristic species: Jarrah and marri open woodland with Dryandra sessilis, Gompholobium preissii, Synaphea grandis, Hibbertia sp., Xanthorrhoea preissii.	plentiful.		Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the tracks 5.2 km N and 0.6 km W. The plants grow mainly on the N side of the track,	1	24/09/2001
Lasiopetalum venustum	3	Erect, single stemmed, few branching, open plant with pink flowers. Height to 60 cm. Early/mid flowering.	Characteristic species: Jarrah and marri open woodland with Dryandra echinata, Synaphea grandis, Acacia clydonophora, Hakea lissocarpha, H. ruscifolia.	ca 50 plants.		Boonanarring Nature Reserve, Gingin: take Wannamal West Road for 5.8 km E of Brand Highway then the track SSE for 1.7 km to the population W of the track,	1	5/11/2001
Lasiopetalum venustum	3	Erect, single stemmed, few branching plant with pink flowers. 0.3 m - 1.5 m high. Early flowering stage.	Characteristic species: Low jarrah and marri woodland with Hakea stenocarpa, H. lissocarpha, Leptospermum erubescens, Daviesia sp.	ca 50 plants.		Boonanarring Nature Reserve, Gingin: take Wannamal West Road for 1.9 km E of Boonanarring Nature Reserve's NW corner then the track S for 1.8 km,	1	23/10/2001
Lasiopetalum venustum	3	Erect, single stemmed, few branching plant with pink flowers. Height to 90 cm.	Characteristic species: clumps of stunted marri with Darwinia neildiana, Tetratheca hirsuta, Dryandra echinata, Hakea trifurcata, H. lissocarpha, H. incrassata.	scattered patches ca 100 plants in total.		Boonanarring Nature Reserve, Gingin: ca 4 km S along the western boundary from Wannamal West Road. The plants grow on the high plateau,	1	14/10/2001
Lasiopetalum venustum	3		Mixed Jarrah - Marri woodland with Xanthorrhoea preissii and Hibbertia hypericoides.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Lasiopetalum venustum	3		Mixed low heath, with Xanthorrhoea drummondii, Hibbertia hypericoides, Melaleuca urceolaris and Calothamnus sanguineus.	uncommon.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	27/08/2007
Lasiopetalum venustum	3	Dwarf shrub, 90 - 100 cm high x 90 - 100 cm wide, pink calyx with dark red base, black -	Woodland, with Eucalyptus gomphocephala, Xanthorrhoea, Hibbertia, Leschenaultia sp.			200 m s on track from Wannamal W Road, track is 10.3 km N of Clewleys Road, Boonanarring Reserve	1	30/09/2002
Lasiopetalum venustum	3	Erect shrub, c. 1 m tall. Few main stems. Flowers pink.	Open Eucalyptus marginata mallee woodland over shrubland including Banksia sessilis, Sphaerolobium drummondii, Philotheca, Acacia, Lechenaultia biloba, Hibbertia hypericoides, Synaphea grandis, Elythranthera emarginata, Astroloma, Tetratheca sp. Boonanar	occasional.		Boonanarring Nature Reserve	1	27/09/2007
Lasiopetalum venustum	3		The upper stratum was Low Woodland A to Open Low Woodland A to 15 m tall, dominated by Corymbia calophylla and Eucalyptus marginata: over Low Woodland B to 5 m tall dominated by Banksia attenuata: over Low Scrub A and B and Dwarf Scrub C dominated by Hak			Site Gs 5D, 2 km N of Boonanarring Hill, Boonanarring Nature Reserve	3	13/09/1993
Lasiopetalum venustum	3	Erect, single stemmed, branching, open plant with pink flowers. To 85 cm high. Early-mid flowering stage.	Wandoo, jarrah and marri open woodland with Zamia, Lechenaultia biloba, Xanthorrhoea preissii, Acacia clydonophora, Hakea lissocarpha. Burnt 1998/9.	200+ flowering plants.		Boonanarring Nature Reserve, Gingin: take Boonanarring Road for 4.2 km E of Brand Highway then the track N-NNE for 1.4 km. The plants are among the lateritic boulders ca 30 m E of the track,	1	12/10/2001

Lasiopetalum venustum	3	Erect, few-branching shrub to 1.5 m high; pink flowers.	Jarrah, marri and Banksia grandis with Dryandra sessilis, Hakea trifurcata, H. lissocarpha and Synaphea grandis.	plentiful.	Collection made to record flowering period. This population started flowering in mid September.	c. 7.2 km E of Brand Highway on Wannamal West Road, then S on track for 100 m, Boonanarring Nature Reserve, Shire of Gingin (Map/Site Ref: Mindarra 2035-1, 392491E 6551476N),	1	31/12/2001
Lasiopetalum venustum	3	Erect, few branching plant with pink flowers, to 1.2 m high.	Jarrah, marri and Banksia grandis.	locally common.		Boonanarring Nature Reserve, Wannamal West Road, Gingin, 7.2 km E from Brand Highway, then 200 m south	1	7/01/2006
Lasiopetalum venustum	3	Erect, single stemmed, few branching plant with pink flowers. 0.3 m - 1. 5 m high. Early flowering stage.	Characteristic species: low jarrah and marri woodland with Hakea stenocarpa, Dryandra echinata, Acacia clydonophora, Calothamnus sanguineus.	ca 100+ plants.		Boonanarring Nature Reserve, Gingin: from Wannamal West Road take the western boundary track S for 0.8 km then walk E over the ridge for 300 m,	1	23/10/2001
Lasiopetalum venustum	3	Erect, single stemmed, branching, open plant with pink flowers. Height to 45 cm. Early-mid flowering stage.	Characteristic species: a small clump of Eucalyptus lane-poolei with Xanthorroea preissii, Stylidium carlquistii, Stenanthemum emarginatum, Jacksonia sp., Darwinia neildiana, Leucopogon sp. Yanchep,	ca 18 plants.		Boonanarring Nature Reserve, Gingin: take Boonanarring Road for 4.2 km E of Brand Highway then the track N-NW-W for 5.7 km,	1	12/10/2001
Lasiopetalum venustum	3	Erect, single stemmed, few branching shrub with pink flowers. 25-150 cm high. Early/mid flowering.	Characteristic species: Jarrah, marri and Banksia grandis open woodland with Stylidium carlquistii, Synaphea grandis, Calytrix flavescens, Hibbertia hypericoides.	plentiful - over a wide area at this location, ca 300 plants.		Boonanarring Nature Reserve, Gingin: take Wannamal West Road for 5.8 km E of Brand Highway then the track SSE for 300 m. The plants grow among the laterite boulders just E of the track and also W of the gravel pit,	1	5/11/2001
Lasiopetalum venustum	3	Erect, open, single stemmed plant with pink flowers. Height to ca 60 cm. Early flowering stage.	Characteristic species: Heath with scattered Nuytsia floribunda and Dryandra echinata, Hakea trifurcata, H. incrassata, Allocasuarina humilis, Leucopogon sp. Yanchep, Guichenotia sarotes.	ca 20 plants.		Boonanarring Nature Reserve, Gingin: from Wannamal West Road take the western boundary track S for 2.85 km. The plants are a few metres E of the track,	1	17/10/2001
Lasiopetalum venustum	3	Erect shrub, 90-100 x 90-100 cm. Stipules absent. Pink calyx with base dark red.	In Eucalyptus gomphocephala woodland with Xanthorrhoea, Hibbertia, Leschenaultia spp.	ca 15 plants in area.		200 m S on track 10.3 km from Wannamal West Road in Boonanarring Reserve	1	30/09/2002
Lasiopetalum venustum	3	Shrub, 0.35 m high.	Jarrah-marri woodland. Associated species: Eucalyptus marginata, Corymbia calophylla, Banksia sessilis, Synaphea grandis, Xanthorrhoea preissii.	2. Locally common on laterite.		Private property 500 m N of Boonanarring Nature Reserve	1	19/11/2011
Lasiopetalum venustum	3	Shrub 1.3 m x 0.5 m.	Jarrah-marri woodland. Associated species: Eucalyptus marginata, Corymbia calophylla, Banksia sessilis, Synaphea grandis, Xanthorrhoea preissii.	20+. Locally common on laterite, abundant seedlings.		Private property 500 m N of Boonanarring Nature Reserve	1	17/11/2011
Lasiopetalum venustum	3	Erect, single stemmed, few branching plant with pink flowers. 0.3 m - 1.5 m high. Full flowering stage.	Characteristic species: Low jarrah and marri woodland with Hakea lissocarpha, Dryandra sessilis, Synaphea grandis, Acacia clydonophora, Hibbertia sp.	ca 600+ plants - a few dense patches at this locality.		Boonanarring Nature Reserve, Gingin: take Wannamal West Road for 3.7 km E of Boonanarring Nature Reserve's NW corner then the track S for 0.2 km - plants grow both sides of the track on the ridge just N of disused gravel pit,	1	24/10/2001
Lepidobolus densus	4	Upright herb, sedge-like, rhizomatous, 40 cm high.	Eucalyptus todtiana scattered low trees over Jacksonia sternbergiana scattered tall shrubs over Daviesia nudiflora subsp. nudiflora, Allocasuarina humilis open shrubland over Eremaea pauciflora, Calothamnus quadrifidus, Hibbertia hypericoides low shrubla			C. 300 m E of Brand Highway in road reserve, between Brand Highway and Bartlett's Well Nature Reserve, c. 20 km N of Brand Highway and Dewar Road intersection, c. 4 km W of Gingin	1	22/11/2012
Leucopogon allittii	3	Single stemmed, woody shrub 80 cm high. Greenish yellow buds.	Low heath.	occasional.		Boonanarring Brook (proposed Nature Reserve), off Wannamal W road, Gingin, Quadrat 1,	3	20/03/1986
Leucopogon allittii	3	Erect shrub.	Assoc. vegn.: open low jarrah/banksia woodland over heath with Leucopogon oliganthus, Petrophile seruriae, Hibbertia subvaginata & Petrophile shuttleworthiana.			Boonanarring Nature Reserve SW corner, in gully where track crosses Boonanarring Brook	0	25/08/1996
Loxocarya gigas	2	Large, tall sedge, 2 m high.	Low open marri woodland with Melaleuca and Banksia sessilis shrubland. Associated species: Corymbia calophylla, Melaleuca urceolaris, Banksia sessilis, Xanthorrhoea preissii.	1		Boonanarring Nature Reserve	1	26/11/2011
Loxocarya gigas	2		Mixed Jarrah - Marri woodland, with Dryandra sessilis.	patch of about 25 clumps.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	5/06/2007
Persoonia rudis	3	Low shrub 0.25 m high x 0.25 m wide.	Open Jarrah - Marri woodland. Eucalyptus marginata, C. calophylla, Synaphea grandis, Hibbertia hypericoides, Stirlingia latifolia, Macrozamia sp., Bossiaea eriocarpa, Xanthorrhoea preissii.	1 plant.		Boonanarring Nature Reserve (C41805)	1	24/11/2011
Persoonia rudis	3	Low shrub, 0.3 m high x 0.6 m wide. Spreading growth.	Adenanthos cygnorum shrubland with E. todtiana. Associated species: A. cygnorum, E. todtiana, Hibbertia hypericoides, Stirlingia latifolia.	1		Private property ca 5 km N of Wannamal Road	1	23/11/2011
Persoonia rudis	3	Low shrub, 0.45 m high x 0.8 m wide. Spreading growth.	Jarrah-marri woodland. Associated species: Eucalyptus marginata, Corymbia calophylla, Synaphea grandis, Hibbertia hypericoides, Acacia pulchella, Daviesia sp.	2		Boonanarring Nature Reserve (C41805) ca 800 m S of Wannamal West Road	1	24/11/2011
Persoonia rudis	3	Open shrub 50 cm high x 80 cm wide.	Jarrah woodland.	occasional.		Boonanarring Nature Reserve	1	26/10/2014
Persoonia rudis	3		Mixed Banksia attenuata - B. menziesii.	scattered plants.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	14/11/2007
Platysace ramosissima	3	Perennial herb, from rhizome.	Low open heath.		Abundance: uncommon in area.	Boonanarring Brook Reserve; 20 km NNE of Gingin	3	28/09/1988
Platysace ramosissima	3		Banksia attenuata / menziesii woodland with Leptospermum erubescens, Hibbertia hypericoides, Eremaea pauciflora, Corymbia calophylla.	scattered.	Moderate population condition.	Bartletts Well Nature Reserve	1	15/11/2007
Platysace ramosissima	3	Herb to 8 inches. Flowers white.	In scrub.			7 miles N of Gingin	3	24/11/1969
Styphelia filifolia	3	Erect, branching, single stemmed plant to 75 cm high. Seeding.	Banksia ilicifolia, B. attenuata, Eremaea purpurea, Kunzea glabrescens.	2 plants.		Boonanarring Road for 4.2 km E of Brand Highway then the internal track for 0.3 km Ss, 1.55 km E, 1.8 km N, 2.1 km E, 1.1 km N and 1.8 km E, Boonanarring Brook, Boonanarring Nature Reserve, Gingin, GDA 94,	1	2/09/2001

Styphelia filifolia	3	Erect, branching shrub with white flowers. To 0.45 m high. Mid flowering stage.	Banksia woodland.	solitary.		Boonanarring Nature Reserve (41805), Gingin, take the eastern boundary for 1.7 km S of Wannamal West Road	1	22/04/2002
Styphelia filifolia	3	Erect, single stemmed, branching shrub with white flowers. 0.4 m high. Early- mid	Banksia and Eucalyptus todtiana woodland with Banksia ilicifolia, Allocasurina humilis, Hakea costata, Melaleuca urceolaris.	2 plants.		Boonanarring Nature Reserve (41805), Gingin, take the eastern boundary for 5.0 km S of Wannamal West Road then 4.1 km west	1	22/04/2002
Styphelia filifolia	3	Erect, single stemmed, branching shrub with white flowers. 0.75 m high x 0.75 m wide. Early-mid flowering stage.	Banksia and Jarrah open woodland with Hibbertia hypericoides, Stirlingia latifolia, Conostephium pendulum, Melaleuca urceolaris.	solitary.		Boonanarring Nature Reserve (41805), Gingin, take Wannamal West Road for ca 7.5 km E of the NW corner of the reserve then the track south for ca 8.5 km	1	22/04/2002
Styphelia filifolia	3	Erect, branching shrub with white flowers. 0.75 m high. Mid flowering stage.	Jarrah and marri open woodland with Stirlingia latifolia, Daviesia spp., Acacia pulchella, Hibbertia hypericoides.	solitary.		Boonanarring Nature Reserve (41805), Gingin, take Wannamal West Road for 3.8 km E of the NW corner of the reserve then the track south for 3.6 km	1	22/04/2002
Styphelia filifolia	3	Erect, branching shrub with white flowers. 0.45 m high. Mid flowering stage.	Jarrah and marri open woodland with Adenanthos cygnorum, Synaphea grandis, Xanthorrhoea preissii, Conostephium pendulum.	2 plants.		Boonanarring Nature Reserve (41805), Gingin, take Wannamal West Road for 3.8 km E of the NW corner of the reserve then the track S for 1.75 km	1	22/04/2002
Styphelia filifolia	3	Erect, branching shrub with white flowers. To ca 0.6 m high. Mid flowering stage.	Jarrah and marri open woodland with Zamia, Daviesia sp., Conostephium pendulum, Hibbertia hypericoides.	ca 100+ plants over area of 700 m S x 300 m E.	Plants are particularly plentiful 0.7 km S of Wannamal West Road and then take the minor track SE-E for 300 m - counted 70 plants in an area ca 50 m x 60 m.	Boonanarring Nature Reserve (41805), Gingin: Take Wannamal West Road for 3.8 km E of the NW corner of the reserve then the track south. The plants are scattered on the E side of the track from Wannamal West Road and up to 700 m S	1	22/04/2002
Synaphea grandis	4	Tufted shrub, 0.2 m x 0.4 m.	Jarrah-marri woodland. With Eucalyptus marginata, Corymbia calophylla, Banksia sessilis, B. grandis, Hibbertia hypericoides, Xanthorrhoea preissii.	locally common on laterite.		Private property N of Boonanarring Nature Reserve	1	19/11/2011
Synaphea grandis	4	Tufted shrub, 0.35 - 0.5.	Jarrah-marri woodland. With Eucalyptus marginata, Corymbia calophylla, Petrophile serruriae, Banksia sessilis, B. lindleyana, Bossiaea eriocarpa, Xanthorrhoea preissii.	100+. Locally common on laterite.		Boonanarring Nature Reserve	1	24/11/2011
Synaphea grandis	4	Open shrub 60 cm high x 90 cm wide.	Jarrah forest. With Banksia sessilis.	frequent.		Boonanarring Nature Reserve	1	22/09/2012
Synaphea grandis	4	Mounding shrubs to 1 m. diam. Flowers	Jarrah - marri woodland.	frequent.		Boonanarring Nature Reserve	1	25/09/2010
Synaphea grandis	4	Low shrubs to 20 cm. Not in flower.	Low heath, emergent Allocasuarina and Banksia.	common.		Boonanarring Brook (proposed Nature Reserve), off Wannamal West Road, Quadrat 1, Gingin,	3	20/03/1986
Synaphea grandis	4		The upper stratum was Low Woodland A to Open Low Woodland A to 15 m tall, dominated by Corymbia calophylla and Eucalyptus marginata: over Low Woodland B to 5 m tall dominated by Banksia attenuata: over Low Scrub A and B and Dwarf Scrub C dominated by Hak			Site Gs 5D, 2 km N of Boonanarring Hill, Boonanarring Nature Reserve	3	13/09/1993
Synaphea grandis	4	Erect plant with multi-planar lobed leaves and yellow flowers. To 50 cm high x to 75 cm wide. Early/mid flowering stage.	Jarrah and Banksia scattered in heathland with Grevillea saccata, Allocasuarina humilis, Hibbertia hypericoides and Synaphea spinulosa.	a few plants.	Regenerating after wildfire - 3-4 years ago.	Boonarring Nature Reserve, Gingin. On NS track through reserve to Wannamal West Road,	1	5/09/2000
Synaphea grandis	4		(Muir's): Heath with scattered clumps of stunted jarrah and marri. Associated species: Hakea trifurcata, H. incrassata, H. gilbertii, H. stenocarpa, H. lissocarpha, Darwinia neildiana, Calothamnus sanguineus, Stylidium carlquistii, Dryandra echinata.		Condition of population:Healthy/moderate/poor.	Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km and W ofr 3.55 km to the W boundary then N for 1 km. (It is possibly easier to access this from Wannamal West Road and take the western	1	14/10/2001
Synaphea grandis	4		(Muir's): Jarrah and marri open woodland merging with sandy heath and low woodland. Associated species: Dryandra sessilis, Grevillea synaphea, Stylidium carlquistii, Hibbertia glomerata, Lechenaultia biloba.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km then W for 0.6 km. Most of the plants grow on the N side of the track following the boulder strewn laterite adjacent to the yellow sand soils in	1	14/09/2001
Synaphea grandis	4		(Muir's): Jarrah and marri open woodland merging with low wooded heath land. Associated species: Synaphea spinulosa, Allocas humilis, Stylidium carlquistii, Hakea incrassata, H. trifurcatta, H. stenocarpa, Grevillea saccata, Grevillea monticola.		Condition of population:Healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 2.7 km to the southern end of the population. The population continues N for 0.9 km. This parallels the N/S track ca 100-150 m to the W where the later	1	14/09/2001
Synaphea grandis	4		(Muir's): Jarrah and marri open woodland. Associated species: Dryandra sessilis, Zamia, Stylidium carquistii, Acacia sp., Hakea stenocarpa, H. lissocarpha.		Condition of population:Healthy.	Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.1 km E of Brand Highway then the boundary track N-NW-W for 4.8 km to Pop.4A. Pop.4B is 0.9 km W of the start of Pop.4A,	1	12/10/2001
Synaphea grandis	4		(Muir's): Jarrah and marri open woodland. Associated species: Stylidium carlquistii, Conospermum glumaceum, Dryandra sessilis, Xanthorrhoea preissii, Leucopogon sp. Yanchep, Tetratheca hirsuta.		Condition of population:Healthy.	Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km and W for 2.1 km. Grows both sides of the track,	1	14/10/2001
Synaphea grandis	4		(Muir's): Jarrah and marri open woodland merging with low wooded heath land. Associated species: Hibbertia hypericoides, Conospermum glumaceum, Dryandra sessilis, Xanthorrhoea preissii.		Condition of population: healthy/moderate.	Boonanarring Nature Reserve: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 4.2 km. The population is on both sides of the track where the lateritic soil merges with the yellow sand,	1	14/09/2001
Synaphea grandis	4		Jarrah and marri open woodland with Hakea lissocarpha, H. stenocarpa, Xanthorrhoea preissii, Thomasia sp. Boonanarring, Stylidium carlquistii.	c. 100 plants in an area 200 m EW x 250 m NS.	Condition of population: healthy/moderate.	Boonanarring Reserve, 0.8 km S from Wannamal West Road along the W boundary then walk c. 300 m E, Gingin Shire (Map/Site Ref: Mindarra, 389279E 6549476N),	1	23/10/2001
Synaphea grandis	4		Jarrah and marri open woodland with Banksia grandis, Hakea lissocarpha, Stylidium carlquistii, Thomasia sp. Boonanarring, Hibbertia enervia, Dryandra echinata, Acacia clydonophora.	c. 950 plants is an area 200 m S x 250 m EW.	Condition of population: healthy/moderate.	Boonanarring Reserve, c. 3.8 km E of the NW corner of the reserve along Wannamal West Road and then S along track for 0.1 km. Gingin Shire (Map/Site Ref: Mindarra 2035-1, 392571E 6550344N),	1	24/10/2001
Synaphea grandis	4		Jarrah and marri open woodland with Hakea lissocarpha, Hemigenia humilis, H. glomerata, Stylidium carlquistii, Dryandra echinata, D. sessilis, Acacia clydonophora.	c. 2300+ mature plants.	Condition of population: healthy/moderate.	Boonanarring Reserve, c. 3.8 km E of the NW corner of the reserve along Wannamal West Road and then S along track for 1.2 - 2.1 km. Gingin Shire (Map/Site Ref: Mindarra 2035-1, 392585E 6548704N),	1	24/10/2001

Synaphea grandis	4		Jarrah and marri open woodland with Calothamnus sanguineus, Stylidium carlquistii, Melaleuca urceolaris, Dryandra echinata, D. sessilis.	c. 60 mature plants.	Condition of population: healthy/moderate.	Boonanarring Reserve, c. 3.8 km E of the NW corner of the reserve along Wannamal West Road and then S along track for 4.1 - 4.25 km. Gingin Shire (Map/Site Ref: Mindarra 2035-1, 392554E 6546460N),	1	24/10/2001
Synaphea grandis	4		Heath with scattered Nuytsia floribunda and Hakea trifurcata, H. incrassata, Allocasuarina humilis, Leucopogon sp. Yanchep, Mealeuca urceolaris, Guichenotia sarotes, Thomasia sp. Boonanarring, Calothamnus sanguineus.	c. 100 plants in an area 100 m NS x 100 m EW.	Condition of population: healthy/moderate; thrives on disturbed soil.	Boonanarring Reserve, 2.85 km S from Wannamal West Road along the W boundary, Gingin Shire (Map/Site Ref: Mindarra 2035-1, 889 476),	1	17/10/2001
Synaphea grandis	4		Jarrah and marri open woodland with Hakea lissocarpha, H. stenocarpa, Hibbertia vaginata, Stylidium carlquistii, Dryandra echinata, Xanthorrhoea preissii.	c. 554 mature plants.	Condition of population: healthy/moderate.	Boonanarring Reserve, c. 1.9 km E of the NW corner of the reserve along Wannamal West Road and then S along track for 2.1 km. Gingin Shire (Map/Site Ref: Mindarra 2035-1, 391044E 6548593N),	1	23/10/2001
Synaphea grandis	4		Jarrah and marri open woodland with Hakea lissocarpha, H. stenocarpa, Hibbertia vaginata, Stylidium carlquistii, Dryandra echinata, Xanthorrhoea preissii.	c. 260 plants.	Condition of population: healthy/moderate.	Boonanarring Reserve, c. 1.9 km E of the NW corner of the reserve along Wannamal West Road and then S along track for 3.9 - 4.2 km. Gingin Shire (Map/Site Ref: Mindarra 2035-1, 391289E 6546259N),	1	23/10/2001
Synaphea grandis	4		Jarrah and marri open woodland with Hakea lissocarpha, H. stenocarpa, Hibbertia vaginata, Hemigenia humilis, Stylidium carlquistii, Xanthorrhoea preissii.	c. 275 plants in an area 150 m NS x 100 m EW.	Condition of population: healthy/moderate.	Boonanarring Reserve, c. 1.9 km E of the NW corner of the reserve along Wannamal West Road and then S along track for 0.4 km. Gingin Shire (Map/Site Ref: Mindarra 2035-1, 390848E 6550121N),	1	23/10/2001
Synaphea grandis	4		Mixed low heath, with Xanthorrhoea preissii, Corymbia calophylla, Allocasuarina humilis, Calothanmus sanguineus.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	27/08/2007
Synaphea grandis	4		Mixed Jarrah - Marri woodland, with Xanthorrhoea preissii, Hibbertia hypericoides.	common.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	8/08/2007
Synaphea grandis	4	Young peduncles red, greening with age. Sheaths pink. No scent detectable, Cup-like stigma. Many flowers in bud, open flowers at base of spike are very widely spaced. 30-	Open Corymbia calophylla forest with Dryandra sessilis, Xanthorrhoea, Hibbertia, Daviesia, Hakea, Gompholobium.	occasional - ca 30 plants seen near roadside.		Boonanaring Nature Reserve, 8.95 km E along Wannamal West Road from Brand Highway	1	31/08/1997
Synaphea grandis	4	Tufted low shrub to 30 cm x 75 cm. Inflorescence longer than leaves. Flowers bright yellow, in full flower.	Jarrah (E. marginata) low woodland.	common in area.		Wannamal West Road, Boonanarring Reserve, 20 km N Gingin	3	20/10/1990
Tetraria sp. Chandala (G.J. Keighery 17055)	2	Rhizomatous perennial herb, to 1.5 m x 40 cm wide. Flowers brown, past flowering.	Banksia littoralis woodland.		Abundance: Common but very localized, along edges of swamp.	Boonanarring Brook; 20 km NNE of Gingin	0	29/09/1988
Tetratheca hirsuta subsp. boonanarring	2	Erect-sprawling, multi-stemmed plant with glabrous stems and leaves, dark pink flowers. To 1.05 m high x ca 60 cm wide.	Jarrah and marri open woodland with Stirlingia latifolia, Astroloma xerophyllum, Hibbertia hypericoides, H. vaginata, Leucopogon sp. Murdoch.	a few scattered plants.		Boonanarring Nature Reserve, take Boonanarring Road for 4.2 km E of Brand Highway then the tracks for 5.2 km N, 3.65 km E, 2.65 km S and 0.7 km E, Gingin	1	2/10/2001
Tetratheca hirsuta subsp. boonanarring	2	Erect, sprawling, multi-stemmed plant to ca 45 cm high. With pink flowers.	Characteristic species: Jarrah and marri open woodland with Dryandra sessilis, Stylidium carlquistii, Acacia clydonophora.	plentiful.		Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km and W for 2.1 km. Grows both sides of the track	1	14/10/2001
Tetratheca hirsuta subsp. boonanarring	2	Sprawling shrub to 0.5 m.	Jarrah/marri woodland. Associated species: Acacia spp., Corymbia calophylla, Daviesia sp., Eucalyptus marginata, Hakea sp., Hibbertia sp., Macrozamia reidlei, Xanthorrhoea preissii.	>50 plants.		Bartletts Well Nature Reserve, E boundary	1	7/01/2016
Tetratheca hirsuta subsp. boonanarring	2	Sprawling many stemmed shrub to ca 45 cm high. Pink flowers.	Jarrah clump with Hakea trifurcata, Melaleuca urceolaris, Gastrolobium spinosum, Acacia sp., Grevillea saccata.	a few plants.	Prefer shaded areas.	Boonanarrin Nature Reserve, C 41805, Red Gully; take Boonanarring Road east for ca 4.25 km then the track N for 2.95 km	1	25/09/2006
Tetratheca hirsuta subsp. boonanarring	2	Herb to sub-shrub. 0.2 m high.	Jarrah-marri woodland. Associated species: Eucalyptus marginata, Corymbia calophylla, Banksia sessilis, B. grandis, Hibbertia hypericoides, Xanthorrhoea preissii.	1		Private property N of Boonanarring Nature Reserve	1	19/11/2011
Tetratheca hirsuta subsp. boonanarring	2		The upper stratum was Low Woodland A to Open Low Woodland A to 15 m tall, dominated by Corymbia calophylla and Eucalyptus marginata: over Low Woodland B to 5 m tall dominated by Banksia attenuata: over Low Scrub A and B and Dwarf Scrub C dominated by Hak			Site Gs 5D, 2 km N of Boonanarring Hill, Boonanarring Nature Reserve	3	13/09/1993
Tetratheca hirsuta subsp. boonanarring	2	Multi-stemmed herb 20 cm high; flowers purple.	Open woodland.	occasional.		Boonanarring Brook (proposed Nature Reserve) off Wannamal W road, Gingin, Quadrat 7	0	13/08/1986
Tetratheca hirsuta subsp. boonanarring	2	Open shrub to 45 cm. Deep pink petals.	Banksia/Eucalyptus todtiana woodland.	uncommon.		Boonanarring Brook, Vacant Crown Land, (proposed Nature Reserve), off Wannamal West Road, Gingin	3	14/11/1986
Tetratheca hirsuta subsp. boonanarring	2	Multi-stemmed erect, sprawling plant to 30 cm, with pink flowers.	Characteristic species: Jarrah and marri open woodland with Hakea trifurcata, H. lissocarpha, Melaleuca urceolaris, Hibbertia glomerata, Stylidium carlquistii.	plentiful.		Boonanarring Nature Reserve, Gingin: take Boonanarring Road for 4.2 km E of Brand Highway then the tracks for 5.2 km N and 0.8 km E	1	8/10/2001
Tetratheca hirsuta subsp. boonanarring	2	Erect open shrub 20 cm x 40 cm, flowers pink.	Open forest.	frequent.		15.7 km W of Wannamal	1	14/09/1995
Tetratheca hirsuta subsp. boonanarring	2	Multi-stemmed, erect, sprawling plant to 50 cm high, with pink flowers.	Jarrah and marri well shaded woodland with Xanthorrhoea preissii, Boronia spp., Hibbertia hypericoides, Lobelia sp.	scattered clumps.		Bartlets Well Nature Reserve, Brand Highway, Gingin: from Brand Highway go 1.8 km E and 0.2 km N	1	10/10/2001
Tetratheca hirsuta subsp. boonanarring	2	Erect, sprawling many stemmed plant to ca 30 cm. Pink flowers.	Jarrah, Marri and Banksia attenuata with Hakea ruscifolia, H. lissocarpha, Hibbertia hypericoides, Zamia, Xanthorrhoea preissii.	10+ plants.		Boonanarring Nature Reserve, Red Gully, take Wannamal West Road for ca 3.75 km W of the NW corner of the nature reserve then the track S for 2.25 km	1	23/09/2006
Tetratheca hirsuta subsp. boonanarring	2	Herb to sub-shrub, 0.25 m x 0.4 m.	Jarrah-marri woodland. Associated species: Eucalyptus marginata, Corymbia calophylla, Banksia sessilis, B. grandis, Hibbertia hypericoides, Xanthorrhoea preissii.	2		Private property ca 500 m N of Boonanarring Nature Reserve	1	19/11/2011
Tetratheca hirsuta subsp. boonanarring	2		Mixed Jarrah - Marri woodland with Xanthorrhoea preissii, Petrophile recurva, Hibbertia hypericoides.	scattered.		Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	7/08/2007
Tetratheca hirsuta subsp. boonanarring	2		Mixed Jarrah - Marri woodland.	uncommon.		Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	30/08/2007

Tetratheca hirsuta subsp. boonanarring	2		Mixed Jarrah - Marri woodland with Xanthorrhoea preissii, Hakea lissocarpha, Hibbertia hypericoides, Acacia clydonophora.	very common.		Bartletts Well Nature Reserve	1	30/08/2007
Tetratheca hirsuta subsp. boonanarring	2	Multistemmed at base; slender stemmed subshrub; erect to lax, 25 x 85 cm. Stems with minute tubercules, otherwise glabrous. Phyllotaxis - 3-whorled or alternate. Young leaves with marginal setae and a few simple hairs, especially at apex; mature leaves m	Shrubland around dwarf Eucalyptus marginata stands, with Allocasuarina humilis, Melaleuca urceolare, Hakea trifurcata, Xanthorrhoea preissii, Synaphea spinulosa, Synaphea grandis, Sphaerolobium medium, Hypocalymma, Calthamnus, Verticordia & Hibbertia.	frequent.		Boonanarring Nature Reserve	1	27/09/2007
Tetratheca hirsuta subsp. boonanarring	2	Multi-stemmed plant to 60 cm high with pink flowers.	Characteristic species: small jarrah clump with Dryandra lindleyana, Hibbertia hypericoides, Stylidium diuroides, Grevillea saccata, Synaphea spinulosa.	a few plants.		Boonanarring Nature Reserve, Gingin: take Boonanarring Road for 4.2 km E of Brand Highway then the track N for c. 2.6 km	1	8/10/2001
Tetratheca hirsuta subsp. boonanarring	2	Erect, sprawling, multi-stemmed plant to ca 45 cm high. With pink flowers.	Characteristic species: Jarrah and marri open woodland with Dryandra sessilis, Stylidium carlquistii, Acacia clydonophora.	plentiful.		Boonanarring Nature Reserve, Gingin: Take Boonanarring Road for 4.2 km E of Brand Highway then the track N for 5.2 km and W for 2.1 km	1	14/10/2001
Tetratheca hirsuta subsp. boonanarring	2	Sprawling many stemmed shrub to ca 30 cm. Pink flowers.	Scattered Jarrah and Marri with Hakea trifurcata, Synaphea spinulosa, Lechenaultia biloba, Thelymitra macrophylla.	a few plants.		R 539, Boonanarring Road, Beermulla, 3 km E of Brand Highway	1	25/09/2006
Tetratheca hirsuta subsp. boonanarring	2	Many stemmed shrub to 20 cm high x 90 cm wide. Pink flowers.	Eucalyptus todtiana with Calytrix sylvestre, Conospermum stoechadis, Stirlingia latifolia, Hakea trifurcata.	a few clumps.		Boonanarring Nature Reserve, C 41805, Red Gully, 5 km S along the western boundary from the NW corner of the nature reserve then the track E for 1.5 km	1	25/09/2006
Tetratheca hirsuta subsp. boonanarring	2	Multistemmed at base; slender stemmed subshrub; erect to lax, 25 x 85 cm. Stems with minute tubercules, otherwise glabrous. Phyllotaxis - 3-whorled or alternate. Young leaves with marginal setae and a few simple hairs, especially at apex; mature leaves m	Shrubland around dwarf Eucalyptus marginata stands, with Allocasuarina humilis, Melaleuca urceolare, Hakea trifurcata, Xanthorrhoea preissii, Synaphea spinulosa, Synaphea grandis, Sphaerolobium medium, Hypocalymma, Calthamnus, Verticordia & Hibbertia.	frequent.		Boonanarring Nature Reserve	1	27/09/2007
Tetratheca hirsuta subsp. boonanarring	2	Many-stemmed, sprawling perennial sub-shrub, 15 cm tall x 50 cm wide. Lax habit with very thin stems, usually found sprawling in more shaded areas through other shrubs. Overall plants appear more or less glabrous except for a few hairs	Open Jarrah-Marri woodland. Eucalyptus marginata and Corymbia calophylla over Hakea trifurcata, Xanthorrhoea preissii and Hibbertia hypericoides.	locally frequent.		Boonanarring Nature Reserve. Follow Boonanarring Road E and turn left (N) at T-junction 4.6 km from Brand Highway	1	6/10/2013
Tetratheca hirsuta subsp. boonanarring	2	Many-stemmed, sprawling perennial sub-shrub, 60 cm tall x 60 cm wide. Lax habit with very thin stems. Overall plants appear more or less glabrous except for a few hairs concentrated at the base of leaves and	Open woodland of Corymbia calophylla and Eucalyptus todtiana over Xanthorrhoea preissii and Hibbertia hypericoides. Some weed species present.	locally frequent.	This appears to be the only suitable habitat and population within Bartlets Well Nature Reserve.	Bartlets Well Nature Reserve: From Brand Highway take the track into the reserve for 1.8 km E and 0.2 km N	1	6/10/2013
Tetratheca hirsuta subsp. boonanarring	2	Sprawling slendre-stemmed shrub, 50 cm x 100 cm. Leaves narrow, glabrous. Pedicels pink-red. Calyx segments long, acute, pale pink. Petals pale to darker pink across population, with a magenta-dark purple	Under clumps of Eucalyptus marginata with Hakea trifurcata, Xanthorrhoea preissii, Sphaerolobium medium, Gastrolobium spinosum, Acacia drummondii, Hibbertia hypericoides, Stylidium carlquistii, S. junceum, Gompholobium.	locally frequent.		Boonanarring Nature Reserve	1	27/09/2007
Thelymitra stellata	T	Perennial herb, c. 35 cm high.	Open Low Woodland A over Heath A over Herbs. Eucalyptus marginata, Corymbia calophylla, Hakea trifurcata, Xanthorrhoea sp., Hibbertia hypericoides, Gastrolobium sp., Baeckea camphorosmae, Goodenia sp..	17 plants.	Healthy, mature plants. Area occupied is 5 m x 17 m. New population- population 3. Note, this population previously known as Thelymitra stellata population 25 however confirmed by Andrew Brown on 6/11/2009 to be Thelymitra dedmaniarum.	Boonanarring Nature Reserve, SW corner. E onto Boonanarring Road from Great Northern Highway, then E c. 4.3 km to track running N-S within the reserve then N along track for c. 1.15 km. Plants occur c. 60 m E of track	1	4/11/2009
Thysanotus glaucus	4	Erect tuberous perennial herb, 20 cm height x 8 cm wide. Flowers puple.	Banksia woodland, with Banksia attenuata.	occasional.		1.1 km W along Wannamal Road from junction of Clewleys Road	1	6/12/2015
Verticordia lindleyi subsp. lindleyi	4	Small shrub, 0.5 x 0.7.	Open jarrah woodland with Banksia midstorey. Associated species: Eucalyptus marginata, Corymbia calophylla, B. menziesii, Stirlingia latifolia, Corynotheca micrantha, Acacia pulchella, Adenanthos cygnorum, Verticordia paludosa.	5	Only found on disturbed areas.	Private property on firebreak, ca 5 km N of Wannamal West Road	1	18/11/2011
Verticordia lindleyi subsp. lindleyi	4	1 ft high, flowers pink.	With Anigozanthos pulcherrimus, Calytrix angulata, Verticordia acerosa var. preissii.			61 mile peg on Gingin Road [14 km N of Gingin on the Brand Highway	3	26/11/1975
Verticordia lindleyi subsp. lindleyi	4		Heath. Associated species: Nuytsia floribunda with Hakea varia, H. trifurcata, Verticordia densiflora, Dryandra lindleyana.		Condition of population: healthy/moderate. Plants on the S edge of the swamp.	Boonanarring Nature Reserve, Gingin: take Wannamal West Road for 3.4 km E of Brand Highway then head S for 2.1 km along the western boundary track	1	22/01/2002
Verticordia lindleyi subsp. lindleyi	4		Wet heath with Pericalymma ellipticum, Cyathochaeta avenacea and Hypocalymma angustifolium.	uncommon.	Healthy population condition.	Boonanarring Nature Reserve, S of Wannamal Road in NW corner of reserve	1	28/08/2007
Verticordia paludosa	4	Small shrub, 0.4 m high x 0.6 m wide.	Banksia and Melaleuca preissiana woodland with Adenanthos understorey. Associated species: Melaleuca preissiana, Banksia illicifolia, Adenanthos cygnorum, Kunzea glabrescens.	50+.	Ploughed white sand - firebreak. Only found on disturbed areas.	Private property on firebreak, ca 5 km N of Wannamal West Road	1	23/11/2011
Verticordia paludosa	4	Slender shrub 70 - 90 cm tall with pink	Eucalyptus todtiana heath.		Abundance: common.	Bartlett's Well, 25 km N of Gin Gin	3	25/01/1988
Verticordia paludosa	4	Open, woody shrub to 90 cm high. Flowers (old) pinkish.	Sand-heath.		Abundance: occasional.	Boonanarring Brook, (proposed Nature Reserve) off Wannanal W Road, Gingin on sand just W of Q6.	3	20/03/1986

Verticordia paludosa	4		LA.r. S.SA.SB.SC. c-d. Odd Paperbarks, very open almost treelss flat with Banksia ilicifolia/menziesii/odd grandis and Adenanthos cygnorum, Jacksonia furcellata, Blackboys, Beaufortia squarrosa, Verticordia sp., Stirlingia latifolia, Dryandra nivea, Hake		Abundance: 50, 000 + plants.	Boonanarring Nature Reserve No. 41805 and Shire Road Reserve, 6.1 km E along Wannamal West road from the N/W corner of Boonanarring Nature Reserve and S side of road	0	4/03/1994
Verticordia paludosa	4		Very open, narrow, almost treeless flat with Banksia ilicifolia, B. menziesii, B. grandis, Adenanthos cygnorum, Jacksonia furcellata, Xanthorrhoea sp., Beaufortia squarrosa, Verticordia sp., Stirlingia latifolia etc.	50,000+ plants. Late flower.		Boonanarring Nature Reserve No 41805 and Shire Road Reserve,	0	4/03/1994
Verticordia paludosa	4		(Muir's) Banksia low woodland with dense shrubs. Associated species: Adenanthos cygnorum, Beaufortia squarrosa, Hakea trifurcata, Banksia ilicifolia, Verticordia densiflora.	ca 50,000 plants over ca 500 m EW x 300 m NS.		Boonanarring Nature Reserve, Wannamal West Road, Gingin. ca 5.8-6.1 km E from the NW corner of reserve	1	21/03/2002

Taxon	Cons. Stat.	WA	Pop #	Sub Pop	Location	District	Vesting	CountDate	Mature #	Juv #	Live Total	Type	Area	Flower	Population
Acacia cummingiana	3		4		4 kilometres from Brand Highway on West Wannamal Road. 24 km west of Wannamal.	SWAN COASTAL	LGA	25/05/1979	0		0			Y	
Acacia cummingiana	3		7		Opportunistic collection from Boonanarring Nature Reserve, north of Gingin. Bounded by Wannamal West Road to the north and Brand Highway on the west.	SWAN COASTAL	CC	01/01/1994	0		0			N	
Acacia drummondii subsp. affinis	3		3		West side of Brand Highway, 24.7 kilometres north of Gingin (60 mile peg).	SWAN COASTAL	MRD	23/01/1971	0		0			N	
Acacia drummondii subsp. affinis	3		4		West side of Brand Highway, 26.4 kilometes north of Gingin. (61 mile peg).	SWAN COASTAL	MRD	26/08/1971	0		0			N	
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3		2		Un-Named Reserve (ID:22602). Boonanarring Brook (proposed nat.res), off Wannamal W Rd, Gingin, Quadrat 5.	SWAN COASTAL	NON	13/08/1986	0		0			N	
Banksia mimica	T	VU	8		Crown Reserve 41805 (Boonanarring Nature Res). From the NW cnr of the Nature Res head east along West Wannamal Rd for approx 7.5Km then sth along sandy track 5.4Km. Plants occur from 60m E of the track.	SWAN COASTAL	CC	20/05/2010	263		0	CLUMPS	90000		MODERATE
Banksia mimica	T	VU	9		Crown Reserve 41805 (Boonanarring Nature Res). From northwestern corner ofNature Res head east along West Wannamal Rd for approx 7.5Km south along sandytrack for approx 5.1Km. Plants occur on the southeastern edge of heath approx 270m w of track.	SWAN COASTAL	CC	02/06/2010	23		0	CLUMPS	2625		MODERATE
Banksia mimica	T	VU	10	A	Boonanarring NR (R 41805). From NW corner go 7.5km E along Wannamal Rd, then S along sandy track for ca. 3.7km. Pop on E side of track. Gingin.	SWAN COASTAL	CC	20/09/2007	179		179			N	
Banksia mimica	T	VU	10	B	Boonanarring NR (R 41805). From NW corner go 7.5km E along Wannamal Rd, then S along sandy track for ca. 3.45km. Pop on W side of track, ca. 200m into bush. Gingin.	SWAN COASTAL	CC	05/09/2008	300		300			N	
Banksia mimica	T	VU	11		Crown Reserve 41805 (Boonanarring Nature Res), Gingin. Population occurs approx 12km E of the intersection of Brand Hwy & Wannamal W Rd, then approx 1km S of road.	SWAN COASTAL	CC	27/10/2009	11		0	CLUMPS	100		HEALTHY
Banksia mimica	T	VU	12		Clewely's Road Reserve, Mindarra. Plants occur approx 2.35Km - 3.04Km north of the intersection of Wannamal West and Clewly's Roads, on both road verges.	SWAN COASTAL	LGA	09/03/2010	394		0	CLUMPS			MODERATE
Goodenia arthrotricha	T	EN	7	A	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve. [Ca. 4.8km NNW of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	13/11/2007	0		0			Y	
Goodenia arthrotricha	T	EN	7	B	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve. [Ca. 5.1km NNW of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	13/11/2007	0		0			Y	
Goodenia arthrotricha	T	EN	7	C	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve. [Ca. 5.5km NNW of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	13/11/2007	0		0			Y	
Goodenia arthrotricha	T	EN	7	D	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve. [Ca. 4.5km NNW of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	13/11/2007	0		0			Y	
Goodenia arthrotricha	T	EN	7	E	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve. [Ca. 4.9km NNW of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	13/11/2007	0		0			Y	
Goodenia arthrotricha	T	EN	7	F	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve. [Ca. 4km NNW of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	13/11/2007	0		0			Y	
Goodenia arthrotricha	T	EN	7	G	Boonanarring Nature Reserve (41805), Lot 9727. S of Wannamal Road, in NW corner of reserve, along old seismic line. [Ca. 5.2km N of Boonanarring Hill]. Shire of Gingin.	SWAN COASTAL	CC	22/02/2008	0		0			N	
Grevillea saccata	4		5	A	Boonanarring N.Res. 3.2km E of end of Aurisch Rd.	SWAN COASTAL	CC	17/09/1986	0		0			N	
Grevillea saccata	4		5	B	Boonanarring N.Res. From 100m N of NW cnr of Loc 4372, extending to ca 850m NNE of cnr.	SWAN COASTAL	CC	21/07/1992	0		2220			Y	
Grevillea saccata	4		5	C	Boonanarring N.Res. 200m W of NW cnr of Loc 4372.	SWAN COASTAL	CC	28/07/1992	0		186			Y	
Grevillea saccata	4		5	D	Boonanarring N.Res. Adj N boundary of Loc 3869. 4.5km E of Brand Hwy. 5.5km S of Wannamal Road West.	SWAN COASTAL	CC	02/07/1992	0		341			N	
Grevillea saccata	4		5	E	Loc 3869. 4.5km E of Brand Hwy. 5.5km S of Wannamal Road West.	SWAN COASTAL	PRI	12/08/1989	11		11			Y	
Grevillea saccata	4		5	F	Boonanarring N.Res. E of the NE cnr of Loc 3869.	SWAN COASTAL	CC	28/07/1987	0		400			N	
Grevillea saccata	4		5	G	Boonanarring N.Res. 150m W from NE cnr of Loc 3869, then N down fireline for 370m & then directly W for 100m to plants.	SWAN COASTAL	CC	08/07/1992	0		5			N	
Grevillea saccata	4		5	H	500m N from NW cnr of Loc 3869 then 1.2km E then 800m & 990m N to popn. Boonanarring N.Res.	SWAN COASTAL	CC	08/07/1992	0		10			Y	
Grevillea saccata	4		5	I	Boonanaring N.Res. 8km S of Wannamal Rd on W fenceline.	SWAN COASTAL	CC	13/08/1986	0		0			Y	
Grevillea saccata	4		5	J	530m N along Res 41805 W bdy fireline from NW cnr of Loc 3869 & then 4.6km E along fireline to plants on both sides of track. Boonanarring N.Res.	SWAN COASTAL	CC	02/07/1992	0		0			N	
Grevillea saccata	4		5	K	Boonanarring Nature Reserve, SW end. 0 to ca. 750 m east of PP Location 5280 at from ca. 450 m to 1.1 km south of the NE corner of that Location. Ca. 1.75 km ENE of Boonanarring Hill.	SWAN COASTAL	CC	30/06/1993	1776		1776			Y	
Grevillea saccata	4		5	L	Boonanarring Nature Reserve, SW end. Ca. 1.9 km east of PP Location 5280 at ca. 800 m south of the NE corner of that Location. Ca. 2 km ENE of Bonnanarring Hill.	SWAN COASTAL	CC	15/07/1993	24		24			Y	
Grevillea saccata	4		5	M	Boonanarring Nature Reserve, SW end. Ca. 1 km east of PP Location 5280 at ca. 0.7 km south of the NE corner of that Location. Ca. 2.3 km ENE of Boonanarring Hill.	SWAN COASTAL	CC	16/07/1993	47		47			Y	
Grevillea saccata	4		26		500 m N of the NW corner of Location 3869. Boonanarring Nature Reserve.	SWAN COASTAL	CC	02/07/1990	8		8			Y	
Hibbertia glomerata subsp. ginginensis	2		1		Boonanerring NR. S side,on ridge N of track which runs E of Rd at gravel pits.	SWAN COASTAL	CC	25/08/1996	0		5			Y	
Hibbertia glomerata subsp. ginginensis	2		6		Boonanarring Nature Reserve (No.41805), Gingin. Take Boonanarring Rd 4.2km E of Brand Highway, then track N 3km.	PERTH HILLS	CC	14/09/2001	0		0			Y	
Hibbertia glomerata subsp. ginginensis	2		7		Boonanarring Nature Reserve (No.41805), ca.7km S of Wannamal West Rd on track ca.7.3km E of Brand Highway.	PERTH HILLS	CC	09/12/2002	0		100			N	
Platysace ramosissima	3		2		Boonanarring Brook, Water Reserve 22602, Gingin.	SWAN COASTAL	NON	28/09/1988	0		0			N	
Synaphea grandis	4		1	A	Boonanarring Reserve. South side of Wannamal West Rd, ca. 3.7 km west of the junction with Mindarra Springs Rd.	SWAN COASTAL	CC	20/10/1990	0		0			Y	
Synaphea grandis	4		1	B	Shire Gravel Reserve. South side of Wannamal West Rd, ca. 3.5 km west of the junction with Mindarra Springs Rd.	SWAN COASTAL	MRD	20/10/1990	0		0			Y	
Thelymitra stellata	T	EN	57	A	Boonanarring Nature Reserve (41805), SW corner. Ca. 4.3km E along Boonanarring Rd (Wannamal Rd) from Great Eastern Hwy to a N-S track, ca. 1.15km N along track, plants ca. 60m E of track.	SWAN COASTAL	CC	04/11/2009	4	9	0	PLANTS		N	
Thelymitra stellata	T	EN	57	B	Boonanarring Nature Reserve, SW corner. 950m N of Boonanarring Brook, 1.9 km SE of Boonanarring Hill, found approx 300m ENE of pop 57A.	SWAN COASTAL	CC	04/11/2009	4	1	0	PLANTS		N	
Verticordia paludosa	4		3	A	Boonanarring Nature Reserve. S side of Wannamal West Rd, at 6.1 km E of the NW corner of the reserve (or ca 9 km E of the junction with Brand Hwy). Population extends for ca 0.5 km SSE of the roadside.	SWAN COASTAL	CC	04/03/1994	0		50000			Y	
Verticordia paludosa	4		3	B	S verge of Wannamal West Rd, at 6.1 km E of the NW corner of Boonanarring Nature Reserve (or ca 9 km E of the junction with Brand Hwy).	SWAN COASTAL	LGA	04/03/1994	0		0			N	
Verticordia paludosa	4		13		E boundary of Boonanarring Nature Reserve, at ca 5.5 km S of Wannamal West Rd.	SWAN COASTAL	CC	20/03/1986	0		0			N	

Taxon	Status	Rank	EPBC	DPaWRegion	DPaWDistrict	Distribution	FloweringPeriod	Recovery Plan	
Acacia pulchella var. reflexa acuminate bracteole variant (R.J. Cumming 882)	3			SWAN	PERTH HILLS	Wannamal, Bindoon, York, Boonanarring			
Anigozanthos viridis subsp. terraspectans	T	VU	VU	MWST,SWAN	MOORA,SWAN COASTAL	Cataby, Beermullah, Cooljarloo	Oct-Nov		
Banksia chamaephyton	4			MWST,SWAN	MOORA,SWAN COASTAL	Mogumber, Coomallo Creek, Eneabba, Boonanarring	Oct-Dec		
Banksia pteridifolia subsp. vernalis	3			MWST,SWAN	MOORA,SWAN COASTAL	Dandaragan, Alexander Morrison N.P., Three Springs, Forrestfield, Gillingarra, Boonanarring NR, Maida Vale, Gooseberry Hill	Sep		
Haloragis aculeolata	2			SWST,SWAN	WELLINGTON	Yalgorup N.P., (Toolbrunup, Cannington), Beermullah	Dec		
Hibbertia glomerata subsp. ginginensis	2			SWAN	PERTH HILLS,SWAN COASTAL	Gingin, Bindoon, Boonanarring N.R.	Jul-Sep		
Lasiopetalum venustum	3			SWAN	SWAN COASTAL	Boonanarring NR			
Leucopogon allittii	3			MWST,SWAN,WHTB	MOORA,GERALDTON,SWAN COASTAL,CENTRAL WHEATBELT	Gingin, Regans Ford, Boonanarring, Moora, Ajan, Yuna	Apr-Jun		
Platysace ramosissima	3			MWST,SWAN,SWST	MOORA,PERTH HILLS,SWAN COASTAL,WELLINGTON	Yalgorup, Boonanarring, Gingin, Lancelin, Bullsbrook Nature Reserve			
Styphelia filifolia	3			MWST,SWAN,SWST	MOORA,SWAN COASTAL,WELLINGTON	Eneabba, Bullsbrook, WAttle Grove, Huntingdale, Leeming, Boonanarring N.R., Wanneroo, Keysbrook	Mar-May		
Thelymitra dedmaniarum	T	CR	EN	SWAN	PERTH HILLS,SWAN COASTAL	Gidgegannup, Red Hill, Boonanarring NR	Oct-Nov	IRP	
Verticordia paludosa	4			MWST,SWAN	MOORA,SWAN COASTAL	Mogumber West Road, Moore River N.P., Regans Ford, Boonanarring, Marchagee NR	Jan		

Appendix B
Flora Inventory

Family	Species
Apiaceae	*Xanthosia huegelii*
Asparagaceae	*Lomandra* sp.
Celastraceae	*Stackhousia* sp.
Cyperaceae	*Tetraria octandra*
Dilleniaceae	*Hibbertia acerosa*
	Hibbertia glomerata supsp. ?darlingensis
	Hibbertia hypericoides
	Hibbertia semipilosa
Droseraceae	*Drosera barbigera*
	Drosera erythrorhiza
	Drosera sp.
Ericaceae	*Conostephium pendulum*
	Leucopogon cinereus
Fabaceae	*Acacia ?lasiocarpa*
	Acacia alata
	Bossiaea eriocarpa
	Bossiaea ornata
	Gompholobium knightanianum
	Hovea trisperma
Goodeniaceae	*Leschenaultia biloba*
Haemodoraceae	*Haemodorum* sp.
Hemerocallidaceae	*Caesia micrantha*
	Dianella revoluta
Malvaceae	*Lasiopetlum venustum* (P3)
Myrtaceae	*Calytrix* sp.
	Corymbia calophylla
	Eucalyptus marginata
	Hypocalymma xanthopetalum
	Leptospermum erubescens
Orchidaceae	Caladenia flava
	Diuris brumalis
	Elythranthera emarginata
	Elythranthera brunonis
	Orchidaceae sp.
	Pterostylis pyramidalis
	Pterostylis recurva
	Pyrorchis nigricans
Proteaceae	Banksia sessilis
	Grevillea synapheae
	Petrophile striata
	Synaphaea grandis (P4)
	Synaphea sp.
Rutaceae	*Boronia ramosa*
	Philotheca spicata subsp. Moore River
Santalaceae	*Lepidosperma squamatum*
Stylidiaceae	*Stylidium* sp.
Xanthorrhoeaceae	*Chamaescilla corymbosa*
	Xanthorrhoea brunonis
	Xanthorrhoea preissii

Appendix C
Flora Site Sheets

FLORA SITE SHEET - TWIN RIVERS

Project Name Twin Rivers Detailed Flora and Vegetation Assessment
Site: TRQ1 **Latitude** -31.1715791 **Longitude** 115.8715839

Described by: Shenaye Hummerston
Date: 2019-09-06
Type: Quadrat 10 x 10
Soil Colour: Brown
Soil Type: Gravel,Loam,Sand
Habitat: Upper slope
Vegetation:
Eucalyptus marginata woodland over open shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preisii* over sparse shrubland of *Hibbertia semipilosa*

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** Burnt Trunks
Notes
Rock Type Laterite **Rock Cover:** 1-5 % **Outcropping:** 2-10 %
Total PFC: 70 % **Bareground:** 0 % **Leaf Litter:** 90 % **Logs:** 12 %
Disturbance Type: Fire evidence,historic logging signs

SPECIES LIST

Name	Height	Cover	Notes
Acacia ?lasiocarpa	160	1.5	
Banksia sessilis	650	30	
Boronia ramosa	5	0.5	
Bossiaea eriocarpa	10	0.1	
Bossiaea ornata	15	0.1	
Conostephium pendulum	40	1	
Corymbia calophylla	900	14	
Eucalyptus marginata	800	22	
Gompholobium knightianum	35	1	
Grevillea synapheae	5	0.2	
Haemodorum sp.	20	0.1	
Hibbertia acerosa	6	1	
Hibbertia hypericoides	50	12	
Hibbertia semipilosa	90	18	
Hypocalymma xanthopetalum	10	1	
Lepidosperma squamatum	45	1	
Leptospermum erubescens	350	5	
Leucopogon cinereus	16	0.2	
Stackhousia sp.	40	0.1	
Stylidium sp.	5	0.01	
Synaphaea grandis	15	1	P4
Tetraria octandra	7	0.2	
Xanthorrhoea brunonis	200	3	
Xanthorrhoea preisii	180	13	
Xanthosia huegelii	3	0.5	

FLORA SITE SHEET - TWIN RIVERS

Project Name Twin Rivers Detailed Flora and Vegetation Assessment
Site: TRQ2 **Latitude** -31.1689189 **Longitude** 115.868566

Described by: Shenaye Hummerston
Date: 2019-09-06
Type: Quadrat 10x 10
Soil Colour: Brown
Soil Type: Gravel,Loam,Sand
Habitat: Ridge
Vegetation:
Corymbia calophylla woodland over *Banksia sessilis* shrubland over sparse shrubland of *Xanthorrhoea preissii* over sparse sedgeland of *Lepidosperma squamatum*

Veg Condition: Good
Fire Age: Unknown **Fire Evidence:** -
Notes
Rock Type Laterite **Rock Cover:** 1-5 % **Outcropping:** 2-10 %
Total PFC: 80 % **Bareground:** 0 % **Leaf Litter:** 95 % **Logs:** 5 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia ?lasiocarpa	30	0.1	
Acacia alata	15	0.1	
Banksia sessilis	350	60	
Bossiaea eriocarpa	20	5	
Caesia micrantha	20	0.1	
Caladenia flava	12	0.1	
Calytrix sp.	35	6	
Chamaescilla corymbosa	1	0.01	
Corymbia calophylla	1000	40	
Drosera sp.	0	0.01	
Elythranthera emarginata	10	0.1	
Eucalyptus marginata	7	5	
Hibbertia glomerata supsp. ?darlingensis	30	2	
Hibbertia semipilosa	50	2	
Hypocalymma xanthopetalum	10	2	
Lepidosperma squamatum	35	5	
Leschenaultia biloba	14	0.1	
Orchidaceae sp.	25	0.1	
Petrophile striata	25	3	
Philotheca spicata subsp. Moore River	15	0.2	
Pterostylis pyramidalis	4	0.01	
Pyrorchis nigricans	2	1.5	
Synaphea grandis	14	0.2	P4
Xanthorrhoea brunonis	95	4	

FLORA SITE SHEET - TWIN RIVERS

Project Name Twin Rivers Detailed Flora and Vegetation Assessment
Site: TRQ3 **Latitude** -31.1690112 **Longitude** 115.871098

Described by: Shenaye Hummerston
Date: 2019-09-06
Type: Quadrat 10 x 10
Soil Colour: Brown
Soil Type: Gravel,Loam,Sand
Habitat: Ridge
Vegetation:
Eucalyptus marginata woodland over open shrubland of *Banksia sessilis* over sparse shrubland of *Xanthorrhoea preissii* over sparse sedgeland of *Lepidosperma squamatum*

Veg Condition: Good
Fire Age: Unknown **Fire Evidence:** -
Notes
Rock Type Laterite **Rock Cover:** 6-20 % **Outcropping:** 10-20 %
Total PFC: 90 % **Bareground:** 0 % **Leaf Litter:** 90 % **Logs:** 15 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia ?lasiocarpa	45	1	
Banksia sessilis	500	40	
Bossiaea eriocarpa	25	2	
Caesia micrantha	12	0.5	
Calytrix sp.	40	2	
Corymbia calophylla	900	17	
Dianella revoluta	30	0.5	
Drosera barbigera	2	2	
Drosera erythrorhiza	1	0.1	
Elythranthera emarginata	10	0.01	
Eucalyptus marginata	1200	22	
Gompholobium knightanianum	25	1	
Grevillea synapheae	45	1.5	
Hibbertia glomerata supsp. ?darlingensis	35	0.5	
Hovea trisperma	30	0.2	
Hypocalymma xanthopetalum	20	3	
Lasiopetlum venustum	30	1	P3
Lepidosperma squamatum	30	15	
Leschenaultia biloba	20	1	
Leucopogon cinereus	35	1	
Lomandra sp.	10	0.1	
Petrophile striata	25	4	
Stylidium sp.	6	0.1	
Xanthorrhoea brunonis	120	3	
Xanthorrhoea preissii	140	28	
Xanthosia huegelii	2	0.1	

Appendix D
Black Cockatoo Breeding Trees

DATE	TAXA	LONG	LAT	DBH (mm)	HEIGHT (m)	# HOLLOWS	HOLLOWS > 120mm	PHOTO REF
2019-09-06 14:53:02 AWST	*Jarrah (Eucalyptus marginata)*	-31.16997330	115.86998097	796	20	12	8	1
2019-09-06 11:17:20 AWST	*Jarrah (Eucalyptus marginata)*	-31.17047227	115.87219312	860	18	8	6	2
2019-09-13 09:55:43 AWST	*Jarrah (Eucalyptus marginata)*	-31.16966283	115.86879124	955	17	6	5	3
2019-09-13 15:00:03 AWST	*Jarrah (Eucalyptus marginata)*	-31.16871099	115.86865922	1115	15	7	5	4
2019-09-06 11:50:32 AWST	*Jarrah (Eucalyptus marginata)*	-31.17046657	115.87123523	637	18	4	4	5
2019-09-13 10:57:08 AWST	*Jarrah (Eucalyptus marginata)*	-31.16894061	115.86817014	1592	18	4	4	6
2019-09-13 11:58:21 AWST	*Jarrah (Eucalyptus marginata)*	-31.16935487	115.87032035	796	15	5	4	7
2019-09-13 13:33:15 AWST	*Jarrah (Eucalyptus marginata)*	-31.16835281	115.87136205	764	20	6	4	8
2019-09-13 14:51:28 AWST	*Marri (Corymbia calophylla)*	-31.16836259	115.86899861	796	18	6	4	9
2019-09-13 15:04:23 AWST	*Jarrah (Eucalyptus marginata)*	-31.16820782	115.86860809	955	18	6	4	10
2019-09-06 11:21:03 AWST	*Jarrah (Eucalyptus marginata)*	-31.17019710	115.87211349	955	18	6	4	11
2019-09-06 10:54:27 AWST	*Jarrah (Eucalyptus marginata)*	-31.17093102	115.87202070	955	18	7	4	12
2019-09-06 14:34:37 AWST	*Jarrah (Eucalyptus marginata)*	-31.16947173	115.87174544	541	17	3	3	13
2019-09-06 12:49:05 AWST	*Jarrah (Eucalyptus marginata)*	-31.17019914	115.87142911	573	14	3	3	14
2019-09-13 14:33:08 AWST	*Jarrah (Eucalyptus marginata)*	-31.16879640	115.86958434	605	15	3	3	15
2019-09-13 14:37:05 AWST	*Jarrah (Eucalyptus marginata)*	-31.16862878	115.86923204	637	18	3	3	16
2019-09-13 12:35:33 AWST	*Marri (Corymbia calophylla)*	-31.16917991	115.87119852	764	15	3	3	17
2019-09-06 12:31:28 AWST	*Jarrah (Eucalyptus marginata)*	-31.17025665	115.87013226	1019	14	3	3	18
2019-09-13 14:54:27 AWST	*Jarrah (Eucalyptus marginata)*	-31.16873091	115.86887162	1274	12	3	3	19
2019-09-06 12:46:14 AWST	*Marri (Corymbia calophylla)*	-31.17010846	115.87119986	637	20	5	3	20
2019-09-13 12:09:56 AWST	*Jarrah (Eucalyptus marginata)*	-31.16902288	115.87067298	955	16	5	3	21
2019-09-13 13:43:18 AWST	*Jarrah (Eucalyptus marginata)*	-31.16839871	115.87080717	1115	18	5	3	22
2019-09-13 13:26:21 AWST	*Jarrah (Eucalyptus marginata)*	-31.16825584	115.87169264	1115	20	7	3	23
2019-09-13 14:20:32 AWST	*Jarrah (Eucalyptus marginata)*	-31.16796785	115.86977787	1274	18	8	3	24
2019-09-06 14:56:26 AWST	*Marri (Corymbia calophylla)*	-31.16979619	115.86958928	510	10	2	2	25
2019-09-06 11:46:09 AWST	*Jarrah (Eucalyptus marginata)*	-31.17060509	115.87147320	541	17	2	2	26
2019-09-06 11:29:37 AWST	*Jarrah (Eucalyptus marginata)*	-31.17029244	115.87163740	573	12	2	2	27
2019-09-13 13:40:36 AWST	*Jarrah (Eucalyptus marginata)*	-31.16844934	115.87087045	573	14	2	2	28
2019-09-06 12:01:35 AWST	*Jarrah (Eucalyptus marginata)*	-31.17090294	115.87056192	589	17	2	2	29
2019-09-06 11:27:24 AWST	*Jarrah (Eucalyptus marginata)*	-31.17020741	115.87176321	605	15	2	2	30
2019-09-06 13:44:05 AWST	*Jarrah (Eucalyptus marginata)*	-31.16959318	115.87195356	621	15	2	2	
2019-09-13 14:46:15 AWST	*Jarrah (Eucalyptus marginata)*	-31.16804446	115.86891881	637	18	2	2	
2019-09-13 14:41:54 AWST	*Jarrah (Eucalyptus marginata)*	-31.16832641	115.86913213	637	20	2	2	
2019-09-13 11:06:08 AWST	*Jarrah (Eucalyptus marginata)*	-31.16903386	115.86890507	796	14	2	2	
2019-09-13 11:14:42 AWST	*Jarrah (Eucalyptus marginata)*	-31.16919500	115.86909064	955	16	2	2	
2019-09-13 14:08:31 AWST	*Jarrah (Eucalyptus marginata)*	-31.16819374	115.86998541	637	15	3	2	
2019-09-06 10:58:39 AWST	*Marri (Corymbia calophylla)*	-31.17067210	115.87214828	796	16	3	2	

DATE	TAXA	LONG	LAT	DBH (mm)	HEIGHT (m)	# HOLLOWS	HOLLOWS > 120mm	PHOTO REF
2019-09-06 12:04:50 AWST	*Jarrah (Eucalyptus marginata)*	-31.17068182	115.87029487	828	20	3	2	
2019-09-06 11:40:47 AWST	*Jarrah (Eucalyptus marginata)*	-31.17093743	115.87132299	1497	17	3	2	
2019-09-13 14:59:47 AWST	*Jarrah (Eucalyptus marginata)*	-31.16866564	115.86858479	732	16	4	2	
2019-09-13 12:48:19 AWST	*Jarrah (Eucalyptus marginata)*	-31.16875486	115.87180822	796	20	4	2	
2019-09-06 14:43:46 AWST	*Marri (Corymbia calophylla)*	-31.17020280	115.87047868	892	20	4	2	
2019-09-13 12:22:19 AWST	*Jarrah (Eucalyptus marginata)*	-31.16882020	115.87099627	955	18	4	2	
2019-09-13 12:06:05 AWST	*Jarrah (Eucalyptus marginata)*	-31.16911906	115.87075084	1115	18	4	2	
2019-09-13 13:58:25 AWST	*Marri (Corymbia calophylla)*	-31.16854387	115.87063249	796	18	5	2	
2019-09-13 12:43:57 AWST	*Jarrah (Eucalyptus marginata)*	-31.16883852	115.87166154	637	19	7	2	
2019-09-06 13:42:41 AWST	*Marri (Corymbia calophylla)*	-31.16957746	115.87198206	541	20	1	1	
2019-09-13 14:48:53 AWST	*Jarrah (Eucalyptus marginata)*	-31.16823485	115.86892032	557	17	1	1	
2019-09-06 10:29:51 AWST	*Marri (Corymbia calophylla)*	-31.17125200	115.87096207	573	14	1	1	
2019-09-06 14:37:53 AWST	*Marri (Corymbia calophylla)*	-31.16986903	115.87165316	573	14	1	1	
2019-09-13 12:20:13 AWST	*Jarrah (Eucalyptus marginata)*	-31.16893115	115.87096844	573	16	1	1	
2019-09-06 12:08:43 AWST	*Jarrah (Eucalyptus marginata)*	-31.17082033	115.86986530	605	12	1	1	
2019-09-13 11:18:05 AWST	*Marri (Corymbia calophylla)*	-31.16908836	115.86898662	605	14	1	1	
2019-09-13 11:54:12 AWST	*Marri (Corymbia calophylla)*	-31.16917270	115.87037232	605	13	1	1	
2019-09-13 14:42:53 AWST	*Stag*	-31.16809060	115.86928535	605	17	1	1	
2019-09-13 11:08:15 AWST	*Jarrah (Eucalyptus marginata)*	-31.16909639	115.86887422	637	18	1	1	
2019-09-13 14:18:09 AWST	*Jarrah (Eucalyptus marginata)*	-31.16804907	115.86981232	637	17	1	1	
2019-09-13 14:09:47 AWST	*Jarrah (Eucalyptus marginata)*	-31.16816176	115.86993705	732	10	1	1	
2019-09-13 14:02:01 AWST	*Jarrah (Eucalyptus marginata)*	-31.16859005	115.87033544	732	18	1	1	
2019-09-06 10:36:42 AWST	*Jarrah (Eucalyptus marginata)*	-31.17138083	115.87108134	796	16	1	1	
2019-09-13 12:57:01 AWST	*Jarrah (Eucalyptus marginata)*	-31.16925446	115.87194543	796	15	1	1	
2019-09-13 10:16:44 AWST	*Jarrah (Eucalyptus marginata)*	-31.16954373	115.86825782	1274	17	1	1	
2019-09-13 15:06:41 AWST	*Stag*	-31.16812744	115.86852880	541	6	2	1	
2019-09-13 10:53:31 AWST	*Jarrah (Eucalyptus marginata)*	-31.16911089	115.86802212	637	17	2	1	
2019-09-06 11:05:30 AWST	*Jarrah (Eucalyptus marginata)*	-31.17135284	115.87177587	796	17	2	1	
2019-09-06 11:53:39 AWST	*Marri (Corymbia calophylla)*	-31.17066074	115.87089912	796	15	2	1	
2019-09-13 09:40:21 AWST	*Marri (Corymbia calophylla)*	-31.16971644	115.86835790	892	16	2	1	
2019-09-13 13:20:26 AWST	*Jarrah (Eucalyptus marginata)*	-31.16853161	115.87193026	541	8	3	1	
2019-09-13 15:17:01 AWST	*Jarrah (Eucalyptus marginata)*	-31.16835605	115.86831682	796	20	4	1	
2019-09-06 10:45:56 AWST	*Jarrah (Eucalyptus marginata)*	-31.17108558	115.87154771	1051	28	4	1	
2019-09-13 14:28:30 AWST	*Jarrah (Eucalyptus marginata)*	-31.16855391	115.86963538	955	20	5	1	
2019-09-13 15:34:32 AWST	*Jarrah (Eucalyptus marginata)*	-31.16866438	115.86783252	1274	20	5	1	
2019-09-06 11:55:40 AWST	*Marri (Corymbia calophylla)*	-31.17050798	115.87076945	510	17	1		
2019-09-13 11:19:25 AWST	*Marri (Corymbia calophylla)*	-31.16897296	115.86906357	541	16	1		

DATE	TAXA	LONG	LAT	DBH (mm)	HEIGHT (m)	# HOLLOWS	HOLLOWS > 120mm	PHOTO REF
2019-09-13 15:20:19 AWST	*Jarrah (Eucalyptus marginata)*	-31.16880537	115.86813292	573	15	1		
2019-09-13 13:56:26 AWST	*Jarrah (Eucalyptus marginata)*	-31.16828921	115.87057273	573	18	1		
2019-09-13 14:04:00 AWST	*Marri (Corymbia calophylla)*	-31.16856891	115.87011826	605	16	1		
2019-09-13 13:15:58 AWST	*Marri (Corymbia calophylla)*	-31.16836008	115.87207711	637	17	1		
2019-09-13 14:25:36 AWST	*Marri (Corymbia calophylla)*	-31.16835061	115.86960571	637	17	1		
2019-09-13 14:13:09 AWST	*Jarrah (Eucalyptus marginata)*	-31.16786894	115.87018532	669	18	1		
2019-09-06 10:39:59 AWST	*Jarrah (Eucalyptus marginata)*	-31.17128561	115.87135375	955	17	1		
2019-09-06 13:40:57 AWST	*Marri (Corymbia calophylla)*	-31.16971317	115.87194644	510	14	2		
2019-09-13 09:43:02 AWST	*Jarrah (Eucalyptus marginata)*	-31.16974171	115.86852143	541	16	2		
2019-09-13 13:17:46 AWST	*Marri (Corymbia calophylla)*	-31.16840203	115.87198885	541	18	2		
2019-09-13 13:36:14 AWST	*Jarrah (Eucalyptus marginata)*	-31.16828707	115.87123205	541	15	2		
2019-09-13 14:38:34 AWST	*Stag*	-31.16850965	115.86937227	541	15	2		
2019-09-13 14:49:37 AWST	*Jarrah (Eucalyptus marginata)*	-31.16827592	115.86892091	573	16	2		
2019-09-13 11:42:07 AWST	*Jarrah (Eucalyptus marginata)*	-31.16931251	115.87012614	605	16	2		
2019-09-13 14:14:25 AWST	*Stag*	-31.16797049	115.87027308	605	15	2		
2019-09-13 11:10:02 AWST	*Marri (Corymbia calophylla)*	-31.16917115	115.86888327	669	18	2		
2019-09-13 11:39:05 AWST	*Jarrah (Eucalyptus marginata)*	-31.16932965	115.86996026	1274	18	2		
2019-09-13 11:40:19 AWST	*Jarrah (Eucalyptus marginata)*	-31.16926289	115.87010301	510	17	3		
2019-09-13 11:28:04 AWST	*Jarrah (Eucalyptus marginata)*	-31.16936616	115.86924512	637	16	3		
2019-09-13 12:51:22 AWST	*Jarrah (Eucalyptus marginata)*	-31.16905992	115.87217174	637	18	3		
2019-09-13 15:14:58 AWST	*Marri (Corymbia calophylla)*	-31.16826172	115.86824583	796	20	3		
2019-09-13 12:23:44 AWST	*Marri (Corymbia calophylla)*	-31.16876802	115.87103072	796	19	3		
2019-09-06 10:03:48 AWST	*Jarrah (Eucalyptus marginata)*	-31.17168765	115.87166196	1146	20	3		
2019-09-13 15:15:48 AWST	*Jarrah (Eucalyptus marginata)*	-31.16834850	115.86842269	637	20	4		
2019-09-13 12:37:56 AWST	*Jarrah (Eucalyptus marginata)*	-31.16905766	115.87122694	637	18	4		
2019-09-13 10:02:28 AWST	*Marri (Corymbia calophylla)*	-31.16953803	115.86891554	669	17	4		
2019-09-13 14:15:13 AWST	*Jarrah (Eucalyptus marginata)*	-31.16805338	115.87035681	637	16	6		
2019-09-06 11:34:30 AWST	*Jarrah (Eucalyptus marginata)*	-31.17074096	115.87184276	494	12			
2019-09-06 12:11:09 AWST	*Marri (Corymbia calophylla)*	-31.17079896	115.86951233	494	17			
2019-09-06 11:36:42 AWST	*Jarrah (Eucalyptus marginata)*	-31.17088085	115.87182700	510	15			
2019-09-06 12:32:36 AWST	*Jarrah (Eucalyptus marginata)*	-31.17046716	115.87027945	510	16			
2019-09-06 12:28:00 AWST	*Jarrah (Eucalyptus marginata)*	-31.17018934	115.86980117	510	17			
2019-09-06 14:41:24 AWST	*Jarrah (Eucalyptus marginata)*	-31.16974732	115.87093424	510	16			
2019-09-06 13:39:52 AWST	*Jarrah (Eucalyptus marginata)*	-31.16981597	115.87207368	510	18			
2019-09-06 14:47:09 AWST	*Jarrah (Eucalyptus marginata)*	-31.17000741	115.87026168	510	17			
2019-09-06 12:06:16 AWST	*Marri (Corymbia calophylla)*	-31.17084125	115.87025732	525	15			
2019-09-13 15:11:58 AWST	*Marri (Corymbia calophylla)*	-31.16780243	115.86851330	541	17			

DATE	TAXA	LONG	LAT	DBH (mm)	HEIGHT (m)	# HOLLOWS	HOLLOWS > 120mm	PHOTO REF
2019-09-13 15:09:28 AWST	*Marri (Corymbia calophylla)*	-31.16763047	115.86892359	541	18			
2019-09-13 15:28:40 AWST	*Jarrah (Eucalyptus marginata)*	-31.16852026	115.86769137	541	15			
2019-09-13 15:26:51 AWST	*Marri (Corymbia calophylla)*	-31.16825199	115.86783704	541	16			
2019-09-06 11:00:05 AWST	*Jarrah (Eucalyptus marginata)*	-31.17058539	115.87230267	541	18			
2019-09-06 10:48:05 AWST	*Marri (Corymbia calophylla)*	-31.17104790	115.87187603	541	18			
2019-09-06 11:32:02 AWST	*Marri (Corymbia calophylla)*	-31.17061188	115.87177377	541	16			
2019-09-06 11:22:26 AWST	*Jarrah (Eucalyptus marginata)*	-31.17001798	115.87215163	541	18			
2019-09-06 12:26:53 AWST	*Marri (Corymbia calophylla)*	-31.17011546	115.86958023	541	16			
2019-09-06 12:12:34 AWST	*Marri (Corymbia calophylla)*	-31.17079883	115.86937789	541	19			
2019-09-06 11:58:52 AWST	*Jarrah (Eucalyptus marginata)*	-31.17083961	115.87077767	541	16			
2019-09-06 14:45:47 AWST	*Jarrah (Eucalyptus marginata)*	-31.16972268	115.87040652	541	18			
2019-09-13 10:23:10 AWST	*Marri (Corymbia calophylla)*	-31.16994405	115.86719180	541	18			
2019-09-13 09:44:36 AWST	*Marri (Corymbia calophylla)*	-31.16990570	115.86863207	541	18			
2019-09-13 11:25:57 AWST	*Jarrah (Eucalyptus marginata)*	-31.16918863	115.86928611	541	16			
2019-09-13 11:23:31 AWST	*Jarrah (Eucalyptus marginata)*	-31.16901621	115.86935702	541	14			
2019-09-13 12:03:10 AWST	*Jarrah (Eucalyptus marginata)*	-31.16935069	115.87068932	541	17			
2019-09-13 11:36:47 AWST	*Jarrah (Eucalyptus marginata)*	-31.16950102	115.86978374	541	15			
2019-09-13 11:27:16 AWST	*Jarrah (Eucalyptus marginata)*	-31.16929047	115.86931746	541	16			
2019-09-13 12:50:09 AWST	*Jarrah (Eucalyptus marginata)*	-31.16890695	115.87207954	541	14			
2019-09-13 12:49:14 AWST	*Jarrah (Eucalyptus marginata)*	-31.16873626	115.87196505	541	15			
2019-09-13 12:27:17 AWST	*Jarrah (Eucalyptus marginata)*	-31.16883982	115.87117388	541	16			
2019-09-13 13:47:10 AWST	*Marri (Corymbia calophylla)*	-31.16817484	115.87054842	541	15			
2019-09-13 13:37:32 AWST	*Marri (Corymbia calophylla)*	-31.16844247	115.87120825	541	16			
2019-09-13 13:22:30 AWST	*Marri (Corymbia calophylla)*	-31.16848069	115.87180101	541	17			
2019-09-13 14:22:53 AWST	*Jarrah (Eucalyptus marginata)*	-31.16819018	115.86971710	541	17			
2019-09-13 14:44:01 AWST	*Marri (Corymbia calophylla)*	-31.16806814	115.86903222	541	16			
2019-09-13 14:37:45 AWST	*Jarrah (Eucalyptus marginata)*	-31.16855651	115.86919961	541	14			
2019-09-13 15:18:24 AWST	*Jarrah (Eucalyptus marginata)*	-31.16863471	115.86833225	557	16			
2019-09-13 15:26:18 AWST	*Jarrah (Eucalyptus marginata)*	-31.16819210	115.86785071	557	16			
2019-09-06 12:12:06 AWST	*Jarrah (Eucalyptus marginata)*	-31.17077134	115.86936590	557	18			
2019-09-06 14:39:55 AWST	*Jarrah (Eucalyptus marginata)*	-31.16973727	115.87119835	557	16			
2019-09-13 11:01:39 AWST	*Jarrah (Eucalyptus marginata)*	-31.16904961	115.86849217	557	6			
2019-09-13 15:25:30 AWST	*Jarrah (Eucalyptus marginata)*	-31.16838925	115.86786160	573	17			
2019-09-13 15:23:46 AWST	*Marri (Corymbia calophylla)*	-31.16876693	115.86781450	573	18			
2019-09-06 11:06:27 AWST	*Marri (Corymbia calophylla)*	-31.17144135	115.87186891	573	18			
2019-09-06 10:56:20 AWST	*Jarrah (Eucalyptus marginata)*	-31.17074234	115.87207527	573	18			
2019-09-06 11:54:51 AWST	*Jarrah (Eucalyptus marginata)*	-31.17050224	115.87084296	573	18			

DATE	TAXA	LONG	LAT	DBH (mm)	HEIGHT (m)	# HOLLOWS	HOLLOWS > 120mm	PHOTO REF
2019-09-06 11:32:33 AWST	*Jarrah (Eucalyptus marginata)*	-31.17065362	115.87169934	573	18			
2019-09-06 11:24:30 AWST	*Jarrah (Eucalyptus marginata)*	-31.17028180	115.87190327	573	18			
2019-09-06 12:26:15 AWST	*Jarrah (Eucalyptus marginata)*	-31.17021453	115.86968291	573	18			
2019-09-06 12:33:19 AWST	*Marri (Corymbia calophylla)*	-31.17053053	115.87033636	573	17			
2019-09-06 14:59:36 AWST	*Jarrah (Eucalyptus marginata)*	-31.17006290	115.86903423	573	17			
2019-09-13 11:24:08 AWST	*Jarrah (Eucalyptus marginata)*	-31.16902589	115.86942533	573	16			
2019-09-13 11:22:59 AWST	*Jarrah (Eucalyptus marginata)*	-31.16898750	115.86929960	573	18			
2019-09-13 11:18:36 AWST	*Marri (Corymbia calophylla)*	-31.16908042	115.86904286	573	16			
2019-09-13 11:11:44 AWST	*Marri (Corymbia calophylla)*	-31.16934474	115.86899995	573	17			
2019-09-13 11:03:09 AWST	*Marri (Corymbia calophylla)*	-31.16897548	115.86859108	573	17			
2019-09-13 11:47:24 AWST	*Jarrah (Eucalyptus marginata)*	-31.16894191	115.87024131	573	15			
2019-09-13 13:38:43 AWST	*Jarrah (Eucalyptus marginata)*	-31.16854737	115.87106508	573	17			
2019-09-13 14:03:38 AWST	*Jarrah (Eucalyptus marginata)*	-31.16858991	115.87015640	573	16			
2019-09-13 14:55:34 AWST	*Marri (Corymbia calophylla)*	-31.16872264	115.86874296	573	17			
2019-09-13 15:01:01 AWST	*Jarrah (Eucalyptus marginata)*	-31.16859045	115.86860047	605	18			
2019-09-13 15:27:48 AWST	*Jarrah (Eucalyptus marginata)*	-31.16834558	115.86767142	605	17			
2019-09-13 15:27:27 AWST	*Jarrah (Eucalyptus marginata)*	-31.16829956	115.86769111	605	18			
2019-09-06 10:04:12 AWST	*Jarrah (Eucalyptus marginata)*	-31.17194753	115.87223721	605	17			
2019-09-06 12:59:17 AWST	*Marri (Corymbia calophylla)*	-31.16729708	115.87046787	605	20			
2019-09-13 11:04:21 AWST	*Jarrah (Eucalyptus marginata)*	-31.16891651	115.86884983	605	17			
2019-09-13 12:53:51 AWST	*Jarrah (Eucalyptus marginata)*	-31.16904735	115.87181074	605	18			
2019-09-13 12:52:22 AWST	*Jarrah (Eucalyptus marginata)*	-31.16913167	115.87199556	605	15			
2019-09-13 12:41:19 AWST	*Jarrah (Eucalyptus marginata)*	-31.16884254	115.87153740	605	18			
2019-09-13 12:40:25 AWST	*Marri (Corymbia calophylla)*	-31.16885168	115.87138913	605	18			
2019-09-13 14:39:14 AWST	*Jarrah (Eucalyptus marginata)*	-31.16839025	115.86928510	605	15			
2019-09-13 15:17:37 AWST	*Jarrah (Eucalyptus marginata)*	-31.16847923	115.86831272	637	17			
2019-09-13 15:10:19 AWST	*Marri (Corymbia calophylla)*	-31.16767118	115.86943623	637	18			
2019-09-13 15:00:32 AWST	*Jarrah (Eucalyptus marginata)*	-31.16864481	115.86856987	637	11			
2019-09-06 10:23:26 AWST	*Marri (Corymbia calophylla)*	-31.17117107	115.87075101	637	17			
2019-09-06 11:03:07 AWST	*Marri (Corymbia calophylla)*	-31.17129404	115.87206387	637	20			
2019-09-06 12:41:11 AWST	*Jarrah (Eucalyptus marginata)*	-31.17024416	115.87061967	637	20			
2019-09-13 10:54:18 AWST	*Jarrah (Eucalyptus marginata)*	-31.16902376	115.86811071	637	16			
2019-09-13 10:14:47 AWST	*Jarrah (Eucalyptus marginata)*	-31.16935903	115.86829168	637	16			
2019-09-13 11:52:30 AWST	*Jarrah (Eucalyptus marginata)*	-31.16911843	115.87012421	637	18			
2019-09-13 13:23:57 AWST	*Jarrah (Eucalyptus marginata)*	-31.16860956	115.87163053	637	17			
2019-09-13 14:01:16 AWST	*Jarrah (Eucalyptus marginata)*	-31.16875644	115.87056611	669	18			
2019-09-06 10:32:19 AWST	*Jarrah (Eucalyptus marginata)*	-31.17120624	115.87115812	701	18			

DATE	TAXA	LONG	LAT	DBH (mm)	HEIGHT (m)	# HOLLOWS	HOLLOWS > 120mm	PHOTO REF
2019-09-06 14:43:20 AWST	*Jarrah (Eucalyptus marginata)*	-31.16980893	115.87072226	701	20			
2019-09-13 10:13:43 AWST	*Jarrah (Eucalyptus marginata)*	-31.16924801	115.86834147	732	16			
2019-09-13 15:06:01 AWST	*Jarrah (Eucalyptus marginata)*	-31.16810598	115.86852620	796	15			
2019-09-13 12:38:16 AWST	*Jarrah (Eucalyptus marginata)*	-31.16905502	115.87132324	796	14			
2019-09-13 14:11:41 AWST	*Jarrah (Eucalyptus marginata)*	-31.16793855	115.87005121	796	20			

		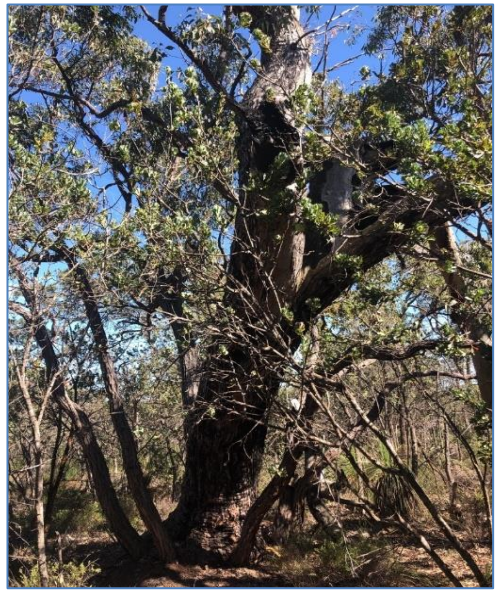
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Photo Reference: 22	Photo Reference: 23	Photo Reference: 24

		
Photo Reference: 25	Photo Reference: 26	Photo Reference: 27
		
Photo Reference: 28	Photo Reference: 29	Photo Reference: 30

Appendix E
Black Cockatoo Evidence Raw Data

DATE	TAXA	LONG	LAT	EVIDENCE TYPE	COMMENTS	PHOTO REF
2019-09-06 10:12:28 AWST	Carnaby's Black Cockatoo	-31.17214269	115.86992372	Sighting		
2019-09-13 11:20:46 AWST	Carnaby's Black Cockatoo	-31.16896563	115.86907639	Foraging	Marri nuts - old	1
2019-09-13 13:35:12 AWST	Carnaby's Black Cockatoo	-31.16829860	115.87122886	Foraging	Marri nuts	2
2019-09-13 14:05:34 AWST	Carnaby's Black Cockatoo	-31.16846477	115.87012178	Foraging	Marri nuts	3
2019-09-13 14:24:19 AWST	Carnaby's Black Cockatoo	-31.16833845	115.86960990	Foraging	Marri nuts - burnt but dentition marks still clear	4
2019-09-13 15:05:15 AWST	Carnaby's Black Cockatoo	-31.16807698	115.86851573	Foraging	Marri nuts	5

		
Photo Reference: 1	Photo Reference: 2	Photo Reference: 3
		
Photo Reference: 4	Photo Reference: 5	

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