

NATIVE VEGETATION CLEARING PERMIT
HARTOG AND BAUDIN LOW IMPACT EXPLORATION
DRILLING PROGRAM - JULIMAR STATE FOREST

PREPARED FOR:

CHALICE MINING LIMITED



JULY 2021

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1. INTRODUCTION

Chalice Mining Limited (Chalice) is a mineral exploration company headquartered in Perth, Western Australia and listed on the Australian Securities Exchange (ASX: CHN). Chalice holds 100% of the tenements associated with the Julimar Project, which is located ~80km north-east of Perth in the Shire of Toodyay (Figure 1).

The Julimar Project commenced as part of Chalice's global search for high-potential nickel sulphide exploration opportunities. Following the identification of a 26 km long magnetic anomaly, now known as the Julimar Complex, Chalice commenced a reconnaissance exploration program on a section of private land on tenements E70/5118 and E70/5119. In March 2020, drilling intersected high-grade nickel-copper-cobalt-PGE mineralisation in the very first drill hole. Subsequent drilling has intersected further significant mineralisation, leading to the announcement of a discovery named Gonneville.

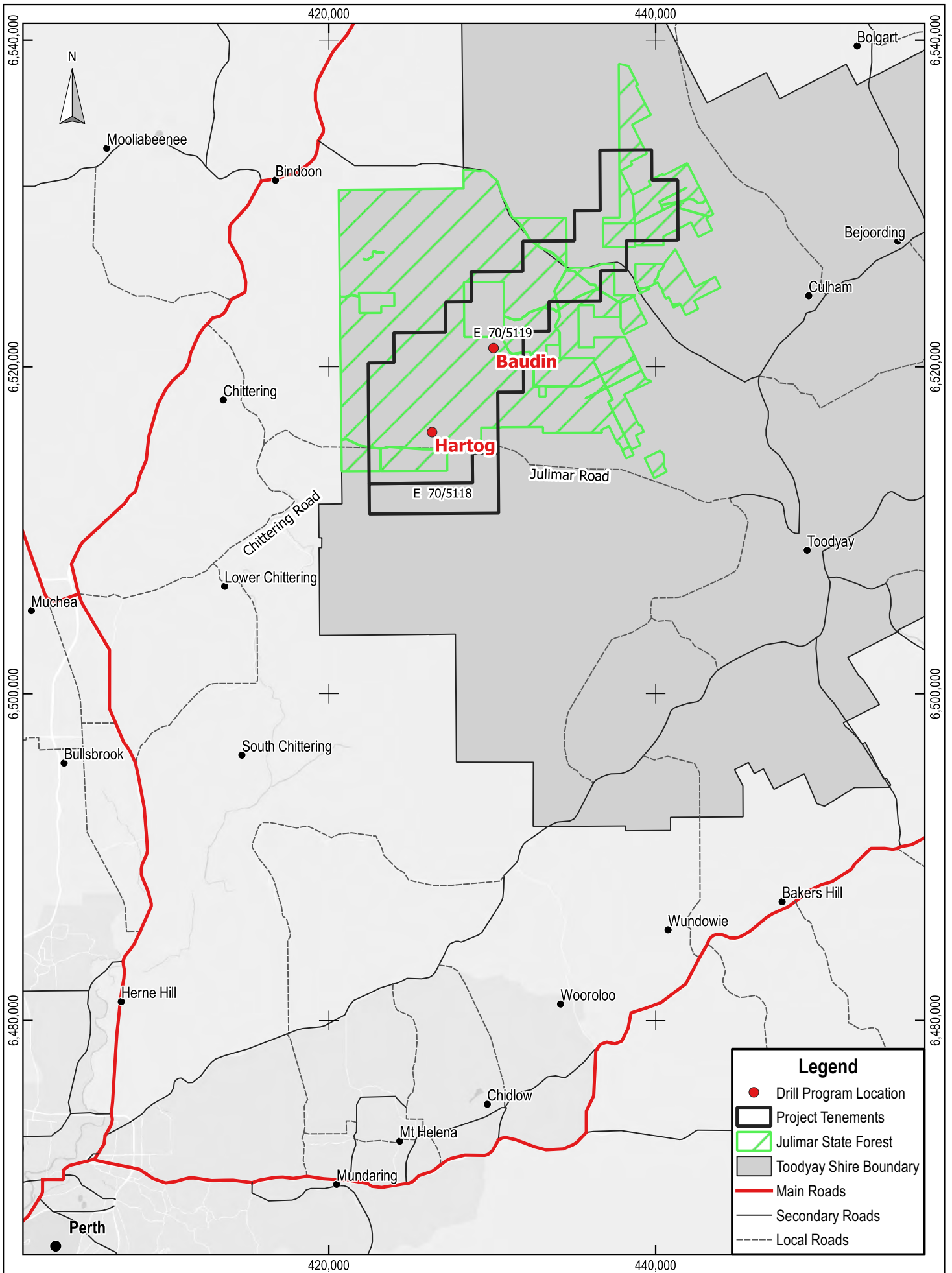
The remaining 24 km of the Julimar Complex extends north-east from Gonneville into the Julimar State Forest. In 2020, Chalice defined an exploration corridor that aligned with the Julimar Complex, covering an area of 7,387 ha or 20% of the Julimar State Forest, on E70/5119. Chalice commenced low impact non-ground disturbing activities, comprising soil sampling and geophysical surveys, within this corridor in January 2021. These activities were strictly governed by a Conservation Management Plan endorsed by the Minister of Environment in December 2020.

Soil sampling and geophysical surveys within Julimar State Forest have demonstrated the presence of potential mineralisation at specific targets. Chalice now wishes to undertake further exploration at two targets within Julimar State Forest, known as Hartog and Baudin, using low-impact drilling techniques at 72 proposed drill sites on tenement E70/5119 (Figure 2).

No mechanised vegetation clearing is proposed. To minimise impacts to vegetation, small track mounted drill rigs with closed-loop drilling fluid systems will be used, negating the need to construct cleared drill pads, sumps, and access tracks. The use of small track-mounted drill rigs and support vehicles, rather than conventional larger wheeled rigs and vehicles, minimises the impact on vegetation, allowing root stock and soil profile (including seed bank) to remain intact, and vegetation to recover once the drill rig and support vehicles have passed over the area. Drill rigs and support vehicles will utilise existing tracks and/or firebreaks where possible (approx. 30% of drill sites) and drill rigs and all support vehicles will be configured in tandem to further reduce the overall footprint associated with set up and operation of drilling activities. It is estimated that total vegetation disturbance resulting from the proposed drilling program will be approximately 4.4 ha. Chalice is applying for 4.4 ha of native vegetation disturbance within a 117.8 ha Purpose Permit Area to ensure adequate allowance within the Permit for potential realignment or reconfiguration to avoid conservation significant species or fauna habitat that may be identified through ongoing surveys and monitoring of proposed off-track access routes and drill sites.

Regulation 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the Clearing Regulations) lists clearing undertaken for the purpose of exploration as 'prescribed clearing' which, in accordance with Section 51C of the *Environmental Protection Act 1986* (EP Act) is exempt from requiring a Native Vegetation clearing Permit (NVCP). However, exemptions only apply if the proposed clearing is not within an Environmental Sensitive Area (ESA). Julimar State Forest is gazetted under the *Conservation and Land Management Act 1984* and is recognised as an ESA and as such the exemption does not apply. The purpose of this document is to support application for a NVCP Purpose Permit under the EP Act to allow disturbance of native vegetation within an ESA which will accompany a future Programme of Work (POW) submission.

A draft *Hartog and Baudin Low Impact Exploration Drilling Program Conservation Management Plan* (CMP, Chalice 2021) has been submitted to the Department of Biodiversity, Conservation and Attractions (DBCA) for review and endorsement by the Minister for Environment as per Section 24 (6B) of the Mining Act 1978.



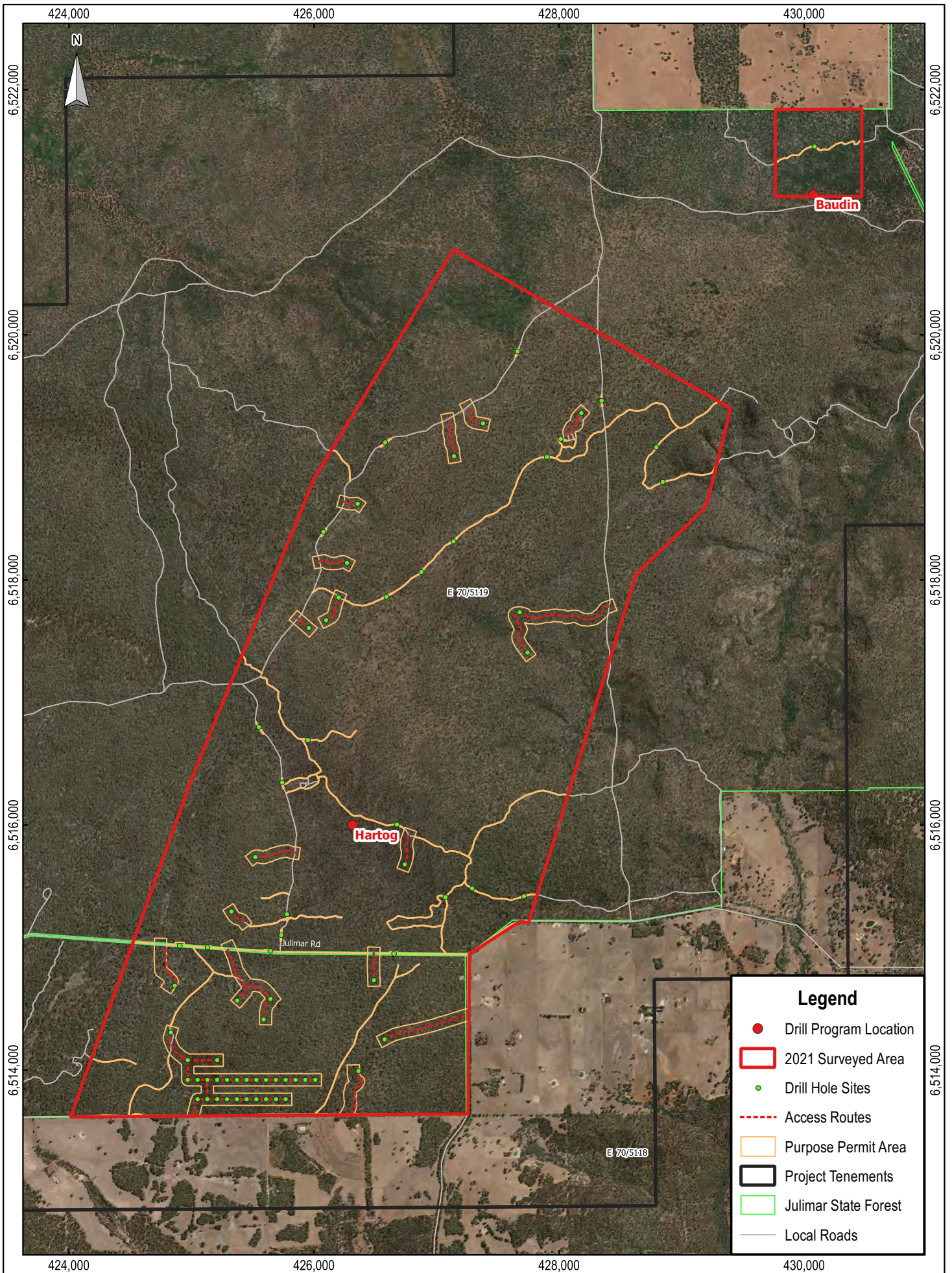
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 Image: Copernicus Sentinel Data 2020
 Grid: GDA94 / MGA zone 50

0 5 10 km

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 Julimar Exploration Project
 Hartog and Baudin
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Figure 1
Julimar Exploration Project Location

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Scale: 1: 40,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 0.5 1 km

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Figure 2
Drill Program Design and
Purpose Permit Area

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2. ACCESS AND TENURE

The location of the proposed exploration drilling program is highly favourable for the purposes of site access, proximity to logistical routes, access to local workforce and townships and proximity to emergency facilities such as hospital, police and fire departments. Access to the Julimar Project from Great Northern Highway is south via Chittering Road (Figure 1), east to Julimar Road and south along Keating Road (Figure 3). The Chalice site office is located on private property accessed via Keating Road. The drill program will be accessed from either (Figure 3):

- Ferguson Road (via Julimar Road) and the network of existing tracks north of Julimar Road.
- Access track via Keating Road adjoining the private property, adjacent to the Chalice site office.

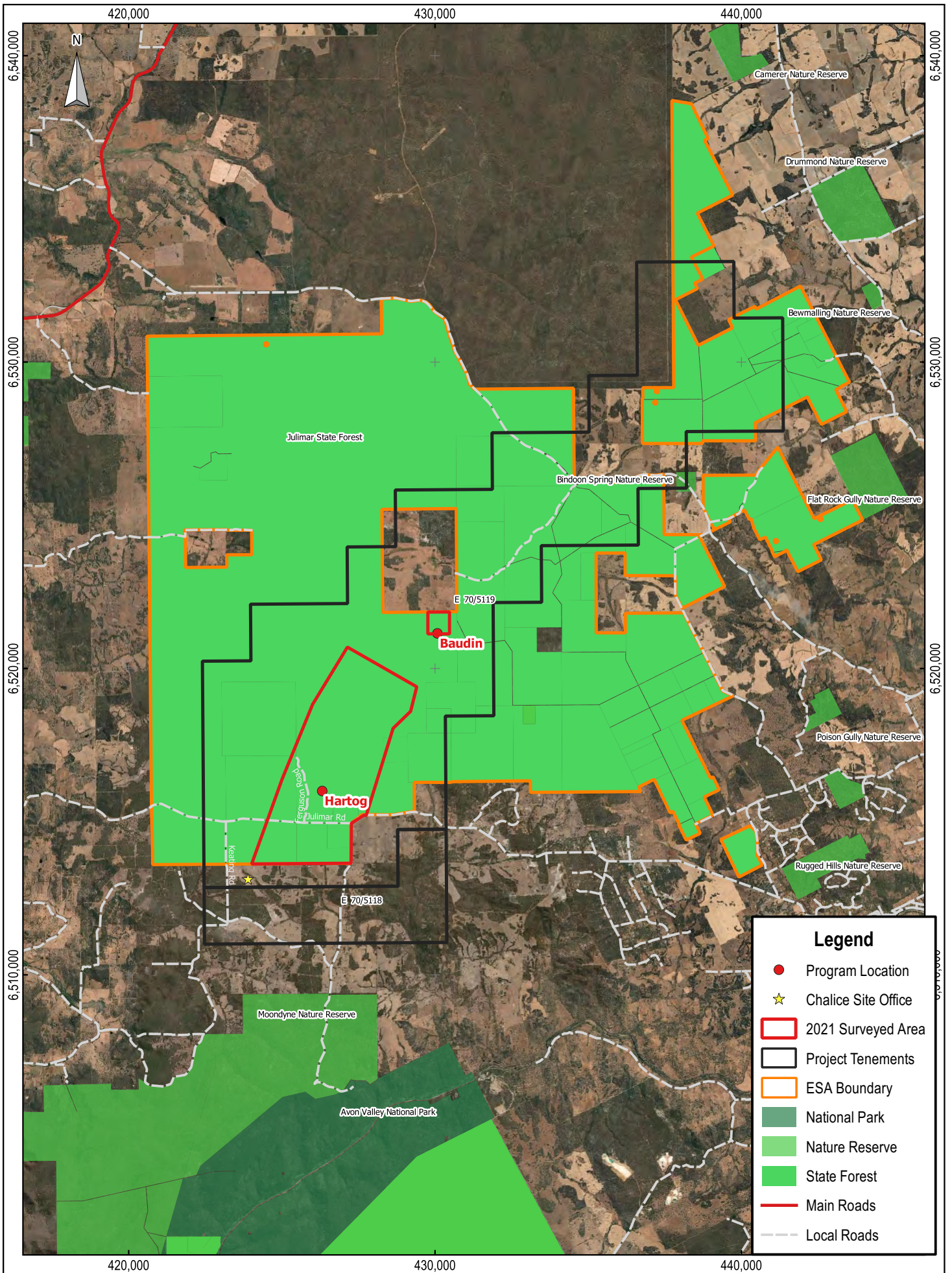
The Julimar Project comprises tenements E70/5118 and E70/5119 which overlie a combination of agricultural land (farmland) and State Forest. The Hartog and Baudin targets lie completely within E70/5119, of which most of the tenement (75%) is within Julimar State Forest and therefore the associated ESA (Figure 3). Tenement E70/5119 is 100% held by Chalice. A summary of the tenement details is provided in Table 1.

Table 1: Tenement Details

| Tenement | Tenement Holder | Area (ha) | Grant Date | Expiry Date | Portion Within State Forest ha (%) |
|----------|----------------------------------|-----------|------------|-------------|------------------------------------|
| E70/5119 | Chalice Gold Mining (WA) Pty Ltd | 13,800 | 31/01/2018 | 29/08/2024 | 10,316 (75%) |

Julimar State Forest covers 28,192 ha of native bushland which is now primarily used for recreation and conservation purposes. Under the Forest Management Plan 2014 – 2023 (CCWA 2013), Julimar State Forest is proposed to become a Forest Conservation Area. These areas are managed for biodiversity values and are not available for timber harvesting, but other uses, including mining, may be permitted. Julimar State Forest is frequently used by the public for outdoor recreational purposes such as camping, hiking, tourism, and 4-Wheel Driving. Access to the Forest by the public is not restricted or actively controlled.

Several other Nature Reserves and National Parks surround the Project tenements, none which overlap the Hartog and Baudin targets (Figure 3). The Camerer, Drummond and Bewmalling Nature Reserves are located to the north and Bindoon Spring, Flat Rock Gully, Poison Gully and Rugged Hills Nature Reserves lie to the east. The Moondyne Nature Reserve and the Avon Valley National Park are south of E70/5118. The Moondyne Nature Reserve covers an area of approximately 2,000 ha and is a significant refuge for endemic flora species of the region, supporting species characteristic of northern sand heaths and woodlands (Mattiske 2019). The Avon Valley National Park covers an area of approximately 4,800 ha and contains diverse flora in Jarrah and Marri woodlands (Mattiske 2019).



Legend

- Program Location
- ★ Chalice Site Office
- ▭ 2021 Surveyed Area
- ▭ Project Tenements
- ▭ ESA Boundary
- ▭ National Park
- ▭ Nature Reserve
- ▭ State Forest
- Main Roads
- Local Roads

Scale: 1: 160,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 2.5 5 km

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Figure 3

Access and Tenure

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3. BASELINE ENVIRONMENT

3.1 CLIMATE

The Purpose Permit Area is situated within the Avon Wheatbelt region of Western Australia, which experiences a Mediterranean climate characterised by cool, wet winters and hot, relatively dry summers. A Bureau of Meteorology (BoM) weather station capturing weather and climate representative of the area is located approximately 33 km south west of Julimar State Forest, at the Pearce RAAF Base (Site 9053) near Bullsbrook. Temperatures recorded from the station (Chart 1) indicate a mean (based on 59 years of data) maximum temperature of 25.2°C (BoM 2021) and minimum temperature of 12.2°C (BoM 2021). Average maximum temperatures (33.5°C) peak in January (BoM 2021), and average minimum temperatures (8.2°C) are experienced in August (BoM 2021).

Rainfall data from BoM weather station Julimar Forest (site 9268) indicates mean annual rainfall is 518.9 mm (BoM 2021) and peaks in July (Chart 1), with an average of 100.6 mm for the month. Annual precipitation falls predominantly in late autumn and winter (May – August).

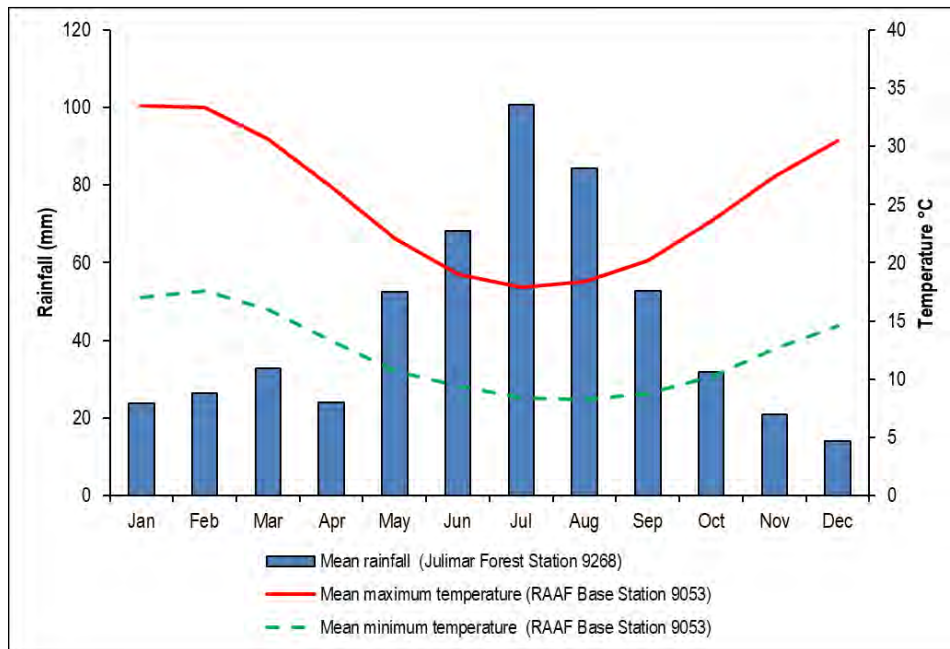


Chart 1: Julimar & Pearce RAAF Base Climate Data (BoM 2021)

3.2 LANDSCAPE AND LAND SYSTEMS

The Purpose Permit Area is located within the Jarrah Forest bioregion as described by the Interim Biogeographic Regionalisation for Australia (IBRA) and is described as duricrusted plateau of the Yilgarn Craton, characterised by jarrah (*Eucalyptus marginata*) – marri (*Corymbia calophylla*) forest on laterite gravels and, in eastern parts, by wandoo (*Eucalyptus wandoo*) – marri woodlands on clayey soils. Eluvial and alluvial deposits support Agonis shrublands, and in areas of Mesozoic sediments, jarrah forests occur in a mosaic with a variety of species rich shrublands (Biologic 2021).

The Jarrah Forest bioregion is classified into two subregions, Northern Jarrah Forest (JAF01) and Southern Jarrah Forest (JAF02), of which the Purpose Permit Area is located within the Northern Jarrah Forest subregion. The Northern Jarrah Forest subregion occupies the northern portion of the Darling Plateau to the east of the Darling Scarp (Biologic 2021). The subregion overlies Archaean granite and metamorphic rocks, and the plateau is an ancient erosion surface capped by an extensive lateritic duricrust, which has been dissected by later drainage and broken by occasional granite hills (Biologic 2021). The Hartog and Baudin targets sit upon igneous and metamorphic

rocks making up the Southwest Terrane of the Yilgarn Craton. The mineral target of the drill programs is a large interpreted mafic-ultramafic layered intrusive complex comprising nickel-copper-platinum group elements and intrusion related to vanadium-titanium mineralisation (Biologic 2021).

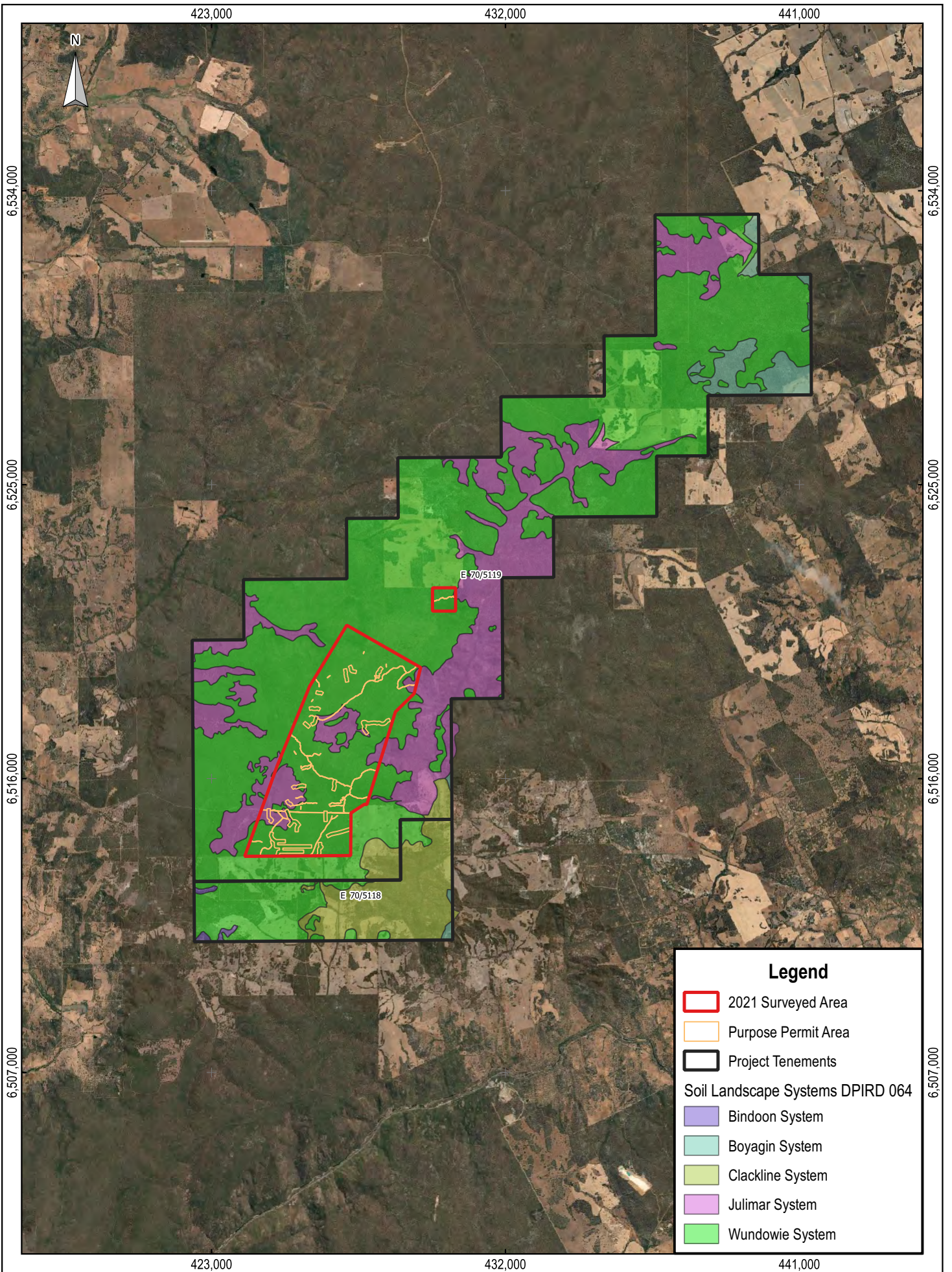
Typically, soils of the Northern Jarrah Forest subregion are defined as lateritic gravels consisting of up to 5 m or more of ironstone gravels in a yellow, sandy matrix. Related to these are the lateritic podzolic soils with ironstone gravels in a sandy surface horizon, overlying a mottled yellow-brown clay subsoil (Biologic 2021). Soils within Hartog and Baudin fall within one broad soil landscape unit, JZ2 (Biologic 2021). This unit consists of dissected plateaus having a gentle to moderately undulating relief, and with broad swampy drainage ways and basins. It is characterised by lateritic gravels and block laterite, with chief soils comprising of ironstone gravels with earthy matrices (Biologic 2021).

Land systems are broad descriptions of landform, geology and soils of which the Purpose Permit Area intersects two as described in Table 2 and shown in Figure 4.

Table 2: Land Systems of Hartog and Baudin

| Land System | Description | Mapped Extent within WA (ha) |
|-------------|--|------------------------------|
| Julimar | Moderately dissected areas with gravelly slopes and ridges and minor rock outcrop on the eastern side of the Darling Plateau over weathered granite and granitic gneiss. Loamy gravel, shallow duplexes and pale deep sand common. Wandoo woodlands. | 1,712.19 |
| Wundowie | Intact undulating lateritic terrain with minor rock outcrops in the north eastern Darling Range. "Buckshot" gravels, duricrust and some deep sands vegetated by Jarrah forest. | 309.27 |

Topography elevations range from 80 - 400 m throughout Hartog and Baudin and the main landform types prevalent throughout the landscape include hills, valleys, drainage lines and wetland. Hills consist of low undulating hills, including lower, mid and upper slopes as well as broad plateau, whilst valleys comprise of depressed areas at the bottom of hillslopes and include broad floodplains on the western and northern edges and steeper valleys on the eastern edges of the area of the proposed drill programs (Biologic 2021). Drainage lines consist of defined creeklines where vegetation is observably different from the adjacent valley and the wetland environment (Biologic 2021).



Legend

- 2021 Surveyed Area
- Purpose Permit Area
- Project Tenements
- Soil Landscape Systems DPIRD 064
- Bindoon System
- Boyagin System
- Clackline System
- Julimar System
- Wundowie System

Scale: 1: 150,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 2.5 5 km

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Figure 4

Land Systems

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3.3 FLORA AND VEGETATION

In April and May 2021, Biologic Consulting (Biologic) completed a Reconnaissance assessment and Targeted field survey across Hartog and Baudin covering an approximate area of 2,023 ha (Appendix 1).

Due to the timing of the survey, identification of conservation significant flora species collected in field could not be verified in some cases. As a precautionary approach, Chalice considers the recording of these specimens as conservation significant species.

3.3.1 Pre-European Vegetation Associations

Pre-European vegetation associations (VAs) of Western Australia were first mapped by Beard (1975) and later reinterpreted and redefined by Shepherd (*et al* 2002) to reflect national standards and the extensive clearing undertaken since the Beard mapping. The Purpose Permit Area is located within the East Darling Range Vegetation System which comprises of the pre-European VAs described in Table 3. Each VA is described as a medium woodland of jarrah, marri and wandoo (Shepherd *et al* 2002). The pre-European and current extent of the VAs within the Hartog and Baudin survey area is also shown in Table 3.

Table 3: East Darling Range Vegetation System Extent in the Hartog and Baudin Survey Area

| Code | Pre-European VA | IBRA Region | Pre-European Extent (ha) | Current Extent (ha) |
|-------|-----------------|------------------------|--------------------------|---------------------|
| 4.5 | Chittering | State | 15,467 | 9,097 |
| | | Jarrah Forest | 15,457 | 9,097 |
| | | Northern Jarrah Forest | 15,457 | 9,097 |
| 968 | East Darling | State | 12,680 | 9,767 |
| | | Jarrah Forest | 12,680 | 9,767 |
| | | Northern Jarrah Forest | 12,680 | 9,767 |
| 968.2 | Chittering | State | 45,068 | 31,580 |
| | | Jarrah Forest | 45,068 | 31,580 |
| | | Northern Jarrah Forest | 45,068 | 31,580 |

3.3.2 Vegetation Communities

Vegetation of the Jarrah Forest IBRA is predominantly jarrah and marri woodland with a common understory of banksia and allocasuarina.

Nineteen vegetation communities were identified and mapped as part of the survey. Broadly, the communities represent *Eucalyptus marginata* and *Corymbia calophylla* woodlands with *Eucalyptus wandoo* and a wetland (Biologic 2021). A description and total mapped extent of the vegetation communities present within the Hartog and Baudin survey area is provided in Table 4 and shown in Figure 5.

Over 90% of vegetation within the Hartog and Baudin survey area was rated to be in 'Excellent' condition, with the main disturbances being prescribed burns and informal tracks throughout the area (Biologic 2021).

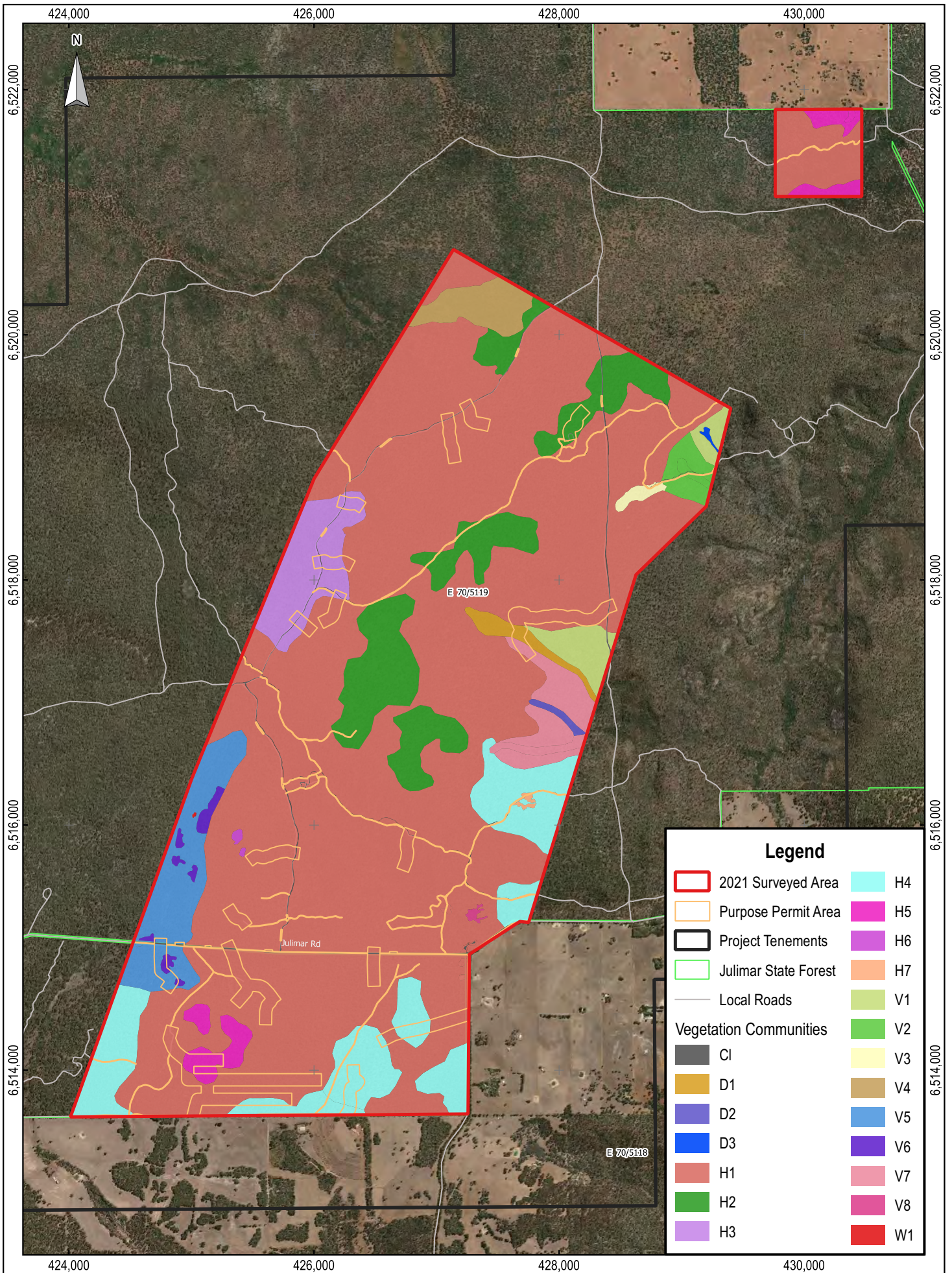
Ten vegetation communities (H1, H2, H3, H4, V1, V2, V3, V4, V5 and V8) were associated with four conservation significant flora species listed in Section 3.3.3. Conservation significant flora recorded in the DBCA database but not observed during the survey were associated with vegetation communities V1 (*Persoonia sulcata*) and H1 (*Synaphea grandis*). The vegetation communities hold importance as refuge for these species (Biologic 2021).

None of the vegetation communities were considered Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

Table 4: Vegetation Communities of the Hartog and Baudin Survey Area

| Vegetation Community | Description | Total Mapped Extent (ha) |
|----------------------|---|--------------------------|
| D1 | Mid woodland of <i>Eucalyptus accedens</i> , <i>Eucalyptus wandoo</i> and <i>Corymbia calophylla</i> over a tall shrubland of <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Xanthorrhoea preissii</i> over a low open shrubland of <i>Phyllanthus calycinus</i> , <i>Hakea lissocarpha</i> and <i>Hibbertia hypericoides</i> | 11.49 |
| D2 | Mid closed forest of <i>Corymbia calophylla</i> with isolated <i>Eucalyptus wandoo</i> trees over tall closed shrubland of <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Xanthorrhoea preissii</i> over low shrubland of <i>Bossiaea eriocarpa</i> , <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Hibbertia semipilosa</i> | 2.77 |
| D3 | Low open woodland of <i>Eucalyptus accedens</i> over tall shrubland of <i>Acacia celastrifolia</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea gracilis</i> and <i>Hakea lissocarpha</i> | 0.77 |
| H1 | Mid open forest of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over mid-tall open shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> , <i>Xanthorrhoea preissii</i> and <i>Banksia sessilis</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Styphelia retrorsa</i> and <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | 1403.19 |
| H2 | Low open woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over tall open shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> , <i>Xanthorrhoea preissii</i> and <i>Macrozamia riedlei</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Phyllanthus calycinus</i> and <i>Hakea lissocarpha</i> | 148.37 |
| H3 | Low-mid open woodland of <i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> over tall shrubland of <i>Adenanthos cygnorum</i> and <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> over low sparse shrubland of <i>Adenanthos cygnorum</i> , <i>Banksia sphaerocephala</i> var. <i>pumilio</i> and <i>Hibbertia hypericoides</i> | 57.60 |
| H4 | Mid woodland of <i>Eucalyptus wandoo</i> , <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over mid-tall open shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> and <i>Xanthorrhoea preissii</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Styphelia retrorsa</i> and <i>Hakea lissocarpha</i> | 157.79 |
| H5 | Mid woodland of <i>Eucalyptus wandoo</i> and <i>Eucalyptus accedens</i> over mid sparse shrubland of <i>Xanthorrhoea preissii</i> over low sparse shrubland of <i>Hibbertia hypericoides</i> , <i>Hakea lissocarpha</i> and <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> . | 29.49 |
| H6 | Tall sparse shrubland of <i>Xanthorrhoea preissii</i> over low shrubland of <i>Banksia fraseri</i> var. <i>fraseri</i> , <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> and <i>Hibbertia hypericoides</i> | 1.11 |
| H7 | Tall open shrubland of <i>Allocasuarina humilis</i> , <i>Xanthorrhoea preissii</i> and <i>Banksia squarrosa</i> over low open shrubland of <i>Patersonia occidentalis</i> , <i>Hibbertia hypericoides</i> and <i>Babingtonia camphorosmae</i> over low open herbland of <i>Laxmannia squarrosa</i> | 1.18 |
| V1 | Low open woodland of <i>Eucalyptus accedens</i> over tall sparse shrubland of <i>Xanthorrhoea preissii</i> and <i>Macrozamia riedlei</i> over low open shrubland of <i>Bossiaea eriocarpa</i> , <i>Hakea lissocarpha</i> and <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | 27.36 |
| V2 | Mid woodland of <i>Eucalyptus wandoo</i> and <i>Eucalyptus accedens</i> over mid-tall open shrubland of <i>Acacia lasiocarpa</i> var. <i>sedifolia</i> and <i>Xanthorrhoea preissii</i> over low open shrubland of <i>Hibbertia hypericoides</i> | 16.07 |
| V3 | Mid open woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> with isolated <i>Eucalyptus wandoo</i> trees over tall open <i>Banksia sessilis</i> shrubland over mid shrubland of <i>Daviesia angulata</i> and <i>Xanthorrhoea preissii</i> over low shrubland of <i>Babingtonia camphorosmae</i> , <i>Melaleuca trichophylla</i> and <i>Styphelia retrorsa</i> | 4.13 |

| Vegetation Community | Description | Total Mapped Extent (ha) |
|----------------------|--|--------------------------|
| V4 | Mid isolated <i>Corymbia calophylla</i> trees over tall, scattered <i>Hakea undulata</i> and <i>Adenanthos cygnorum</i> shrubs over mid closed shrubland of <i>Gastrolobium calycinum</i> and <i>Leptospermum erubescens</i> | 28.32 |
| V5 | Mid open woodland to isolated trees of <i>Eucalyptus wandoo</i> , <i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> over tall open shrubland of <i>Leptospermum erubescens</i> , <i>Banksia squarrosa</i> and <i>Adenanthos cygnorum</i> over low open shrubland of <i>Bossiaea eriocarpa</i> , <i>Babingtonia camphorosmae</i> and <i>Styphelia retrorsa</i> | 71.80 |
| V6 | Tall closed shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> and <i>Banksia sessilis</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Calytrix</i> sp. indet 2, and <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> | 7.33 |
| V7 | Mid open forest of <i>Eucalyptus wandoo</i> over mid-tall open shrubland of <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Xanthorrhoea preissii</i> over low open shrubland of <i>Gastrolobium calycinum</i> and <i>Bossiaea eriocarpa</i> | 39.95 |
| V8 | Tall closed shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> , <i>Leptospermum erubescens</i> and <i>Allocasuarina huegeliana</i> over low open shrubland of <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | 1.17 |
| W1 | Wetland | 0.09 |
| Cl | Cleared | 12.84 |
| Survey Total | | 2,022.82 |



Scale: 1: 40,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 0.5 1 km

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Figure 5
Vegetation Communities

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3.3.3 Significant Flora Species

Database searches of the area surrounding the Hartog and Baudin survey area were undertaken as part of the desktop assessment and identified 15 Threatened Federal and State listed flora species, seven Priority 1, 19 Priority 2, 16 Priority 3 and 21 Priority 4 listed species as likely to occur.

The flora survey recorded 127 native vascular plant taxa and three introduced vascular plant taxa.

Of the 78 conservation significant flora species potentially occurring in the Hartog and Baudin survey area, the following species of significance were recorded during the survey and are shown in Figure 6.

- *Conospermum densiflorum subsp. unicephalatum* (T (EPBC Act and BC Act)).
- *Drosera sewelliae* (P2).
- *Beaufortia eriocephala* (P3).
- *Lasiopetalum caroliae* (P3).

DBCA database records indicate the presence of Priority 4 species *Persoonia sulcata* and *Synaphea grandis* within the Hartog and Baudin survey area (Figure 6). Existing records were visited during the survey for further assessment of the populations; however, the populations of these species could not be identified. (Biologic 2021). Collections made from the vicinity of the records has subsequently determined both species as other, non-conservation significant species, but of the same genus. It is recognised the timing of the survey was not optimal for flowering and as such there is potential that more than one species of the genus co-occurs in proximity (Biologic 2021). Additional targeted spring surveys will revisit these areas to resolve this discrepancy. Until this time, Chalice will take the precautionary approach and assume both P4 species are present at the DBCA noted locations.

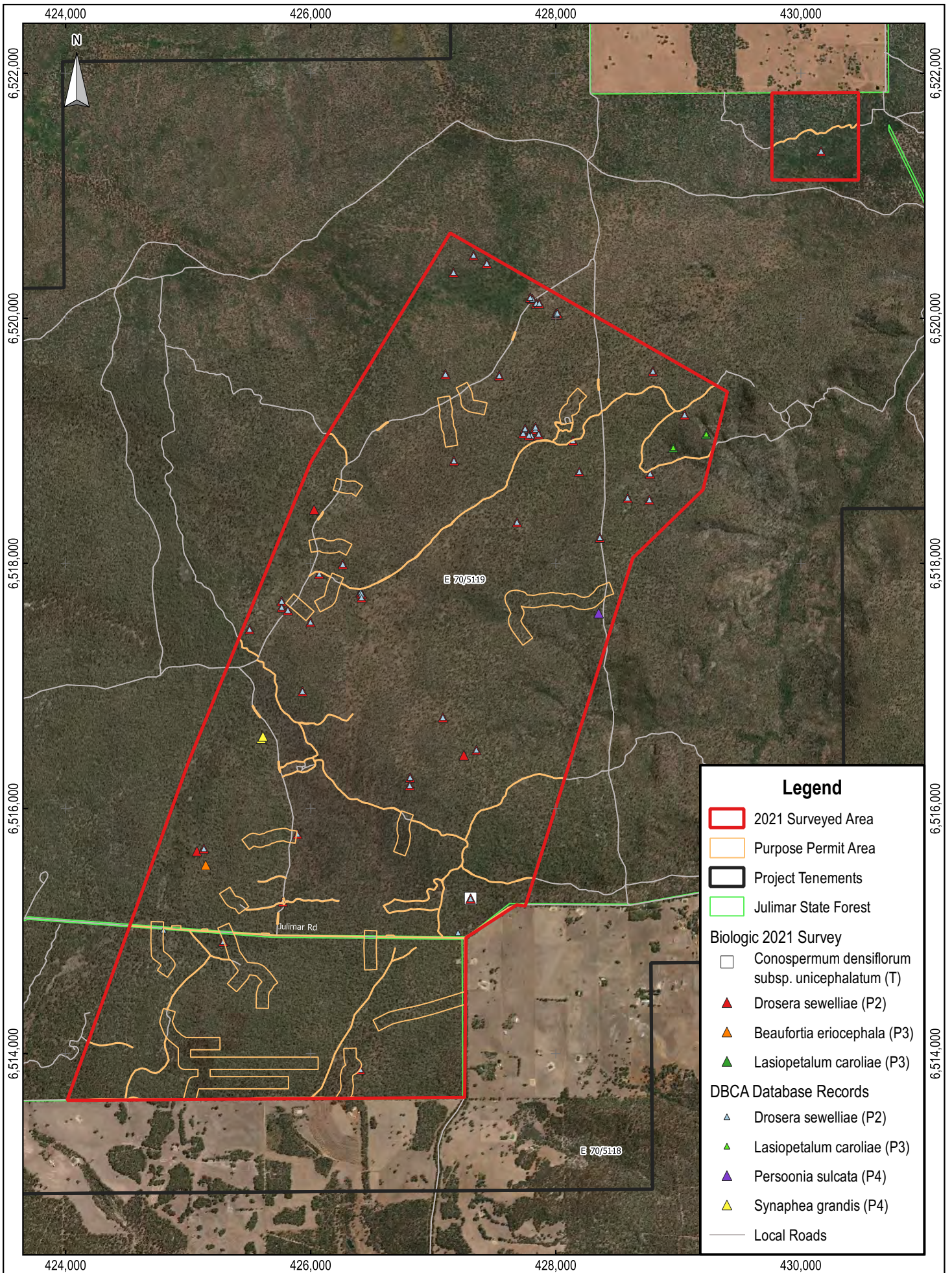
Due to specimens lacking fruit/flower and the size of the survey area, additional presence of Threatened and Priority species is considered possible. However, ground-truthing of the known locations and potential habitat of conservation significant flora within the Purpose Permit Area indicates Threatened flora are unlikely to occur (Biologic 2021). Further Targeted survey of conservation significant species will be undertaken of the Purpose Permit Area in Spring 2021. Previously recorded locations will be re-visited to confirm the results of the Reconnaissance and Targeted survey.

3.3.4 Weeds

Introduced flora species recorded during survey include those listed below, with none recognised as Weeds of National Significance (WoNS) or Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (WA):

- *Aira caryophyllaceus*.
- *Ursinia anthemoides*.
- *Solanum nigrum*.

All introduced species were recorded outside the Disturbance Footprint, with one record of *Ursinia anthemoides* occurring within the Purpose Permit Area. Overall, the majority of the survey area was free of any introduced weed species (Biologic 2021).



Legend

- 2021 Surveyed Area
- Purpose Permit Area
- Project Tenements
- Julimar State Forest

Biologic 2021 Survey

- Conospermum densiflorum* subsp. *unicephalum* (T)
- ▲ *Drosera sewelliae* (P2)
- ▲ *Beaufortia eriocephala* (P3)
- ▲ *Lasiopetalum caroliae* (P3)

DBCA Database Records

- ▲ *Drosera sewelliae* (P2)
- ▲ *Lasiopetalum caroliae* (P3)
- ▲ *Persoonia sulcata* (P4)
- ▲ *Synaphea grandis* (P4)
- Local Roads

Scale: 1: 40,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 0.5 1 km

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Figure 6
Conservation Significant
Flora

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3.3.5 *Phytophthora* Dieback

To date, no formal assessment for the presence of *Phytophthora* Dieback (Dieback) has been undertaken within the Hartog and Baudin survey area or within Julimar State Forest. A previous desktop assessment concluded that although the vegetation in the Julimar area is thought to have a medium susceptibility to *Phytophthora* Dieback, there are no known disease positive sample points recorded (to 30 June 2018) for the State Forest (Mattiske 2019).

Chalice commissioned Glevan Consulting (Glevan) to undertake a Dieback assessment of the Gonneville target on private farmland adjacent to the southern boundary of the Julimar Forest in June 2020. No Dieback infestations were observed over the 132 ha assessment area. Of the eligible survey area approximately 60% was assessed as Dieback uninfected and protectable with the remaining assessed as uninterpretable due to the lack of reliable indicator species (Glevan 2020).

Chalice has engaged Glevan to undertake a Linear Dieback Assessment of the Hartog and Baudin drill program and associated forest tracks in Q3 2021 which encompasses the Purpose Permit Area. The purpose of the assessment is to determine the inherent risk of spread and/or introduction of dieback throughout Hartog and Baudin and identify protectable areas which may require further management.

3.4 TERRESTRIAL FAUNA AND HABITATS

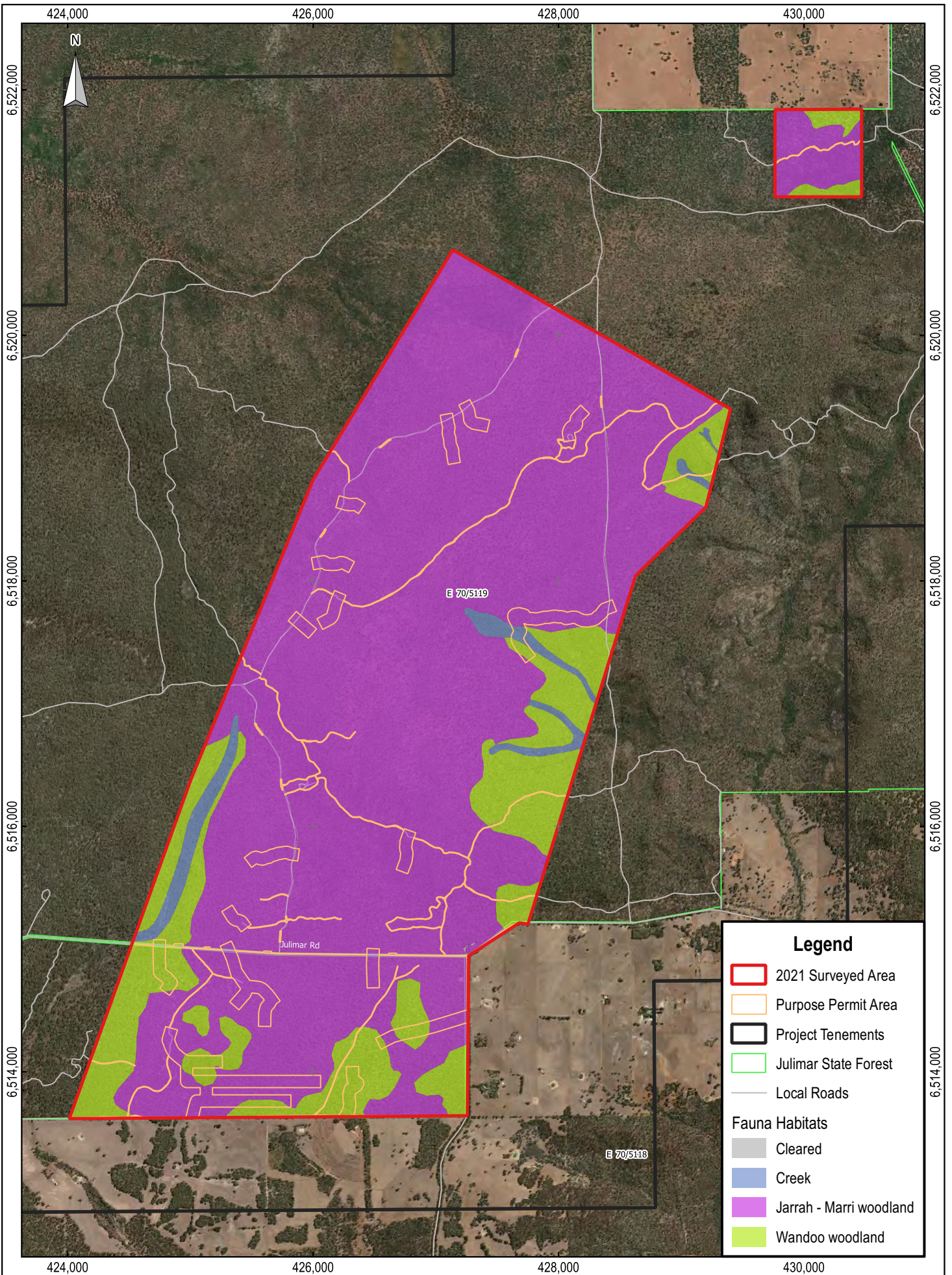
In April and May 2021 Western Wildlife (WW) completed a Basic Vertebrate Fauna survey and Targeted Mammal survey across Hartog and Baudin covering an approximate area of 2,023 ha. The baseline fauna survey consisted of fauna habitat identification and mapping, deployment of camera traps at 20 locations and opportunistic recordings. The fauna survey report is provided in Appendix 2.

3.4.1 Fauna Habitat

The survey identified three fauna habitats as described in Table 5 and shown in Figure 7. Jarrah-marri woodlands account for most of the habitat identified throughout the Hartog and Baudin survey area with wandoo woodlands generally surrounding creek habitats in areas of lower topography. The habitats are common in the Northern Jarrah Forest IBRA subregion and are therefore not locally restricted. However, the habitats are of importance because large, intact remnant vegetation areas such as Julimar State Forest are less vulnerable to the impacts of habitat fragmentation as seen through the subregion and increase the likelihood of faunal populations persisting long term (WW 2021). All three habitats are known to support significant species recorded during the survey (WW 2021).

Table 5: Fauna Habitats of the Hartog and Baudin Survey Area

| Habitat Type | Habitat Description | Total Mapped Extent (ha) |
|-----------------------|--|--------------------------|
| Jarrah-marri Woodland | Occurs on higher ground on lateritic sandy gravels with occasional surface rock outcropping. Canopy is mostly marri and jarrah with occasional Wandoo and Bull Banksia in the mid story. Understory is a mixture of low mixed shrubs dominated by <i>Hibbertia hypericoides</i> . Thickets of <i>Banksia sessilis</i> (Parrot Bush) and/or <i>Banksia squarrosa</i> (Pingle) are also present. | 1,643.19 |
| Wandoo Woodland | Occurs mainly on lower slopes and valleys on pale clay-loams. Canopy is mostly wandoo with scattered marri and jarrah. Powderbark wandoo present on lateritic rises. Often sparse understorey consisting of mixed shrubs and grass trees. Large hollow trees present. | 323.56 |
| Creek | Consists of small seasonal or ephemeral channels, with understory which is either open and sparse, shrubby or dense patches. | 43.23 |
| Cleared | Includes existing forest tracks and roads. Provides limited value to fauna species. | 12.84 |
| Survey Total | | 2022.82 |



Scale: 1: 40,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 0.5 1 km

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Figure 7

Fauna Habitats

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3.4.2 Significant Fauna Species

The baseline fauna survey recorded the presence of one frog, three reptiles, 39 birds and 12 mammal faunal assemblages within the Hartog and Baudin survey area.

Database searches of a 40 km area surrounding the proposed drill program were undertaken as part of the desktop assessment. Fifteen conservation significant species have the potential to occur within the survey area. This included six Threatened, one Priority 3 (P3) and three Priority 4 (P4) listed fauna, as well as one Migratory species, two Specially Protected species and one Locally Significant species.

Four Threatened fauna species listed under the EPBC Act and BC Act were recorded during the survey. Two Priority 4 DBCA listed species were also recorded. These are shown in Figure 8 and include:

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*). Threatened.
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). Threatened.
- Chuditch (*Dasyurus geoffroii*). Threatened.
- Woylie (*Bettongia penicilata ogilbyi*). Threatened.
- Tamar Wallaby (*Notamacropus eugenii derbianus*). Priority 4.
- Western Brush Wallaby (*Notamacropus irma*). Priority 4.

Carnaby's Black Cockatoo is listed as Endangered under the BC Act and EPBC Act. It is known from many records within 20 km of the Purpose Permit Area and its population is estimated to be about 40,000 (WW 2021). The Julimar Exploration Project is in the Bindoon - Julimar Key Biodiversity Area, an area that supports at least 1% of the breeding population as well as providing foraging habitat (WW 2021). The species typically breeds in the Avon-Wheatbelt region, nesting in large hollows of *Eucalyptus salmonophloia* and *Eucalyptus wandoo* but has now started breeding in areas further west and south than their traditional breeding range (WW 2021). All woodland habitats present within the Purpose Permit Area offer foraging habitat for the birds. Foraging evidence was recorded during the survey, but no roosting evidence (Figure 8).

The Forest Red-tailed Black-Cockatoo is listed as Vulnerable under the BC Act and EPBC Act. It is patchily distributed through its range with the population size estimated to be 15,000 birds (WW 2021). The species occurs in jarrah, marri and karri forests between Gingin to the north, Albany to the south, and east to Mt Helena, North Bannister and Rocky Gully (WW 2021) and nests in tree hollows. Evidence of the species foraging was recorded during the fauna survey, and nearby calling was also heard (Figure 8). The jarrah – marri woodland and creek habitats are foraging habitat for this species (WW 2021). No evidence of roosting was recorded, but woodland areas may provide roosting habitat.

The Chuditch is listed as Vulnerable under the BC Act and EPBC Act. The Chuditch used to occur across much of Australia, but is now restricted to the south west of WA, mostly drier woodlands, heath and mallee shrubland habitats of the Jarrah Forest and to a lesser extent the Wheatbelt (WW 2021). There are many records within 20 km of the Hartog and Baudin survey area and the reintroduction of the species to Julimar State Forest in the 1990s is now considered by the DBCA to be one of the healthiest Chuditch populations in WA (WW 2021). The Chuditch was recorded on 17 of the 20 camera traps deployed during the fauna survey (Figure 8) and is likely a breeding resident occurring in all habitats, denning in hollow logs, rock piles and possibly tree hollows (WW 2021).

The Woylie is listed as Endangered under the EPBC Act and Critically Endangered under the BC Act. The Woylie was formerly widespread across much of Australia south of the tropics, but has suffered significant population decline due to predation, habitat loss and changed fire regimes and is now restricted to four subpopulations in WA (WW 2021). There are translocated populations at Julimar State Forest, as well as at Avon Valley National Park (Figure 3), although the latter translocations are thought to have not been successful (WW 2021). The species is known to inhabit woodlands and heath with dense protective understory and habitat critical to its survival is considered to include tall eucalypt forests or woodlands, dense myrtaceous shrubland and proteaceous or mallee heath. The Woylie is known from five records within 20 km of the Hartog and Baudin survey area and was recorded

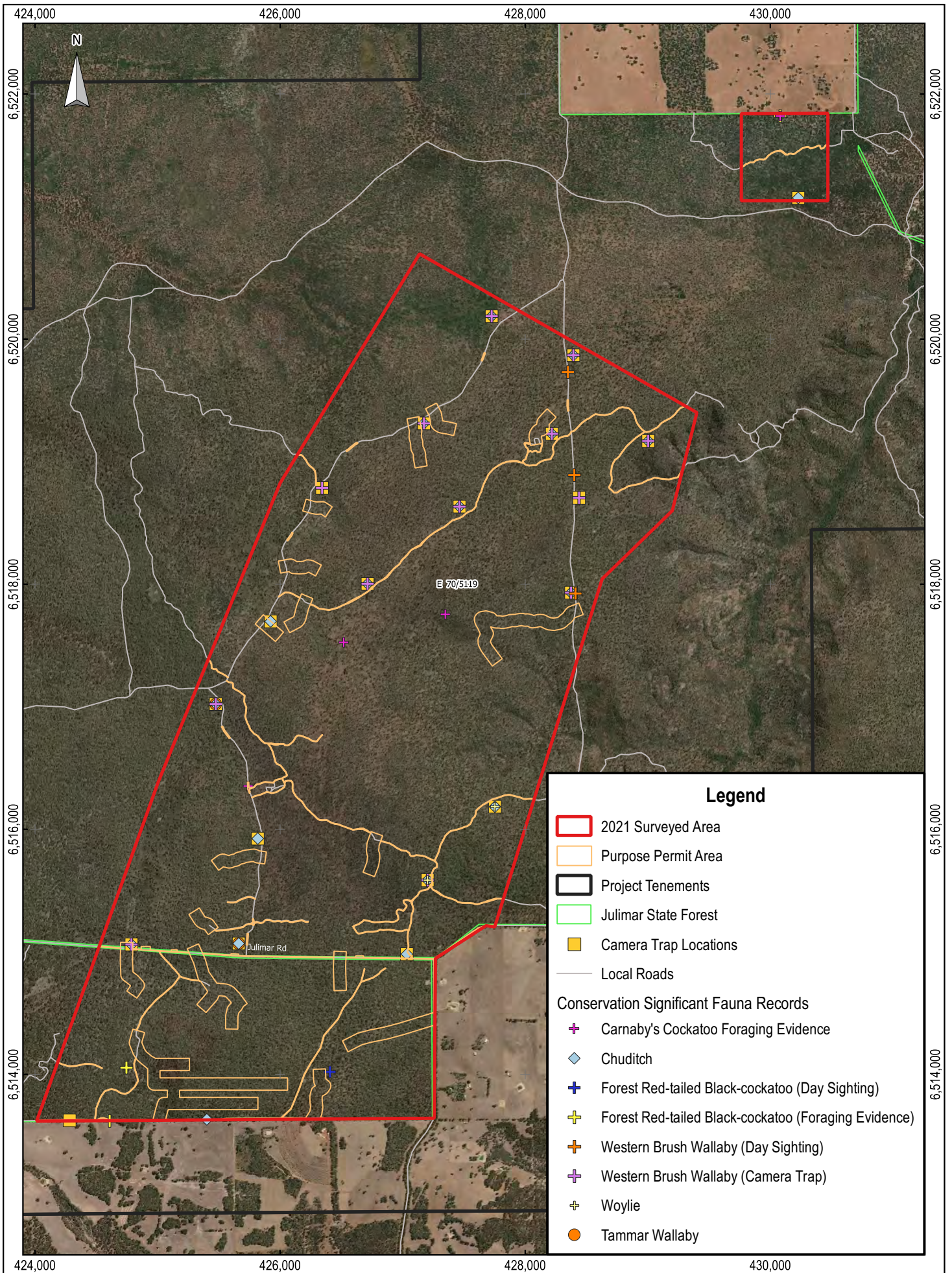
on two camera traps deployed during the survey (Figure 8). The species is a likely breeding resident of the State Forest (WW 2021).

The Tammar Wallaby and Western Brush Wallaby are both listed as Priority 4 by the DBCA. The Tammar Wallaby was once widespread in south western Australia, but now occurs only on islands and in several reserves and National Parks (WW 2021). Translocated populations occur in Julimar State Forest. This species inhabits dense vegetation during the day, foraging in open grassy areas at night (WW 2021) and was recorded on two of the 20 camera traps deployed during the survey (Figure 8), potentially occurring across all mapped habitats. The Western Brush Wallaby occurs in areas of forest or woodland where there is a dense, shrubby understory. This species was recorded on 13 of the 20 camera traps deployed during the survey (Figure 8) and one day sighting, indicating it is relatively common in the Hartog and Baudin area. The Western Brush Wallaby is likely to occur in all mapped habitats, resting in dense vegetation during the day and foraging on grasses at night (WW 2021).

3.4.3 Introduced Species

Of eight potentially occurring introduced fauna species (WW 2021), five were recorded during the survey including:

- Laughing Kookaburra (*Dacelo novaeguineae*).
- Cat (*Felis cattis*).
- Rabbit (*Oryctolagus cuniculus*).
- Pig (*Sus scrofa*).
- Red Fox (*Vulpes vulpes*).



Legend

- 2021 Surveyed Area
- Purpose Permit Area
- Project Tenements
- Julimar State Forest
- Camera Trap Locations
- Local Roads

Conservation Significant Fauna Records

- + Carnaby's Cockatoo Foraging Evidence
- ◇ Chuditch
- + Forest Red-tailed Black-cockatoo (Day Sighting)
- + Forest Red-tailed Black-cockatoo (Foraging Evidence)
- + Western Brush Wallaby (Day Sighting)
- + Western Brush Wallaby (Camera Trap)
- + Woylie
- Tammar Wallaby

Scale: 1: 40,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 0.5 1 km

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Figure 8
Conservation Significant Fauna

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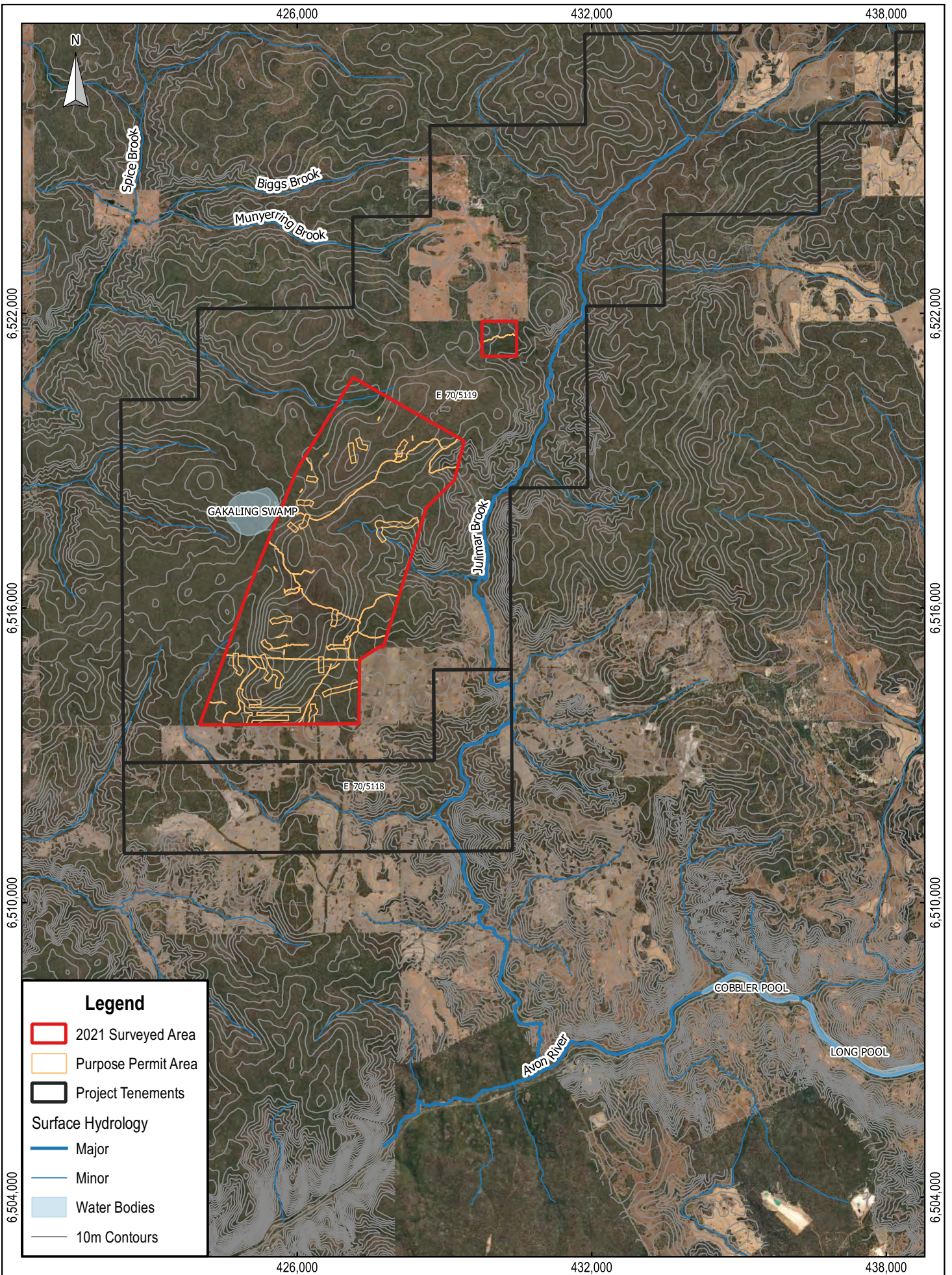
3.5 SURFACE WATER AND GROUNDWATER

Rivers are the only water feature of subregional significance in the Northern Jarrah Forest IBRA subregion (Biologic 2021). The water courses of the subregion are dominated by the creation of water storage structures (dams and reservoirs) within the forested catchment primarily to provide potable water to the Perth metropolitan area and irrigation horticulture and agriculture (Biologic 2021). Hartog and Baudin are in the Brockman River subcatchment within the Swan-Avon Main-Avon Catchment of the Swan Coastal Basin.

There are three un-named, minor watercourses within 1 km of the Purpose Permit Area (Figure 9). Two of the watercourses form tributaries to Julimar Brook. One passes through the mid-eastern side of the Hartog target and intersects the Purpose Permit Area, the other in the south eastern corner of E70/5119 does not intersect the Purpose Permit Area (Figure 9). These minor watercourses originate from Julimar State Forest in the north, flow north west to south east through Hartog and Baudin entering Julimar Brook approximately 3.2 km to the east. Julimar Brook then feeds into the Avon River 5.6 km south of this confluence. The third un-named watercourse, south of Munyerring Brook in the northern portion of Hartog (Figure 9) flows into the Brockman River via Spice Brook and ends in the Chittering-Needonga lakes. Gakaling Swamp is located 3.5 km west of the Area Permit (Figure 9).

Limited groundwater data is available for the Purpose Permit Area. Groundwater is likely to occur in low yielding, fractured rock aquifers. Water for drilling activities will be sourced from ex- agricultural bores on surrounding farmland on E70/5118 and E70/5119 and will be transported to drill sites within the State Forest using a light vehicle and trailer mounted tank.

The Purpose Permit Area occurs within proclaimed surface water and groundwater areas under the *Rights in Water and Irrigation Act 1914* (RIWI Act).



Scale: 1: 100,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 1 2 km

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Figure 9
Surface Water Hydrology

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4. PROPOSED LAND CLEARING

Chalice is applying for a total 4.4 ha of native vegetation disturbance within a Purpose Permit Area of 117.8 ha to ensure adequate allowance for potential realignment or reconfiguration of the drilling program to avoid conservation significant species or fauna habitat that may be identified through ongoing surveys of proposed off-track access routes and drill sites. A breakdown of the Purpose Permit Area and proposed disturbance at each drill site and associated access routes is shown in Table 6 and shown in Figure 10a to Figure 10e.

Table 6: Breakdown of Proposed Disturbance

| Purpose Permit Reference | Purpose Permit Area (ha) | Proposed Disturbance (ha) |
|--------------------------|--------------------------|---------------------------|
| 1 | 3.15 | 0.11 |
| 2 | 4.11 | 0.16 |
| 3 | 3.19 | 0.11 |
| 4 | 2.12 | 0.06 |
| 5 | 3.37 | 0.12 |
| 6 | 3.23 | 0.11 |
| 7 | 2.19 | 0.06 |
| 8 | 12.89 | 0.60 |
| 9 | 3.46 | 0.12 |
| 10 | 4.41 | 0.17 |
| 11 | 2.34 | 0.07 |
| 12 | 4.80 | 0.19 |
| 13 | 3.20 | 0.11 |
| 14 | 10.25 | 0.46 |
| 15 | 28.01 | 1.38 |
| 16 | 4.60 | 0.20 |
| 17 | 7.70 | 0.36 |
| Existing forest tracks | 14.80 | - |
| Total (ha) | 117.80 | 4.39 |

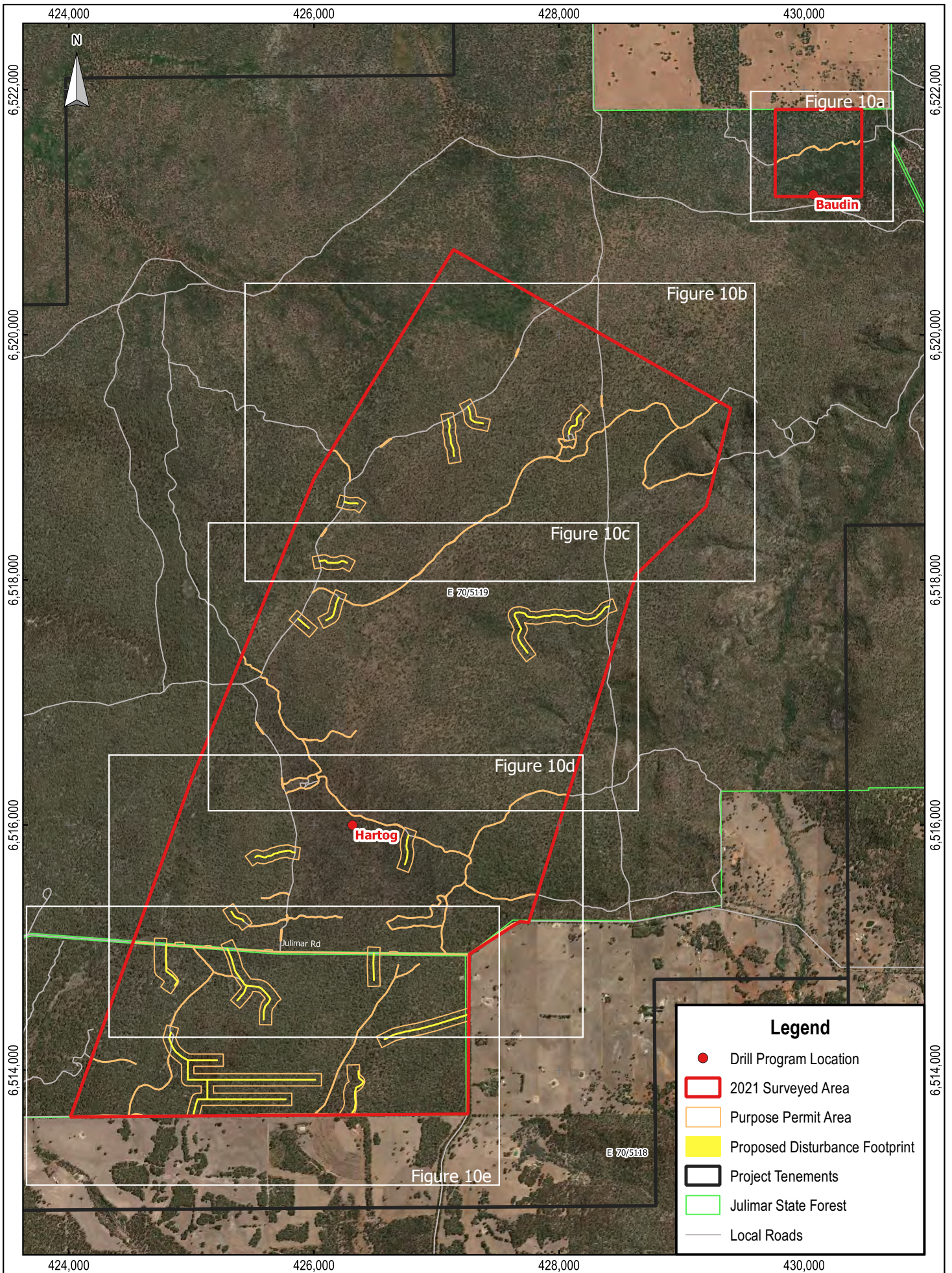
The proposed drilling program consists of a total of 72 drill sites. This is a maximum and it is possible that some sites may not be required if the results from neighbouring drill holes indicate that mineralisation is unlikely to be present.

Diamond core drilling using small track mounted drill rigs and support vehicles will be the only drilling method employed. An example of the type of drill rig planned to be used is shown in Plate 1. Diamond drilling is the preferred technique within the Julimar State Forest because of its environmental and operational advantages in comparison to other drilling methods, including:

- Rigs and support vehicles have a small footprint.
- Rigs produce low levels of noise and do not produce any dust.
- Equipment is track mounted, which means it can drive over vegetation without damaging the root stock.
- No clearing for access tracks is required.
- Closed loop drilling fluid systems will be used allowing all waste to be removed from site (which negates the use of in-ground sumps) and drilling fluids to be contained on the support trucks.



Plate 1: Example of Diamond Drill Rig



Scale: 1: 40,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

0 0.5 1 km

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Figure 10
**Purpose Permit Area and
 Indicative Disturbance
 Footprints**

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Legend

- 2021 Surveyed Area
- Purpose Permit Area
- Julimar State Forest
- Local Roads

Scale: 1: 5,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50

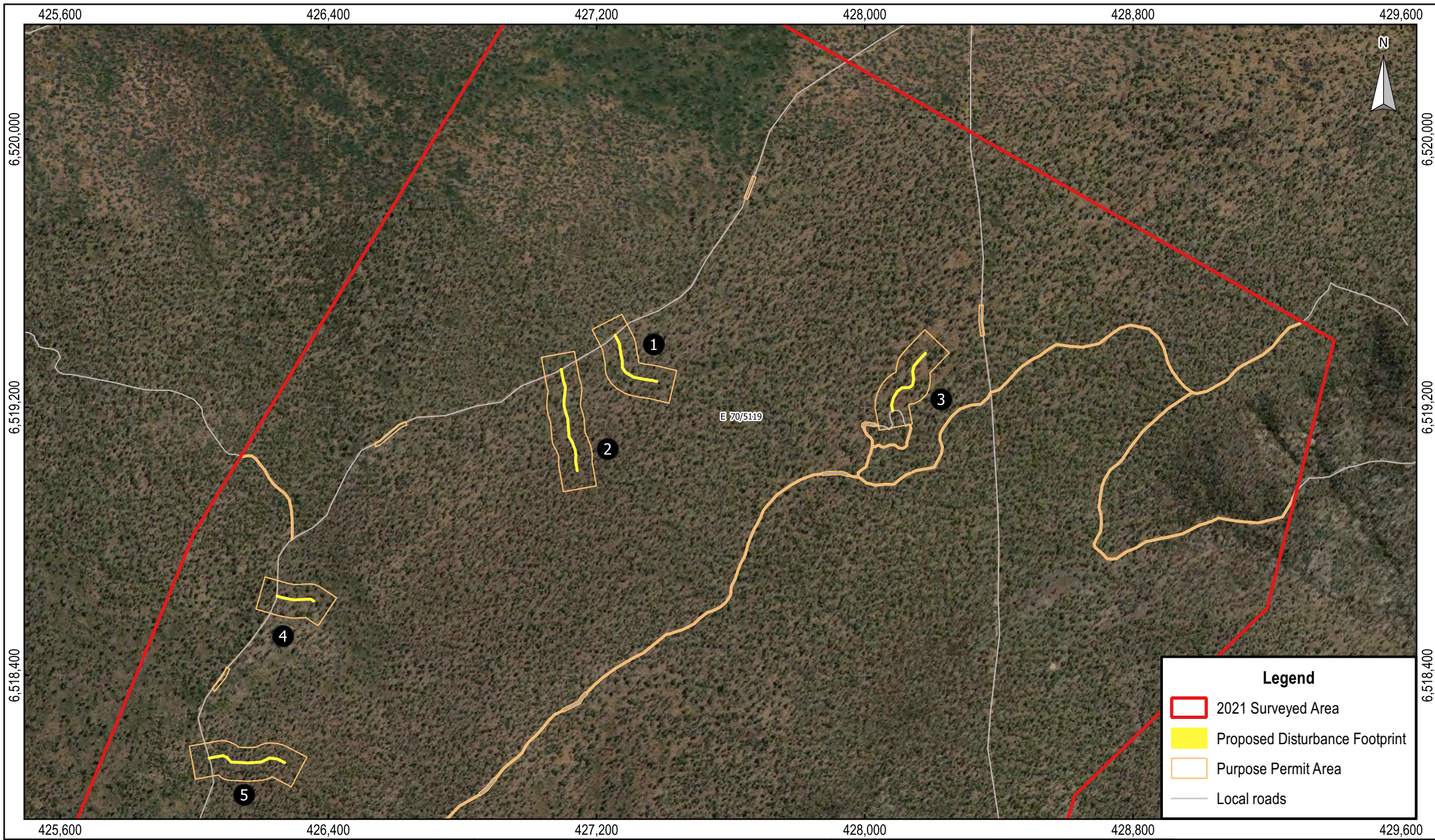
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Figure 10a
Purpose Permit Area and
Indicative Disturbance
Footprints

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Legend

- 2021 Surveyed Area
- Proposed Disturbance Footprint
- Purpose Permit Area
- Local roads

Scale: 1: 15,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50 (EPSG:28350)

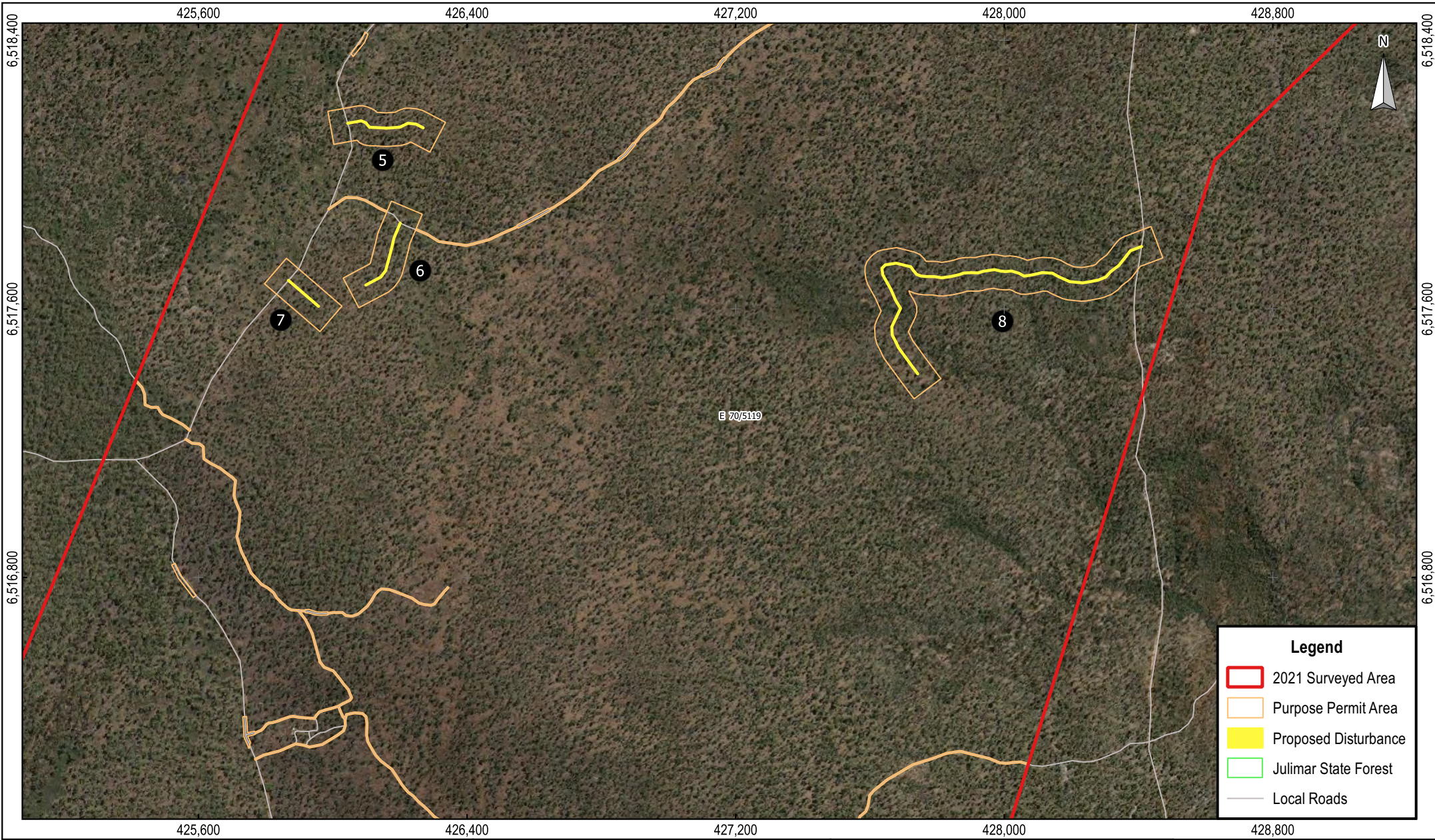
0 250 500 m

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Figure 10b

**Purpose Permit Area and Indicative
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Scale: 1: 15,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50 (EPSG:28350)

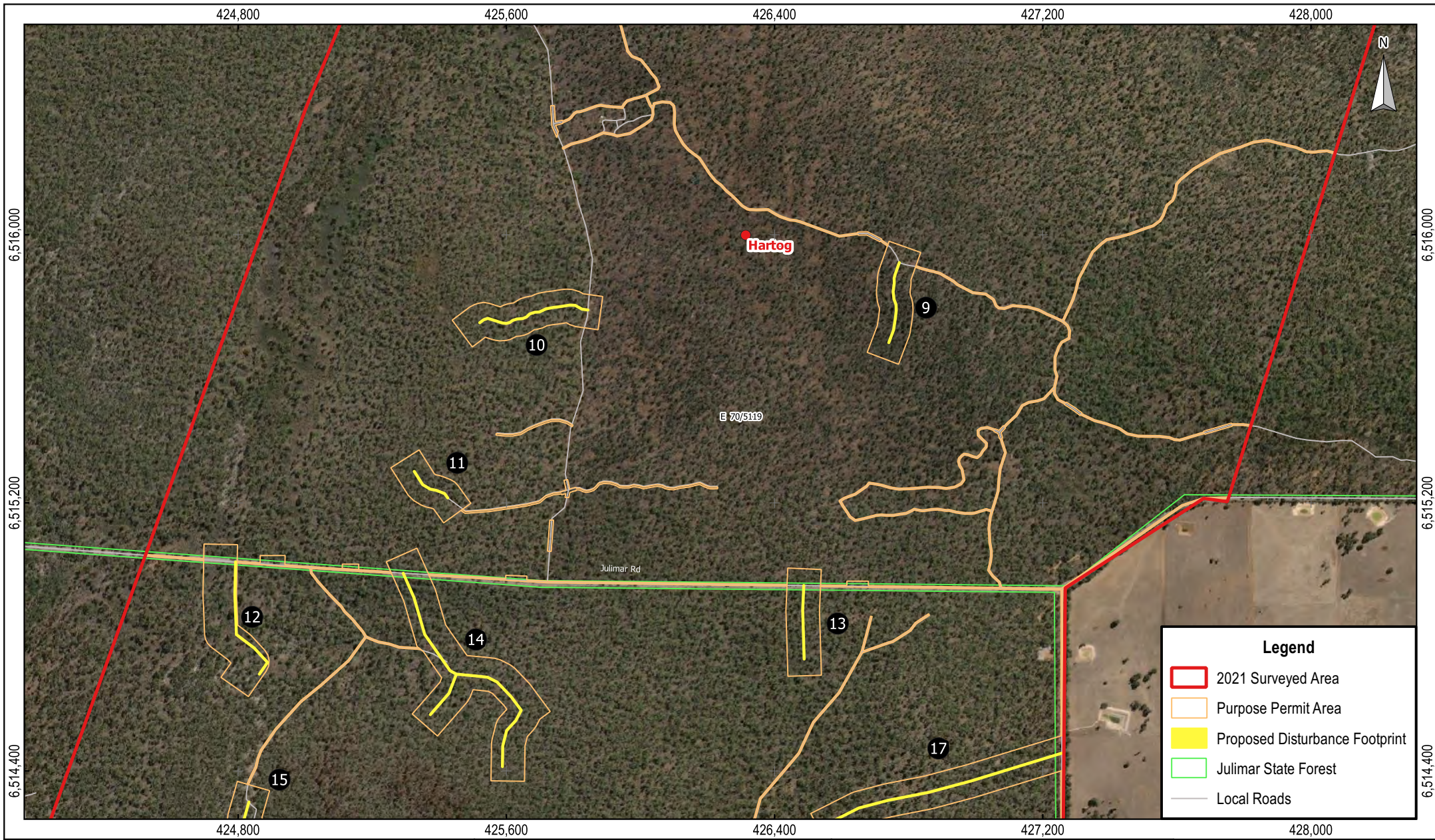
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Figure 10c
Purpose Permit Area and Indicative Disturbance Footprints

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Legend

- 2021 Surveyed Area
- Purpose Permit Area
- Proposed Disturbance Footprint
- Julimar State Forest
- Local Roads

Scale: 1: 15,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50 (EPSG:28350)

0 250 500 m

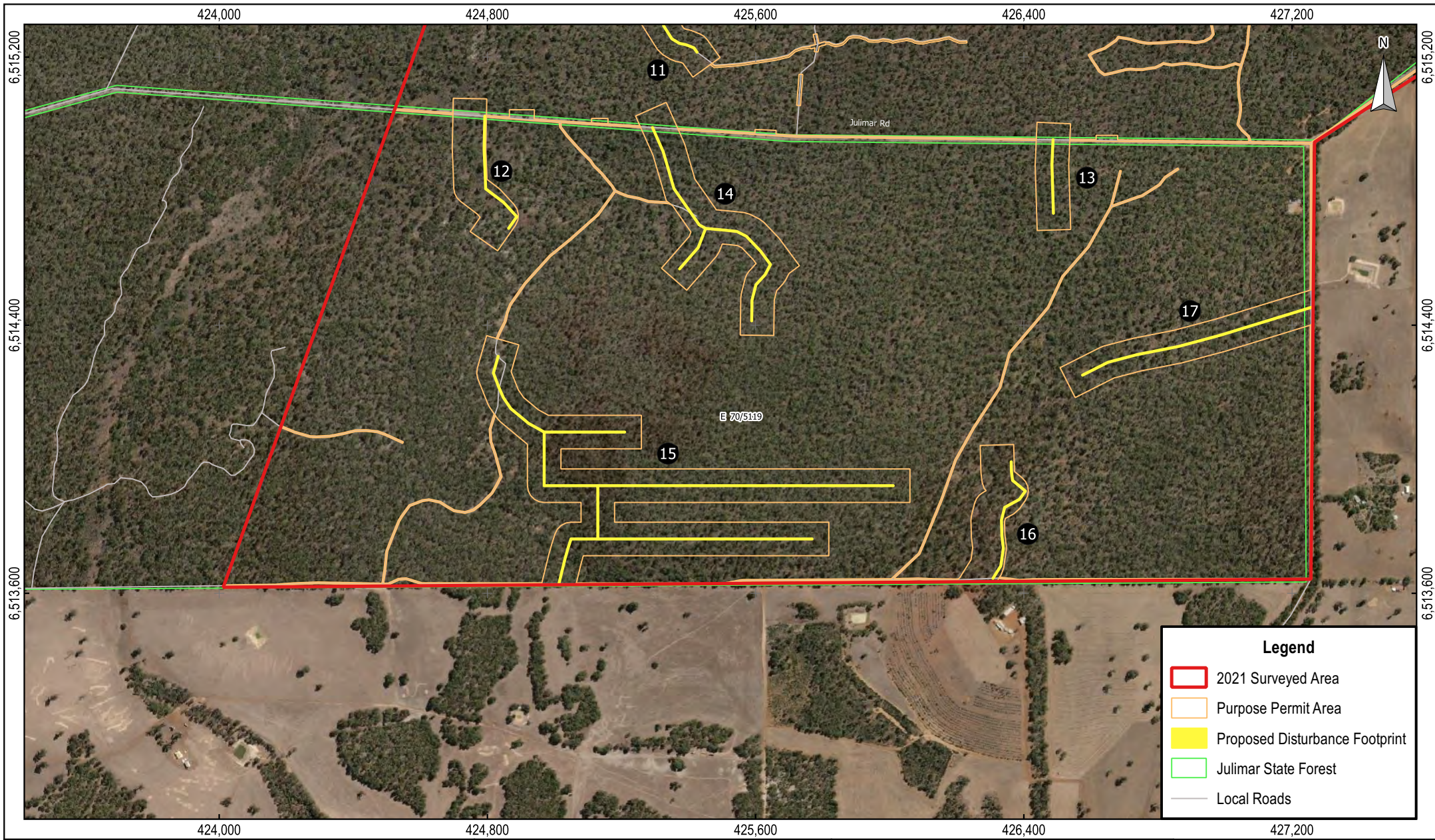
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Figure 10d

**Purpose Permit Area and Indicative
 Disturbance Footprints**

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Legend

- 2021 Surveyed Area
- Purpose Permit Area
- Proposed Disturbance Footprint
- Julimar State Forest
- Local Roads

Scale: 1: 15,000
 Original Size: A4
 Grid: GDA94 / MGA zone 50 (EPSG:28350)

0 250 500 m

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Figure 10e

**Purpose Permit Area and Indicative
 Disturbance Footprints**

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Support vehicles and solids units will be required to follow the drill rig and are also track mounted. The support trailer will house equipment such as rods, casings, core trays, extracted samples and hand tools and has similar dimensions to the drill rigs (i.e. 6m long by 3m wide). Drilling waste will be managed through a closed loop solids removal system and portable tanks. Portable tanks will be inspected regularly to prevent overflow, and waste will **be transported off site for disposal in sumps on Chalice's private property**, which will be rehabilitated at the end of the program. Core samples will be placed in core trays at the drill site and transported for storage at the core shed **at the Chalice exploration office on Chalice's private property**.

No mechanised vegetation clearing is proposed under this NVCP. Drill rigs and support vehicles will utilise existing tracks where possible. Additionally, drill rigs and all support vehicles will be configured in tandem to further reduce the overall footprint associated with set up and operation of drilling activities (Plate 2). Vegetation disturbance is restricted to minor branch pruning and rolling over vegetation only where necessary.

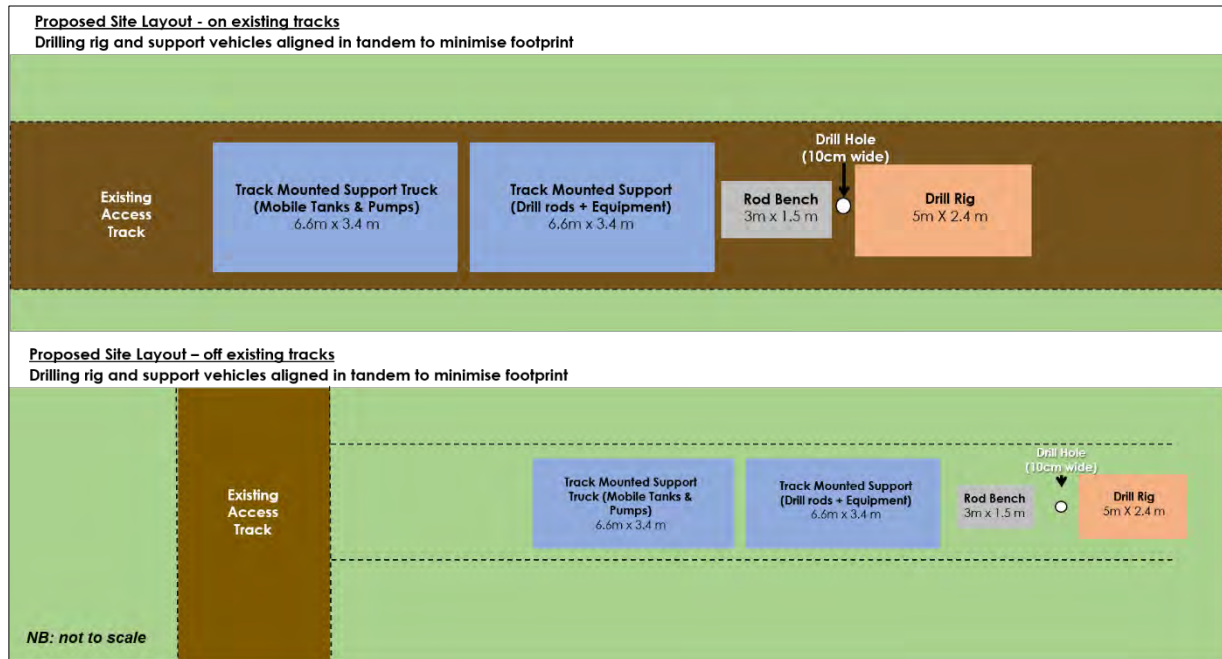


Plate 2: Proposed Drill Site and Access Route Layout

The Purpose Permit Area has been designed with consideration to the proposed layout above. The exploration activities to be undertaken with the Purpose Permit Area include:

- Vegetation disturbance for off-track access routes to drill sites.
- Vegetation disturbance for drill site layout (Plate 2).
- Diamond drilling using small track-mounted drill rigs with closed-loop drilling fluid systems.
- Support activities including water supply, drill rig refuelling and maintenance.
- Demobilisation and rehabilitation.

The drill program will be undertaken over a six to twelve month period, using a combination of existing forest tracks and off-track access routes. The program is planned to commence in late Q3 2021, pending approval of the CMP and associated POW.

The priority in designing the proposed drilling program has been to minimise risk through avoidance and substitution strategies (as per the hierarchy of control).

Key avoidance measures include:

- Utilising existing access tracks in Julimar State Forest where possible (~30% of sites).

- Staged first-pass exploration footprint at Hartog-Baudin targets less than 1% of Julimar State Forest.
- Access routes and drill sites located to avoid threatened flora and vegetation, and significant fauna habitat.
- No mechanised clearing, no clearing of trees.
- Additional surveys in Q3 2021 for conservation significant flora and nesting black cockatoos to verify avoidance.

Key substitution measures include:

- Use of small track-mounted drill rigs and support vehicles, configured in tandem (as opposed to large footprint conventional drilling that necessitates mechanised clearing).
- Multiple holes per drill site which reduces number of drill sites required.
- Closed cycle waste management, all waste removed from Julimar State Forest.

The following machinery and equipment will be used during the campaign:

- Light vehicles.
- Support trucks.
- Diamond drill rigs.

A shapefile is provided for the Purpose Permit Area. There may be minor variations made to the precise location of drill sites and access routes within this nominated footprint, however the area covered by the footprint, in which all activities will occur, will not change.

5. ASSESSMENT OF CLEARING PRINCIPLES

5.1 NATIVE VEGETATION CLEARING PRINCIPLES

Clearing applications are assessed against the 10 principles outlined in Schedule 5 of the *Environmental Protection Act 1986*. These principles aim to ensure that potential impacts resulting from removal of native vegetation are assessed in an integrated method and consistently apply to all lands throughout Western Australia. The principles address the four environmental areas of biodiversity significance, land degradation, conservation estate and ground and surface water quality.

The following sections discuss the potential impacts associated with the proposed exploration drilling program at the Hartog and Baudin targets within Julimar State Forest. A summary of the outcomes of the assessment against the 10 Clearing Principles are provided in Table 7 .

Table 7: Summary of Clearing Assessment Against Clearing Principles

| Principle No. | Clearing Principle | Outcome |
|---------------|--|----------------------------|
| a | Native vegetation should not be cleared if it comprises a high level of biological diversity | Unlikely to be at variance |
| b | Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia. | Unlikely to be at variance |
| c | Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora. | Not at variance |
| 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). | Not at variance |
| 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. | Not at variance |
| f | Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland. | Unlikely to be at variance |
| g | Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation. | Unlikely to be at variance |
| 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 areas. | Unlikely to be at variance |
| i | Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water. | Unlikely to be at variance |
| j | Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding. | Not at variance |

5.2 BIODIVERSITY

Clearing Principle A: Native vegetation should not be cleared if it comprises a high level of biological diversity.

Impacts to the biological diversity of native vegetation associated with the proposed disturbance is limited to localised flora and/or habitat damage, loss or death as a result of vegetation rolling and to a lesser extent pruning, as well as the potential spread and/or introduction of weeds and *Phytophthora* Dieback.

No TECs or PECs are present within the Purpose Permit Area. Vegetation communities in the Purpose Permit Area are well represented in the region and their protection is secured through Julimar State Forest and various other

Nature Reserves and National Parks in the surrounding area (Figure 3). The most commonly occurring vegetation community is H1, covering 1,403.19 ha of the 2,023 ha survey area. Baudin comprises of only two vegetation communities (H1 and H5), both which are also present at Hartog. Exploration activities at Baudin will impact only H1, with the majority of Hartog disturbance also occurring in H1 (Figure 5). Potential impacts on vegetation communities mapped in the Purpose Permit Area are detailed in Table 8.

Findings from the baseline survey determined:

- Of the 19 vegetation communities mapped, 12 intersect the Purpose Permit Area and nine intersect the Disturbance Footprint.
- Potential impact of the proposed disturbance to any mapped vegetation community within the Purpose Permit Area does not exceed 1.4% or 3 ha.
- Disturbance activities will have the greatest impact on V6 (1.5%); however, this is more a reflection of the limited mapped extent (7.33 ha) rather than the significance of proposed disturbance (0.11 ha).
- Potential impact of the proposed disturbance to all other mapped vegetation communities within the Purpose Permit Area (excluding V6) does not exceed 1%.
- Overall disturbance to vegetation communities is restricted to 0.3%.
- The vegetation communities are not considered locally significant.

Table 8: Potential Impacts to Vegetation Communities

| Vegetation Community | Mapped Extent within Survey Area (ha) | Mapped Extent Within Purpose Permit Area (ha) | Mapped Extent within Disturbance Footprint (ha) | Potential Impact (%) |
|----------------------|---------------------------------------|---|---|----------------------|
| D1 | 11.49 | 1.40 | 0.07 | 0.61 |
| D2 | 2.77 | 0 | 0 | 0 |
| D3 | 0.77 | 0 | 0 | 0 |
| H1 | 1403.19 | 79.00 | 2.99 | 0.21 |
| H2 | 148.37 | 3.60 | 0.11 | 0.07 |
| H3 | 57.60 | 6.60 | 0.21 | 0.36 |
| H4 | 157.78 | 11.90 | 0.49 | 0.31 |
| H5 | 29.49 | 4.80 | 0.27 | 0.92 |
| H6 | 1.11 | 0 | 0 | 0 |
| H7 | 1.18 | 0 | 0 | 0 |
| V1 | 27.36 | 0.10 | 0 | 0 |
| V2 | 16.08 | 0.20 | 0 | 0 |
| V3 | 4.13 | 0.10 | 0 | 0 |
| V4 | 28.32 | 0 | 0 | 0 |
| V5 | 71.80 | 3.20 | 0.08 | 0.11 |
| V6 | 7.33 | 1.50 | 0.11 | 1.50 |
| V7 | 39.95 | 1.50 | 0.06 | 0.15 |
| V8 | 1.17 | 0 | 0 | 0 |
| W1 | 0.09 | 0 | 0 | 0 |
| Cleared | 12.84 | 3.80 | 0 | 0 |
| Total | 2,022.82 | 117.8 | 4.39 | 0.28 |

It is unlikely the proposed disturbance will spread or introduce weed species as all introduced taxa recorded during survey are located outside the Purpose Permit Area. The small number of introduced weed species present were in vegetation adjacent to farmland, such as south of Julimar Rd and in Baudin. These weeds were not present in high densities and did not lessen the condition of the vegetation (Biologic 2021). If Targeted spring surveys identify the presence of additional populations within the Purpose Permit Area, weeds will be managed in conjunction with Dieback under the approved *Dieback Management Plan - Julimar State Forest Areas* (Chalice 2020).

It is unlikely disturbance activities will spread or introduce Dieback as no known presence of the disease has been recorded within the Purpose Permit Area to date. A comprehensive dieback management process has been implemented at the Julimar Project under the approved Dieback Management Plan (Chalice 2020).

Management measures to reduce impacts on biodiversity include:

- All exploration activities will be governed by the CMP.
- Drill rigs and support trucks will be configured in tandem to minimise disturbance.
- Drill sites and access route locations have been designed to avoid known records of significant flora.
- Drill sites and access routes are located in areas of sparse vegetation where practicable.
- Drill sites located on existing tracks where possible (approx. 30%).
- Track-mounted diamond drill rigs and support equipment will be used to limit disturbance and negate need for mechanical clearing.
- Rough Terrain Vehicles (RTVs) will be used to transport personnel and equipment to off-track drill sites instead of light vehicles. Number of movements per day will be limited.
- Vegetation rolling limits disturbance to above topsoil and minimises the impact to root stock and seedbank.
- Multiple holes drilled from single drill site, rather than grid configuration, to minimise footprint.
- Establishment of clearly delineated buffer zones around Priority flora species where possible and avoidance of Threatened species occurring in the Purpose Permit Area.
- All personnel will be required to undertake an induction, which will include details on the importance of vegetation and flora protection.
- Implementation of and adherence to a Dieback Management Plan to minimise potential impacts from weeds and Dieback, which in summary includes:
 - Clean on entry/clean on exit procedures as a precautionary approach as the status of Dieback within the Purpose Permit Area is yet to be determined.
 - Designated vehicles for use in the State Forest and therefore the Purpose Permit Area to reduce the occurrence of vehicles within any potential Dieback risk zones.
 - All exploration drilling personnel to undertake Dieback Greencard training prior to working within the State Forest.
- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.

Based on the total area of disturbance (4.4 ha) within this Purpose Permit Area (117.8 ha), exploration activities are not expected to significantly impact biodiversity and subsequently is unlikely to be at variance with Clearing Principle A.

5.3 SIGNIFICANT FAUNA HABITAT

Clearing Principle B: Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia.

The baseline fauna survey determined the presence of three broad fauna habitat types across the Hartog and Baudin survey area, which are all represented within the Purpose Permit Area and are common throughout Julimar State Forest. Potential impacts to fauna habitats are shown in Table 9. Jarrah-marri woodland habitat will be impacted the most by the proposed disturbance (4.4 ha), however this accounts for only 0.21% of the total habitat mapped extent within the survey area. No habitat is impacted more than 0.33 % of its total mapped extent within the survey area. It is likely further habitat mapping would increase the occurrence of these habitats at a local level. Existing habitat disturbance is minimal and includes historical logging, local forest tracks and some illegal rubbish dumping which may be a source of weeds or pathogens (WW 2021).

Carnaby's Cockatoo, Forest-Red-tailed Black-cockatoo and Chuditch are likely to occupy all three habitats. Other significant fauna not recorded during survey, but likely to occur within Julimar State Forest, such as Quenda and Brush-tailed Phascogale are likely supported by wandoo woodlands and jarrah-marri woodlands respectively.

Table 9: Potential Impacts to Fauna Habitat

| Fauna Habitat | Mapped Extent within Survey Area (ha) | Mapped Extent Within Purpose Permit Area (ha) | Mapped Extent Within Disturbance Footprint (ha) | Potential Impact (%) |
|-----------------------|---------------------------------------|---|---|----------------------|
| Jarrah-marri woodland | 1,643.19 | 89.36 | 3.31 | 0.20 |
| Wandoo woodland | 323.56 | 23.22 | 1.01 | 0.31 |
| Creek | 43.23 | 1.43 | 0.07 | 0.16 |
| Cleared | 12.84 | 3.78 | 0 | 0 |
| Total | 2,022.82 | 117.80 | 4.39 | 0.28 |

Management measures to reduce impacts on significant fauna and habitats include:

- All exploration activities will be governed by the CMP.
- Overall disturbance to all habitat types restricted to 0.3%.
- Drill rigs and support trucks will be configured in tandem to minimise disturbance.
- Drill sites and access routes have been designed in areas of sparse vegetation where practicable to avoid possible fauna refuges.
- Utilising and locating drill sites on existing forest tracks where possible to avoid possible fauna refuges.
- No clearing of trees is required, vegetation disturbance will be limited to understorey vegetation.
- Track-mounted diamond drill rigs and support equipment will be used to limit disturbance and negate need for mechanical clearing.
- RTVs will be used to transport personnel and equipment to off-track drill sites instead of light vehicles. Number of movements per day will be limited.
- Access routes will be clearly pegged, and movement of equipment and personnel restricted to designated areas and low speeds to reduce risk of fauna death or injury due to vehicle interaction.
- Potential fauna habitat logs will be moved to the side of access routes and reinstated following drilling.
- Pre-clearance inspections will be undertaken ahead of drill rig and support vehicle movements to ensure no conservation significant fauna in the pathway of imminent activities.
- Establishment of clearly delineated buffer zones around any fauna refuge identified in the pre-clearance inspection for avoidance.
- All personnel will be required to undertake an induction, which will include details on the importance of habitat and fauna protection.

- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.

The proposed disturbance is unlikely to compromise the maintenance of a significant habitat for fauna indigenous to WA, and is therefore unlikely to be at variance with Clearing Principle B.

5.4 THREATENED AND PRIORITY FLORA

Clearing Principle C: Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare (Threatened) flora.

Baseline flora surveys completed to date recorded the presence of one Threatened species, one Priority 2 species and two Priority 3 species within the survey area of which none occur within the Purpose Permit Area as shown in Table 10 and Figure 6.

Table 10: Potential Impacts to Significant Flora

| Significant Flora Species | Number Recorded | Number Present Within Purpose Permit Area |
|---|-----------------|---|
| Recorded During Survey (Biologic 2021) | | |
| <i>Conospermum densiflorum subsp. unicephalum</i> (T) | 1 | 0 |
| <i>Drosera sewelliae</i> (P2) | 1, 551 | 0 |
| <i>Beaufortia eriocephala</i> (P3) | 10 | 0 |
| <i>Lasiopetalum caroliae</i> (P3) | 2 | 0 |
| DBCA Database Records | | |
| <i>Drosera sewelliae</i> (P2) | 43 | 0 |
| <i>Persoonia sulcata</i> (P4) | 3 | 0 |
| <i>Synaphea grandis</i> (P4) | 1 | 0 |

One individual of *Conospermum densiflorum subsp. unicephalum* was recorded (Figure 6) in vegetation type V8. Only 1.17 ha of this vegetation type was mapped during the flora survey, which does not intersect the Purpose Permit Area (Figure 5). The distribution of this Threatened species is known from Wannamal north to Coomberdale, with records also in Moore Rive National Park (Biologic 2021).

Although the 2021 survey occurred outside of optimal flowering time for the bioregion, *Drosera sewelliae* was readily observable and very common in the field (Figure 6) particularly in patches of lateritic gravel with reduced leaf litter (Biologic 2021). In addition to the 1, 551 individuals recorded from 56 locations in the survey area, 43 individuals are also recorded from two DBCA locations in the State Forest (Biologic 2021). Due to widespread presence of the species, it is likely further survey will identify populations within the Purpose Permit Area and the proposed disturbance will result in some minor localised impacts to the species.

Low numbers of Priority 3 species *Beaufortia eriocephala* and *Lasiopetalum caroliae* were recorded during the survey (Table 10), however both species are known from other regional locations. All ten individuals of *Beaufortia eriocephala* were recorded at the one location in the south west of Hartog (Figure 6) within vegetation community H1. There are 28 regional records of this species which has a disjunct distribution, occurring from Gingin north west to Warradarge, and from Toodyay through to York and Greenhills (Biologic 2021). *Lasiopetalum caroliae* is found in a variety of habitats including gullies, slopes, and creeklines in sandy clays and loams over laterite and/or granite and is known from 19 regional records, most of which are within 35 km of the Purpose Permit Area (Biologic 2021). During the survey this species was found from two locations in valley vegetation in the north east of Hartog.

Additional presence of Threatened and Priority species is possible. In circumstances where supplementary spring surveys (planned for Q3 2021) identify additional populations of significant species within the Purpose Permit Area, Chalice will reconsider the location of access routes and drill sites to avoid Threatened and Priority flora where possible. Any adjustment of route or drill site alignment will occur within the Purpose Permit Area.

Management measures to reduce impacts on Threatened and Priority flora comprise:

- All exploration activities will be governed by the CMP.
- Drill rigs and support trucks will be configured in tandem to minimise disturbance.
- Drill sites and access route locations have been designed to avoid known records of conservation significant flora.
- Drill sites and access routes have been designed in areas of sparse vegetation where practicable.
- Drill sites have been located on existing tracks where possible (approx. 30%).
- Track-mounted diamond drill rigs and support equipment will be used to limit disturbance and negate need for mechanical clearing.
- RTVs will be used to transport personnel and equipment to off-track drill sites instead of light vehicles. Number of movements per day will be limited.
- Vegetation rolling limits disturbance to above topsoil and minimises the impact to root stock and seedbank.
- Multiple holes will be drilled from a single drill site, rather than grid configuration, to minimise footprint.
- Supplementary spring surveys will be conducted prior to commencement of disturbance works to verify that proposed access routes and drill sites do not directly impact Threatened or Priority flora.
- Establishment of clearly delineated buffer zones around Priority flora species where possible and avoidance of Threatened species occurring in the Purpose Permit Area.
- All personnel will be required to undertake an induction, which will include details on the importance of vegetation and flora protection.
- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.

The proposed disturbance will not impact upon any known locations, or the continued existence of Threatened or Priority flora species. The proposed disturbance is therefore not at variance with Clearing Principle C.

5.5 THREATENED ECOLOGICAL COMMUNITIES

Clearing 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.

No TECs or PECs listed under the EPBC Act or BC Act were identified within the Purpose Permit Area. Five conservation significant vegetation communities are known to occur nearby Hartog and Baudin, however these are greater than 9 km from the Purpose Permit Area. Therefore, the proposed clearing will not compromise the maintenance of a TEC and is not at variance to Clearing Principle D.

5.6 REMNANT VEGETATION

Clearing 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 Environmental Protection Authority (EPA) uses a standard level of native vegetation retention of at least 30% of the pre-European extent of an ecological community as a benchmark. The levels of native vegetation retention

have most recently been recognised in the *National Objectives and Targets for Biodiversity Conservation 2001-2005*, which suggests the retention of 30% or more, of the pre-European extent of an ecological community is necessary if Australia's biological diversity is to be protected (DoEH 2001). The pre-European vegetation associations occupying the Purpose Permit Area are shown in Table 11, along with the pre-European and current extent.

Table 11: Potential Impacts to Pre-European Vegetation Associations in the Survey Area

| Code | Pre-European VA | IBRA Region | Pre-European Extent in Survey Area (ha) | Current Extent in Survey Area (ha) | % Remaining |
|-------|-----------------|------------------------|---|------------------------------------|-------------|
| 4.5 | Chittering | State | 15,467 | 9,097 | 58.8 |
| | | Jarrah Forest | 15,457 | 9,097 | 58.9 |
| | | Northern Jarrah Forest | 15,457 | 9,097 | 58.9 |
| 968 | East Darling | State | 12,680 | 9,767 | 77.0 |
| | | Jarrah Forest | 12,680 | 9,767 | 77.0 |
| | | Northern Jarrah Forest | 12,680 | 9,767 | 77.0 |
| 968.2 | Chittering | State | 45,068 | 31,580 | 70.1 |
| | | Jarrah Forest | 45,068 | 31,580 | 70.1 |
| | | Northern Jarrah Forest | 45,068 | 31,580 | 70.1 |

The remaining extent of the vegetation associations at the State level exceeds 58% which is greater than the EPA 30% retention target. The proposed disturbance will not have a significant impact on the remaining extent of the pre-European vegetation associations and therefore will not be at variance with Clearing Principle E.

5.7 WATERCOURSE OR WETLANDS

Clearing 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.

Three un-named watercourses run through Hartog and Baudin target areas with one intersecting the Purpose Permit Area in the mid-eastern section of Hartog (Figure 9). This minor watercourse is located within vegetation community D1 which is noted as a creek community containing dry, narrow creeklines with several flora taxa known to grow in low-lying habitats with high moisture levels (Biologic 2021). It is unlikely vegetation in creek communities is dependent upon continuous access to surface or groundwater (Biologic 20021).

The Purpose Permit Area intersects 1.40 ha of vegetation community D1 for the purpose of an access route. The Purpose Permit Area also intersects other creek communities V2 (0.20 ha) and V7 (1.5 ha), of which proposed disturbance only intersects 0.07 ha of D1 and 0.06 ha of V7.

A wetland environment was recorded occupying 0.9 ha of the Hartog target but is not intersected by the Purpose Permit Area.

Management measures which will minimise impacts to watercourses and wetland environments include:

- All exploration activities will be governed by the CMP.
- Proposed disturbance to creek communities is restricted to a total of 1.03 ha.
- Drill rigs and support trucks will be configured in tandem to minimise the Purpose Permit Area.
- Drill sites will be located on existing tracks where possible (approx. 30%).

- Track-mounted diamond drill rigs and support equipment will be used to limit the Purpose Permit Area and negate need for mechanical clearing.
- RTVs will be used to transport personnel and equipment to off-track drill sites instead of light vehicles. Number of movements per day will be limited.
- All personnel will be required to undertake an induction, which will include details on the importance of vegetation and flora protection.
- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.
- Implementation of and adherence to a Dieback Management Plan to minimise potential impacts from weeds and Dieback, which in summary includes:
 - Clean on entry/clean on exit procedures as a precautionary approach as the status of Dieback within the Purpose Permit Area is yet to be determined.
 - Designated vehicles for use in the State Forest and therefore the Purpose Permit Area to reduce the occurrence of vehicles within any potential Dieback risk zones.
 - All exploration drilling personnel to undertake Dieback Greencard training prior to working within the State Forest.

No significant impacts to watercourses or wetland environments from the proposed disturbance are anticipated and subsequently the disturbance is considered unlikely to be at variance with Clearing Principle F.

5.8 LAND DEGRADATION

Clearing Principle G: Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

The condition of vegetation within the Hartog and Baudin survey area ranged from Good to Excellent. The majority (94%) is in Excellent condition with three or more intact structural layers and species diversity consistent with what is expected for the Northern Jarrah Forest subregion (Biologic 2021). Small portions (109 ha or 5%) was assessed as Very Good condition and Good (2 ha or 0.1%). Vegetation in both Very Good and Good rated areas generally supported a vegetation structure that mostly resembled a natural ecosystem (Biologic 2021).

The condition of vegetation community H2 was rated as Very Good as fire frequency has started to affect vegetation structure and cover. Condition of D2 was also rated Very Good due to substantial crown dieback of mature *Corymbia calophylla* trees, which is likely due to water access and availability rather than any fungal pathogens or microbes (Biologic 2021). Previous clearing was noted across 12.85 ha in Hartog and Baudin but < 1 ha within the Purpose Permit Area. Land degradation was mostly attributed to prescribed burns, with vegetation on hills being more fire-affected than the valleys (Biologic 2021), as well as historic borrow pits, existing forest tracks and fire breaks.

Typically, land degradation from exploration activities occurs through wind and water erosion of cleared surfaces or during stripping activities. As no vegetation will be removed and the soil profile will remain intact, these risks are considered negligible.

Management measures to reduce impacts on land degradation include:

- All exploration activities will be governed by the CMP.
- Track-mounted diamond drill rigs and support equipment will be used to limit disturbance and negate need for mechanical clearing.
- Drill rigs and support trucks will be configured in tandem to minimise disturbance and reduce area of soil compaction.

- Utilising and locating drill sites on existing forest tracks where possible to reduce impacts on native vegetation and soils.
- Multiple holes will be drilled from a single drill site, rather than grid configuration, to minimise disturbance.
- RTVs will be used to transport personnel and equipment to off-track drill sites instead of light vehicles and number of movements per day will be limited to reduce impacts on native vegetation and soils.
- Implementation of and adherence to a Dieback Management Plan to minimise potential impacts from weeds and Dieback, which in summary includes:
 - Clean on entry/clean on exit procedures as a precautionary approach as the status of Dieback within the Purpose Permit Area is yet to be determined.
 - Designated vehicles for use in the State Forest and therefore the Purpose Permit Area to reduce the occurrence of vehicles within any potential Dieback risk zones.
 - All exploration drilling personnel to undertake Dieback Greencard training prior to working within the State Forest.
- Hydrocarbon fuel will be stored outside of State Forest boundaries. Drip trays, liners and/or bunding will be utilised during refuelling activities to minimise hydrocarbon spillage.
- Drill rigs and wheeled support vehicles subject to pre-start checks to ensure function and condition of machinery and reduce occurrence of hydrocarbon and/or chemical spills.
- All exploration drilling personnel will undertake spill response training as part of the site induction for all exploration personnel on the containment, remediation and reporting of hydrocarbon spills.
- Daily checks on weather conditions and fire bans to prevent inadvertent forest fires.
- Fire suppression systems/extinguishers on drill rigs and support vehicles.
- All exploration activities will be conducted in accordance with the Chalice Bushfire Response Plan and the location of the Julimar Exploration Project is in proximity to emergency services.
- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.

In the context of the low erodibility of the land system and intact vegetation on a local and regional scale, the extent of disturbance from the exploration activities is not anticipated to increase land degradation. Weeds, dieback and fire, have the potential to cause appreciable land degradation, however, are considered unlikely. Therefore, the proposed disturbance is unlikely to be at variance with Clearing Principle G.

5.9 CONSERVATION ESTATE

Clearing 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.

The Purpose Permit Area lies within Julimar State Forest (Figure 3). All activities within the State Forest will be governed by the approved CMP. Exploration activities will not fragment habitats or landscapes and will not significantly impact flora or fauna species at a local or regional level. Proposed disturbance is low impact due to implementation of the vegetation rolling method in place of traditional mechanised clearing, short duration of the drilling campaign and anticipated recovery of vegetation within the Purpose Permit Area (root stock and seed banks will remain largely intact) post-disturbance.

Proposed disturbance within the Purpose Permit Area is unlikely to have a significant impact on the environmental values of the Julimar State Forest and therefore is unlikely to be at variance with Clearing Principle H.

5.10 SURFACE AND GROUNDWATER QUALITY

Clearing Principle 1: Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

There are no permanent water bodies, wetlands, riparian vegetation, or groundwater dependent ecosystems/vegetation within the Purpose Permit Area. The Purpose Permit Area intersects one minor watercourse which will be traversed for access to a drill site (Figure 9). Intense rainfall events are unlikely to increase surface run-off within the Purpose Permit Area due to the lack of cleared surfaces exposed to wind and/or water erosion. It is unlikely any runoff would impact groundwater or surface water quality due to the minimal proposed disturbance and usual environmental conditions.

The Purpose Permit Area is in both a proclaimed Surface Water and proclaimed Groundwater Area of WA.

Initially, surface water quality is expected to be similar to rainwater and likely recharges groundwater resources in the Swan-Avon Main-Avon Catchment. Limited groundwater data is available for the Purpose Permit Area. Groundwater is likely to occur in low yielding, fractured rock aquifers.

Hydrocarbon and/or chemical spills may occur from drill rigs and support vehicles. Uncontained spills, as well as domestic and drilling wastes have the potential contaminate surface water and groundwater.

Management measures to prevent deterioration of surface and groundwater quality include:

- All exploration activities will be governed by the CMP.
- One drill site requires access across a watercourse, however disturbance in this area is limited to 0.13 ha.
- Track-mounted diamond drill rigs and support equipment will be used to limit the Purpose Permit Area and negate need for mechanical clearing.
- Utilising and locating drill sites on existing forest tracks where possible to reduce impacts on surface water.
- RTVs will be used to transport personnel and equipment to off-track drill sites instead of light vehicles and number of movements per day will be limited to reduce impacts on surface water.
- Hydrocarbon fuel will be stored outside of State Forest boundaries. Drip trays, liners and/or bunding will be utilised during refuelling activities to minimise hydrocarbon spillage and contamination of surface and groundwater.
- Drill rigs and wheeled support vehicles will be subject to pre-start checks to ensure function and condition of machinery and reduce occurrence of hydrocarbon and chemical spills.
- All exploration drilling personnel will undertake spill response training as part of the site induction for all exploration personnel on the containment, remediation and reporting of hydrocarbon spills.
- A closed-circuit drilling method will be used and all cuttings that come from the drill holes and other waste materials will be stored on support trucks in portable sumps and sealed containers and taken off site for disposal. Portable sumps will be regularly inspected and changed out of portable sumps to prevent overflow.
- All waste including rubbish, survey tape, wooden pegs, spare parts etc. will be removed from site and appropriately disposed.
- All personnel will be accommodated outside of the State Forest at existing facilities.
- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.

Proposed disturbance is unlikely to cause deterioration in the quality of surface or groundwater within the Purpose Permit Area. No significant impacts are anticipated and subsequently the disturbance is considered unlikely to be at variance with Clearing Principle I.

5.11 FLOODING POTENTIAL

Clearing Principle J: Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Rainfall of the Northern Jarrah Forest subregion ranges from 1,300 mm on the Darling Scarp to 700 mm in the east and north (Biologic 20021). Annual average rainfall recorded in the Julimar area is approximately 520 mm. The subregion loses more water via evapotranspiration than it receives as rain during the summer, spring and autumn months, typically a result of hot, sunny weather without significant cloud. During the winter months when the region experiences most of its rainfall, less water is lost via evapotranspiration than rainfall (BoM 2021). Approximately 50% of rain falls in winter (Chart 1) when significant rainfall events and thunderstorms typically occur. Shallow pooling is evident in some areas throughout the State Forest, mainly along existing tracks where soil disturbance and degradation has occurred.

Removal of vegetation generally increases flooding when uptake, infiltration, moisture retention and physical barriers to reduce flow velocities provided by vegetation are decreased or removed. However, use of the vegetation rolling method in place of mechanised clearing negates the removal of native vegetation with vegetation structure and soil profile remaining intact. Considering this, it is unlikely the proposed disturbance will increase water flow within the Purpose Permit Area as infiltration of water into the soil profile is likely to remain similar as existing conditions. Any minor effects from rainfall events will be short term.

Management measures to prevent flooding include:

- All exploration activities will be governed by the CMP.
- Track-mounted diamond drill rigs and support equipment will be used to limit the Purpose Permit Area and negate need for mechanical clearing.
- RTVs will be used to transport personnel and equipment to off-track drill sites instead of light vehicles and number of movements per day will be limited to disturbance and flood potential.
- Drill rigs and support trucks will be configured in tandem to minimise the Purpose Permit Area.
- Utilising and locating drill sites on existing forest tracks where possible to maintain existing surface water flow paths.
- Vegetation rolling method limits disturbance to above the soil profile.
- Multiple holes will be drilled from a single drill site, rather than grid configuration, to minimise the Purpose Permit Area.
- Rehabilitation activities will be undertaken in accordance with tenement condition using the PoW Rehabilitation Report Checklist and submission of a PoW Rehabilitation Completion Report to DMIRS.

Overall, the proposed disturbance will have no detectable increased impact on flooding potential and will not cause, or exacerbate, the incidence of flooding. Therefore, the proposed disturbance will not be at variance with Clearing Principle J.

6. ROLES AND RESPONSIBILITIES

Chalice will ensure adequate resourcing to effectively implement the controls outlined in this NVCP throughout the proposed drilling program. Specific roles and responsibilities are defined below.

6.1 GM ENVIRONMENT AND COMMUNITY

- Coordinate preparation and finalisation of the NVCP, in consultation with relevant government agencies, and ensure adequate systems and procedures are in place to facilitate compliance with NVCP requirements through the exploration program.
- Manage all pre-construction environmental surveys and post-implementation monitoring.
- Coordinate engagement with key stakeholders including relevant recreational user groups.
- Overall responsibility for ensuring that all supervisory and management personnel are aware of, and understand, their responsibilities under this NVCP.
- Conduct visits and inspections to ensure all work complies with commitments and management measures outlined in this NVCP.
- Provide advice and assistance to exploration employees and contractors to ensure compliance with this NVCP.
- Oversee the implementation of any corrective and remedial actions arising from audits and incident investigations.

6.2 GM DEVELOPMENT

- **Chalice's** GM Development has overall responsibility for ensuring that all environmental activities undertaken for the Julimar Exploration Project are consistent with this NVCP.
- Ensure measures contained in this NVCP and, the CMP and the Dieback Management Plan are implemented throughout the drilling program.
- Coordinate all exploration activities and operations, ensuring applicable policies, procedures, legislative requirements and management plans are complied with.
- Ensure employees are provided with the training and awareness required to fulfil their obligations under this NVCP (e.g. inductions, noticeboards, bulletins, procedure reviews, toolbox meetings, greencard training).
- Provide advice and assistance to exploration employees to ensure compliance with this NVCP.
- Undertake incident cause analysis method investigations where required.
- Manage the implementation of corrective and remedial actions arising from audits and incident investigations.

6.3 EXPLORATION PROJECT GEOLOGIST

- Ensure measures contained in this NVCP are implemented and maintained on site.
- Ensure the Environmental Checklist is completed for each planned exploration activity allowed by the NVCP prior to commencement.
- Ensure all vehicles and equipment are washed down and free of weed and soil materials prior to entering and exiting Julimar State Forest.
- Reporting incidents and any audit outcomes to the GM Development.

- Conduct task specific inductions with relevant personnel.

6.4 ALL EMPLOYEES AND CONTRACTORS

- Understand the employee responsibilities as defined by this NVCP.
- Follow correct exploration drilling and vehicle movement procedures.
- Dispose of all waste material appropriately as outlined in this NVCP.
- Keep to existing tracks and demarcated access routes at all times.
- Aid in implementing and maintaining impact minimisation programs when requested by the Project Geologist.
- Report incidents and non-compliance with this NVCP to the Project Geologist.

7. COMPLIANCE REPORTING

Upon approval of this NVCP, subsequent environmental approvals will be sought for the Hartog and Baudin drill program. These approvals may include additional conditions and commitments relating to environmental monitoring and reporting.

All disturbance will be reported to DMIRS through:

- Programme of Work Exploration Rehabilitation Reports as required under granted PoWs.
- Annual Clearing Reports as required under the grant of this Purpose Permit application.

8. CONCLUSION

The vegetation and habitats present within the Purpose Permit are well represented on a local and regional scale. It is considered unlikely there will be significant impact on the conservation status of listed flora and fauna species or vegetation communities. There are likely to be only minor localised, short term impacts from damage or loss of vegetation and fauna habitat from vegetation rolling.

The proposed disturbance will not impact significantly upon the ten clearing principles and a range of environmental management measure will be implemented to ensure disturbance is managed to minimise any potential adverse impacts.

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APPENDICES

APPENDIX 1: RECONNAISSANCE FLORA SURVEY OF THE HARTOG AND BAUDIN TARGETS (BIOLOGIC 2021)



Julimar Exploration Project
Reconnaissance and Targeted
Flora Survey

Biologic Environmental Survey
Report to MBS Environmental

June 2021



| DOCUMENT STATUS | | | | |
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| | | | Name | Date |
| 1 | C. Whyte, D. Reith, K. Geelhoed | C. Winton, C. van den Bergh | T. Giltay (MBS) B. Kendall (Chalice) | 11 June 2021 |
| | | | | |

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EXECUTIVE SUMMARY

Chalice Gold Mines Limited (Chalice) are exploring the Julimar Nickel-Copper-Platinum Group Element Project, located approximately 70 kilometres northeast of Perth, in the Shire of Toodyay in Western Australia. The project is located on exploration tenements E70/5118 and E70/5119 which overlay Julimar State Forest and private farmland.

Chalice with the assistance of MBS Environmental (MBS), are looking to progress their existing drilling program with exploration activities within the DBCA managed Julimar State Forest and require botanical studies to support clearing of native vegetation. Biologic Environmental Survey Pty Ltd (Biologic) have been commissioned to conduct a reconnaissance flora and vegetation survey and a targeted flora survey across priority areas within the Julimar State Forest, totalling an area of 2,021 ha.

The field survey was conducted over five days, totalling 18 person days in April and May of 2021. The field team lead, Senior Botanist Samuel Coultas, was supported by five field botanists and one Senior Ecologist. Rainfall in the three months prior to the field survey was above the long-term average for the area presenting adequate survey conditions for this level of assessment. Sixty-one relevés were sampled across the site supplemented with opportunistic flora collections and vegetation notes. Access was good and all areas of the Study Area were accessed.

Thirteen conservation significant flora identified in the database search results are annual or cryptic herbs. For these taxa the survey timing was inadequate and presence or absence at the Study Area was unable to be confirmed.

Nineteen vegetation types were identified from the field survey from four broader landforms; hills, drainage lines, valleys & wetland. They are representative of three widely represented Beard vegetation associations occurring throughout the Julimar State Forest. There were five significant vegetation types identified within 30 km of the Study Area, one TEC and four PECs. No significant vegetation types occur within the Study Area. No vegetation units recorded in the Study Area resemble significant vegetation communities of the Jarrah Forest bioregion. Ten vegetation types were associated with four conservation significant flora taxa from the Study Area. These vegetation types hold importance as refuge for significant flora, they are:

- *Conospermum densiflorum* subsp. *unicephalatum* was associated with vegetation type V8
- *Drosera ?sewelliae* was associated with vegetation types H1, H2, H3, H4, V3, V4, V5 and V8
- *Beaufortia eriocephala* was associated with vegetation type H1
- *Lasiopetalum caroliae* was associated with vegetation types V1 and V2

Five vegetation types, D1, D2, D3, V2 and V7 were noted as containing dry and narrow creeklines with several flora taxa known to grow in low-lying habitat with higher soil moisture levels. It is unlikely that this vegetation is dependent upon continuous access to surface water or groundwater.

Over ninety percent of vegetation in the Study Area was in Excellent condition, with the main disturbances being prescribed burns and informal tracks throughout the area. Three introduced weed

species were recorded, but none of these were present in high enough numbers to warrant a change in condition. No Declared Pests, Weeds of National Significance or Priority Alert weeds were found.

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1 INTRODUCTION

1.1 Project Background

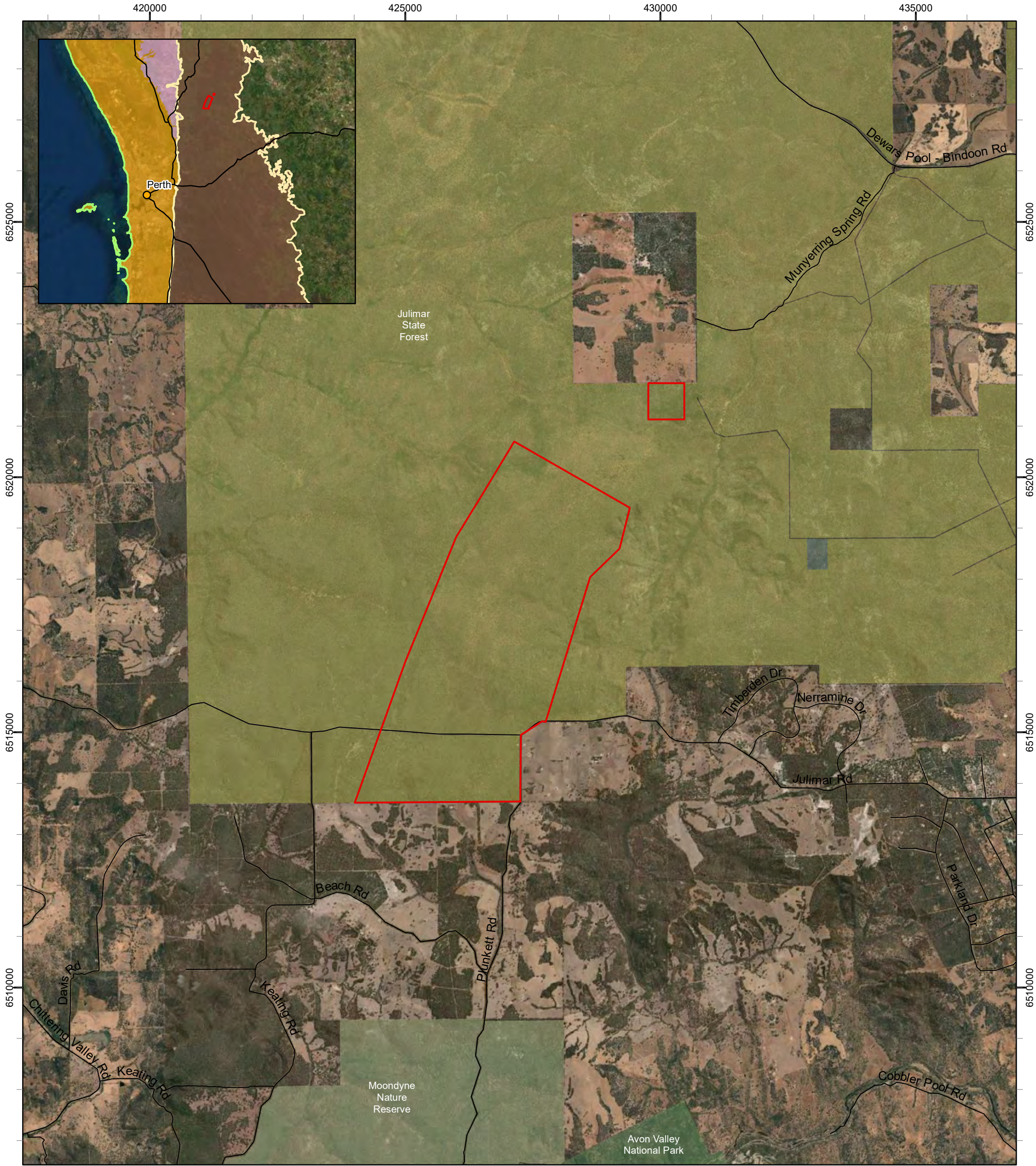
Chalice Gold Mines Limited (Chalice) are exploring the Julimar Nickel-Copper-Platinum Group Element Project, located approximately 70 kilometres (km) northeast of Perth, in the Shire of Toodyay in Western Australia (WA) (Figure 1.1). The project is located on exploration tenements E70/5118 and E70/5119 which overlay Julimar State Forest (JSF) and private farmland (Figure 1.1). Chalice are currently conducting exploration drilling (using both reverse circulation and diamond core rigs) and non-ground disturbing exploration on areas of private farmland, including pockets of native remnant vegetation within these areas. Chalice has submitted a project specific Conservation Management Plan (CMP) which has received approval from the Department of Biodiversity and Conservation (DBCA) as well as the Minister for Environment and Minister for Mines. The CMP governs all activities within the JSF and has allowed Chalice to start conducting low-impact, non-ground disturbing exploration activities within the JSF.

Chalice are looking to progress their exploration activities within the DBCA managed Julimar State Forest. This will involve ground disturbance and clearing of vegetation, and as such, further biological surveys are required. In support of future environmental approvals, MBS Environmental (MBS), on behalf of Chalice, commissioned Biologic Environmental Survey Pty Ltd (Biologic) to conduct a reconnaissance flora and vegetation survey and a targeted flora survey across priority areas within the Julimar State Forest and Chalice tenement areas. Two polygon areas comprising a total of 2021 ha were selected for this survey and will be referred to collectively throughout as the “Study Area”. The two polygons comprising the Study Area are JSF priority areas 1 and 2 (Hartog) and a 50 ha portion of JSF priority area 3 (Baudin).

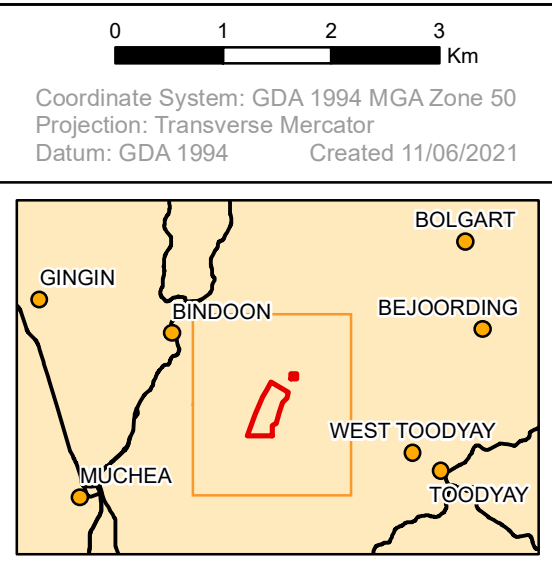
1.2 Objective and Scope of Works


The overall objective of the reconnaissance and targeted flora and vegetation survey was to identify any significant flora and vegetation values within the Study Area. This was achieved through the following scope of works:

- Undertaking a comprehensive desktop assessment to gather contextual information on the survey area and immediate surrounds; including the review of previous biological surveys and government and non-government databases;
- Undertaking a field assessment to determine the condition of the vegetation;
- Undertaking a field assessment to describe and delineate the vegetation types present;
- For species still detectable and identifiable (i.e., perennials) undertaking targeted searches via meandering traverses;
- Completing an assessment to determine the presence of conservation significant vegetation types/ communities; and
- Preparing and submitting a flora and vegetation report.



| Legend | | |
|---------------------------|-------------------------|--|
| | Study Area | |
| | Local Road | |
| IBRA Region | | |
| | Jarrah Forest | |
| | Swan Coastal Plain | |
| IBRA Subregion | | |
| | Dandaragan Plateau | |
| | Northern Jarrah Forest | |
| | Perth | |
| DBCAs Managed Land | | |
| | National Park | |
| | Nature Reserve | |
| | Section 5(1)(g) Reserve | |
| | State Forest | |




 Scale: 1:70,000

MBS ENVIRONMENTAL
Julimar Exploration Project
Reconnaissance and
Targeted Flora Survey

Figure 1.1: Study Area
and regional location

1.3 Background to Protection of Flora

Within Western Australia, all native flora is protected under the *Biodiversity Conservation Act 2016* (BC Act) and any action that has the potential to impact on native flora needs to be approved by relevant State and/ or Federal departments as dictated by the Western Australian *Environmental Protection Act 1986* (EP Act) and the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Flora taxa that are determined to be at risk of extinction or in decline are afforded extra protection under these Acts. For the purposes of this report, these are called conservation significant flora taxa. A summary of applicable legislation and status codes is provided in (Table 1.1). Additional information on conservation status codes is provided in (Appendix A).

The EPBC Act identifies Threatened Ecological Communities (TECs) as ecological communities at risk of extinction. The BC Act provides for the statutory listing of TECs by the Minister. The WA Minister for Environment has endorsed 69 ecological communities as threatened under critically endangered (20 communities), endangered (17 communities), vulnerable (28 communities) and presumed totally destroyed (four communities).

For some flora taxa and ecological communities, there is insufficient information to determine their status. These taxa are generally considered by the Environmental Protection Authority (EPA)/ DBCA as 'conservation significant' for all development related approvals and are listed on a 'Priority List'. The Priority List is regularly reviewed and maintained by DBCA. Possible TECs that do not meet the criteria for statutory listing by the Minister for Environment are added to DBCA's 'Priority Ecological Communities' (PECs) lists under Priorities 1, 2, 3 (near threatened) or 4 (conservation dependent).

Table 1.1 Conservation significance assessment guidelines

| Agreement, Act or List | Status Codes |
|--|---|
| FEDERAL | |
| <i>Environment Protection and Biodiversity Conservation Act 1999</i> DoEE lists threatened flora, which are determined by the Threatened Species Scientific Committee (TSSC) according to criteria set out in the Act. The Act lists flora that are considered to be of conservation significance under one of eight categories (listed under 'Status Codes'). | <ul style="list-style-type: none"> • Extinct (EX) • Extinct in the Wild (EW) • Critically Endangered (CE) • Endangered (EN) • Vulnerable (VU) • Conservation Dependent (CD) |
| Threatened Ecological Communities (TECs) are those that are at risk of extinction. | <ul style="list-style-type: none"> • Critically Endangered (CE) • Endangered (EN) • Vulnerable (VU) |
| STATE | |
| <i>Biodiversity Conservation Act 2016</i> The <i>Biodiversity Conservation Act 2016</i> provides for the listing of threatened native flora and Threatened Ecological Communities that need protection as critically endangered, endangered or vulnerable species or ecological communities because they are | Species <ul style="list-style-type: none"> • Extinct (EX) • Extinct in the Wild (EW) • Critically Endangered (CR) • Endangered (EN) • Vulnerable (VU) |

| Agreement, Act or List | Status Codes |
|---|--|
| under identifiable threat of extinction (species) or collapse (ecological communities). | TECs <ul style="list-style-type: none"> • Presumed Totally Degraded (PD) • Critically Endangered (CR) • Endangered (EN) • Vulnerable (VU) |
| DBCA Priority list DBCA produces a list of Priority species and ecological communities (e.g. Priority Ecological Communities) that have not been assigned statutory protection under the <i>Biodiversity Conservation Act 2016</i> . This system gives a ranking from Priority 1 to Priority 4. | <ul style="list-style-type: none"> • Priority 1 (Poorly known species/ecological communities) (P1) • Priority 2 (Poorly known species/ecological communities) (P2) • Priority 3 (Poorly known species/ecological communities) (P3) • Priority 4 (Rare, Near Threatened, and other species/ecological communities in need of monitoring) (P4) |

1.4 Compliance

The survey work was undertaken in accordance with the requirements outlined in the MBS Environmental scope of works. The survey methods adopted were formulated in accordance with the following regulatory guidance:

- EPA (2018) Statement of Environmental Principles, Factors and Objectives;
- EPA (2016c) Environmental Factor Guideline: Flora and Vegetation; and
- EPA (2016b) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment.

2 ENVIRONMENT

2.1 Biogeographical Regionalisation of Australia

The Study Area is located within the Jarrah Forest bioregion, as described by the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway & Cresswell, 1995). This bioregion is described as duricrusted plateau of the Yilgarn Craton and is characterised by jarrah (*Eucalyptus marginata*) – marri (*Corymbia calophylla*) forest on laterite gravels and, in eastern parts, by wandoo (*Eucalyptus wandoo*) – marri woodlands on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands, and in areas of Mesozoic sediments, jarrah forests occur in a mosaic with a variety of species rich shrublands.

The Jarrah Forest bioregion is classified into two subregions, Northern Jarrah Forest (JAF01) and Southern Jarrah Forest (JAF02), of which the Study Area is located within the Northern Jarrah Forest subregion. The Northern Jarrah Forest subregion is characterised by jarrah – marri forest on laterite gravels in the west, with bullich (*Eucalyptus megacarpa*) and blackbutt (*Eucalyptus patens*) in the valleys, grading to wandoo – marri woodlands on clayey soils in the east, with powder bark (*Eucalyptus accedens*) on breakaways (Williams & Mitchell, 2001). There are extensive, but localised, sand sheets with *Banksia* low woodlands, and heath is found on granite rocks and as a common understory of forests and woodlands in the north and east (Williams & Mitchell, 2001). Most of the diversity in the communities occurs on lower slopes or near granite soils where there are rapid changes in site conditions (Williams & Mitchell, 2001).

2.2 Climate

The climate of the region is classified by cool wet winters, and warm, relatively dry summers. Average annual rainfall for the Northern Jarrah Forest subregion is from 1300 millimetres (mm) on the scarp, to approximately 700 mm in the east and north. The nearby weather stations likely to accurately document the long-term average weather and climate, and rainfall, for the Study Area are the Bureau of Meteorology's (BoM) Northam and Julimar Forest weather stations (station numbers 10111 and 9268, respectively), located approximately 44 km to the southeast and 12 km to the east, respectively (BoM, 2020).

The hottest month for Northam is January (mean maximum temperature 34.2°C), while the coolest is July (mean minimum temperature 5.4°C) (length of record from 1902-2020) (BoM, 2020) (Figure 2.1). The average annual rainfall for the Study Area (recorded at the Julimar Forest weather station) is 524 mm (BoM, 2020), with average monthly rainfall peaking from late autumn to early spring (May to September). The highest average monthly rainfall occurs in July (100.6 mm), with the lowest occurring in December (15 mm) (BoM, 2020).

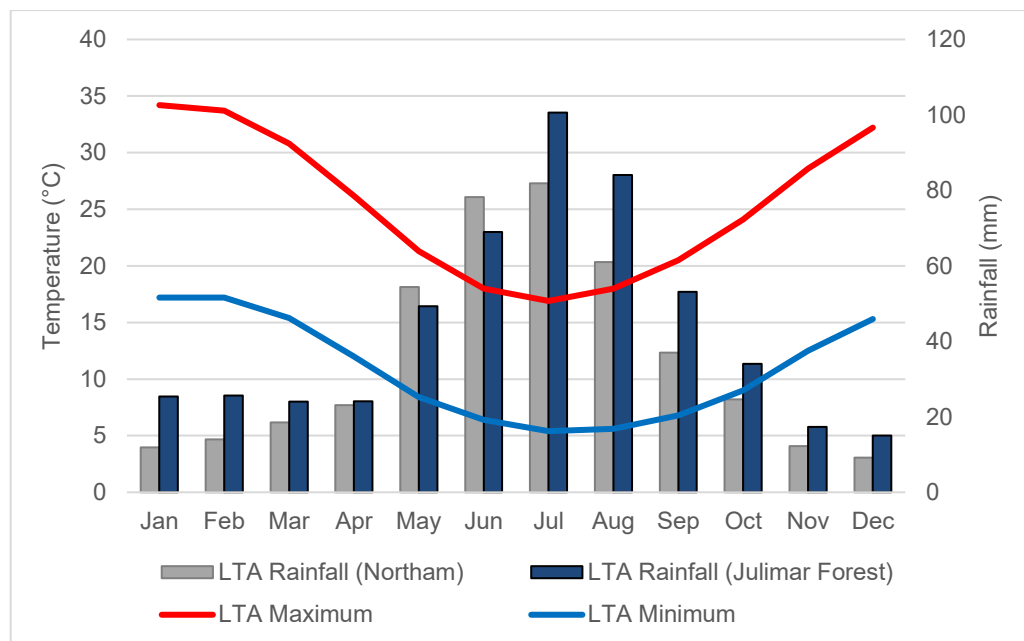


Figure 2.1: Climate data for Northam and Julimar (stations 10111 and 9268, respectively) (BoM, 2020).

2.3 Geology

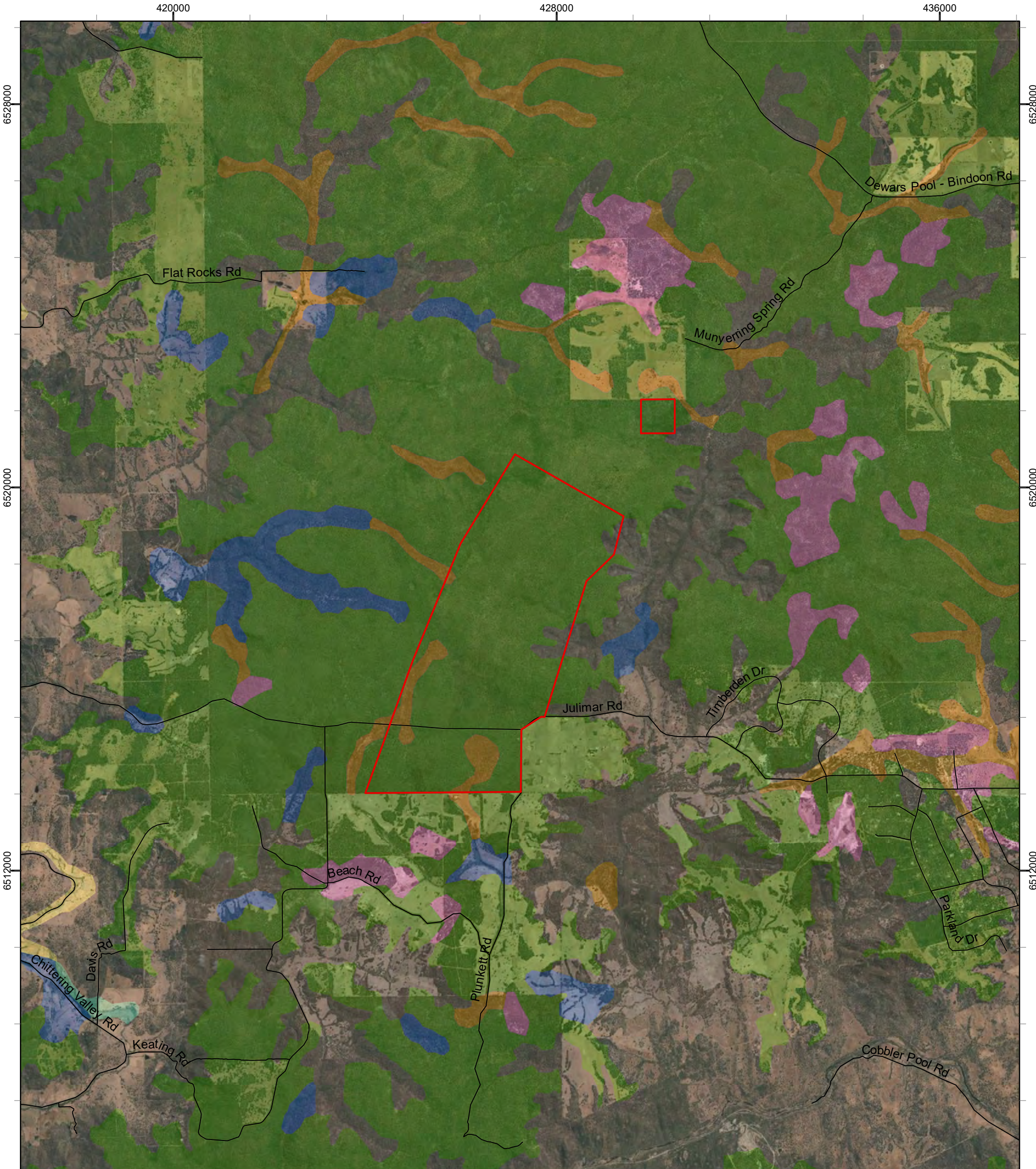
The Study Area is situated within the Northern Jarrah Forest subregion, which occupies the northern portion of the Darling Plateau to the east of the Darling Scarp (Beard, 1990). It overlies Archaean granite and metamorphic rocks. The plateau is an ancient erosion surface capped by an extensive lateritic duricrust, which has been dissected by later drainage and broken by occasional granite hills (Williams & Mitchell, 2001).

Bedrock geology: Using GSWA (2016) the Study Area is mapped as A-g-Y, and A-mgss-Y (Yilgarn Craton granites). The Study Area itself sits upon igneous and metamorphic rocks making up the Southwest Terrane of the Yilgarn Craton. The target of the minerals exploration by Chalice Gold Mines Ltd is a large interpreted mafic-ultramafic layered intrusive complex comprising nickel-copper-platinum group elements and intrusion related to vanadium-titanium mineralisation (Mattiske, 2019).

Regolith geology of the Study Area is displayed in Table 2.1 and Figure 2.2 (GSWA, 2020). Dominant regolith geology is represented by more than 91% as ferruginous duricrust large bedrock to rubbly surface substrate (Rr-f-YPP), with alluvial unit (Ac-YPP) of clay, silt, sand representing 6.3% and 2.4% as exposed bedrock.

Table 2.1: Regolith geology at the Study Area (1:500,000) (GSWA, 2020)

| Regolith Number | Code | Unit Name | Description | Area (ha) / Percentage (%) |
|-----------------|----------|------------------------------|--|----------------------------|
| 423 | Ac-YPP | Alluvial/fluvial unit, YPP | Clay, silt, sand, and gravel in fluvial channels | 127.1799 / 6.29 |
| 480 | Rr-f-YPP | Residual or relict unit, YPP | Ferruginous duricrust, massive to rubbly; includes iron-cemented reworked products | 1846.213 / 91.33 |
| 499 | X-YPP | Exposed unit, YPP | Exposed bedrock | 48.07731 / 2.38 |



Legend

Study Area

— Local Road

Regolith Geology

| | |
|---|---|
| <p> Aa-YPP; Alluvial/fluvial unit, YPP</p> <p> Ac-YPP; Alluvial/fluvial unit, YPP</p> | <p> Aw-YPP; Alluvial/fluvial unit, YPP</p> <p> C-YPP; Colluvial unit, YPP</p> <p> Rr-f-YPP; Residual or relict unit, YPP</p> <p> Rs-l-YPP; Residual or relict unit, YPP</p> <p> X-YPP; Exposed unit, YPP</p> |
|---|---|

0 2 4 Km

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 01/06/2021

Scale: 1:75,000

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**Figure 2.2: Broad geology
 of the Study Area**

2.4 Soils

Broadly speaking, soils of the Northern Jarrah Forest subregion are defined as lateritic gravels consisting of up to 5 m or more of ironstone gravels in a yellow, sandy matrix. Related to these are the lateritic podzolic soils with ironstone gravels in a sandy surface horizon, overlying a mottled yellow-brown clay subsoil (Beard, 1990). The Atlas of Australian Soils places the Survey Area within one broad soil landscape unit, JZ2 (Northcote *et al.*, 1968). This unit consists of dissected plateaus having a gentle to moderately undulating relief, and with broad swampy drainage ways and basins. It is characterized by lateritic gravels and block laterite, with chief soils comprising of ironstone gravels with earthy matrices (DEC, 2004). Six different soil groups from four soil supergroups are mapped within the Survey Area, as described in Table 2.2.

On a state level, the soils of WA have been described and standardised by the Department of Agriculture and Food (DAFWA) into 13 soil supergroups and 60 different soil groups (Schoknecht & Pathan, 2013). Mapping for soil groups has been conducted on a probability basis; in other words, each polygon is assigned the soil group that has the highest probability of occurring (DPIRD, 2021d).

Table 2.2: WA soil groups within the Survey Area (DPIRD, 2021d; Schoknecht & Pathan, 2013)

| Soil Supergroup | Soil Group | Description | Area (ha) / Percentage (%) |
|--------------------------|-----------------------------------|--|----------------------------|
| Ironstone gravelly soils | Deep sandy gravel | Ironstone gravel soil, with a predominantly sandy matrix, usually over clay, cemented gravels (ferricrete) or reticulite at >80 cm | 518.94 / 25.67 |
| | Loamy gravel | Ironstone gravel soil, with a predominantly loamy matrix, often grading to clay at >30 cm | 899.49 / 44.50 |
| | Shallow gravel | Ironstone gravel soil over cemented gravels (ferricrete), rock or other hard or permanently cemented layers at ≤80 cm | 510.26 / 25.24 |
| Loamy duplexes | Yellow/brown shallow loamy duplex | Yellow/brown loam over clay at <30 cm | 61.29 / 3.03 |
| Deep sands | Pale deep sand | Sand >80 cm deep with white, grey or pale yellow topsoil | 24.65 / 1.22 |
| Rocky or stony soils | Stony soil | Soils which are coarse gravelly, stony or rocky throughout | 6.85 / 0.34 |

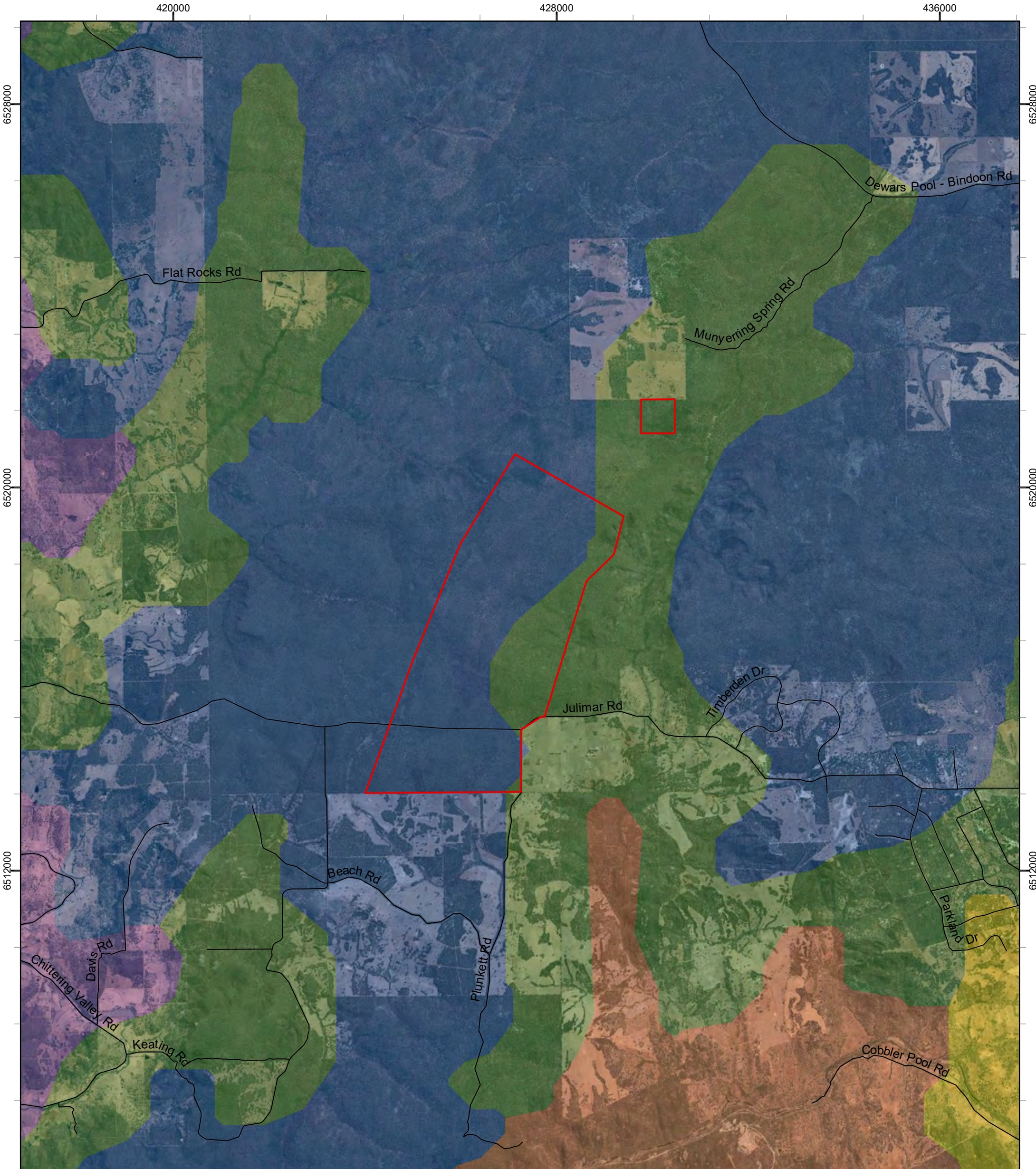
2.5 Soil-Landscape Mapping

The Study Area falls within the Western Region (2), Avon Province (25), the Eastern Darling Range Zone (253) and the Wundowie and Julimar Systems (see Table 2.3 and Figure 2.3). The WA Department of Agriculture, with support from the National Soil Conservation Program, National Landcare Program and Natural Heritage Trust conducted a 15-year mapping program which provides a soil and land resource inventory for the south-west agricultural areas of

Western Australia (Schoknecht *et al.*, 2004). Soil-landscapes are broken up into regions, provinces, zones and land systems across the state.

Table 2.3: Soil-landscape mapping within the Survey Area (based on DPIRD, 2021b; Schoknecht *et al.*, 2004)

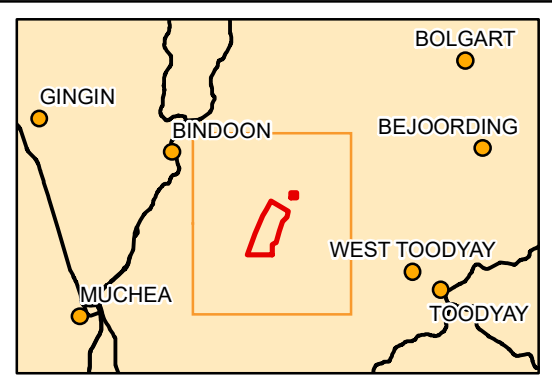
| | Description | Area (ha) / percentage (%) |
|-----------------------------------|---|----------------------------|
| Avon Province | Comprised of Precambrian granites and gneisses with past lateritic weathering. Soils may be calcareous, but red-brown hardpans are uncommon. | |
| Eastern Darling Range Zone | Moderately to strongly dissected lateritic plateau on granite with eastward-flowing streams in broad shallow valleys, some surficial Eocene sediments. Soils are formed in laterite colluvium or granite weathered in-situ. | |
| Land Systems | | |
| Wundowie | Intact undulating lateritic terrain with minor rock outcrops in the north eastern Darling Range. “Buckshot” gravels, duricrust and some deep sands vegetated by Jarrah forest. | 1712.195 / 15.30 |
| Julimar | Moderately dissected areas with gravelly slopes and ridges and minor rock outcrop on the eastern side of the Darling Plateau over weathered granite and granitic gneiss. Loamy gravel, shallow duplexes and pale deep sand common. Wandoo woodland. | 309.2749 / 84.70 |



| Legend | |
|-----------|------------|
| | Study Area |
| | Local Road |
| Soil Unit | |
| | JZ2 |
| | Mw31 |
| | Qb29 |
| | Qb32 |
| | Tf3 |

0 2 4 Km
 Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 01/06/2021

Scale: 1:75,000

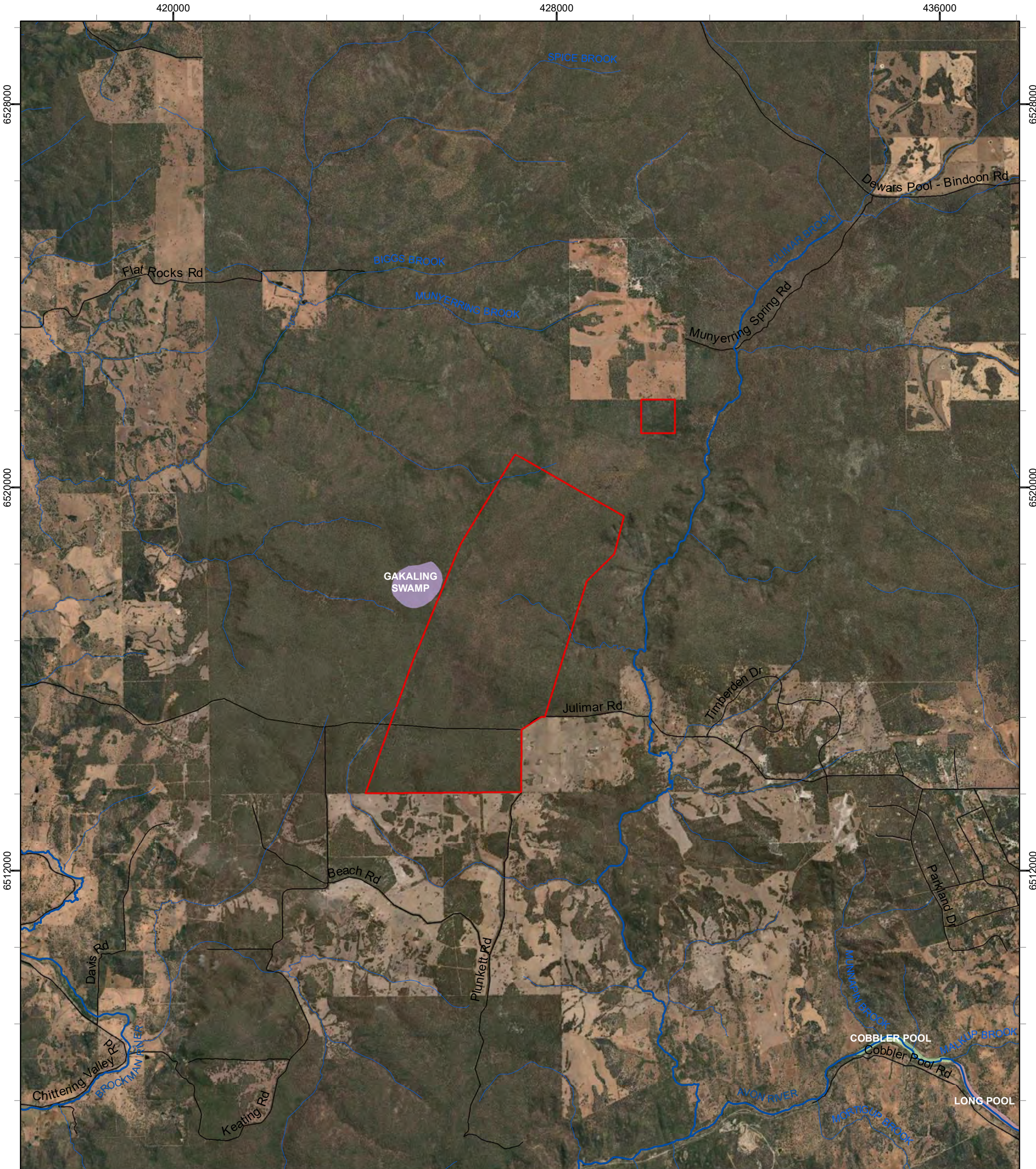


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Figure 2.3: Soils
of the Study Area

2.6 Hydrology

Rivers are the only wetlands of subregional significance in the Northern Jarrah Forest (Williams & Mitchell, 2001). The water courses of the subregion are dominated by the creation of water storage structures (dams and reservoirs) within the forested catchment primarily to provide potable water to the metropolitan area of Perth and irrigation horticulture and agriculture (Williams & Mitchell, 2001). The Study Area is located in the Brockman River subcatchment within the Swan-Avon Main-Avon Catchment of the Swan Coastal Basin (

Figure 2.4). There are two un-named minor watercourses, which form tributaries to Julimar Brook. One intersects the mid-eastern side of the Study Area, the other is just within the southeastern corner. These minor watercourses, originating from Julimar State Forest in the north, flows northwest to southeast through the Study Area entering Julimar Brook approximately 3.2 km to the east. Julimar Brook then feeds into the Avon River 5.6 km south of this confluence. There is also a third un-named watercourse in the northern portion of the Study Area which flows into the Brockman River via the Spice Brook and ends in the Chittering-Needonga lakes.



Legend

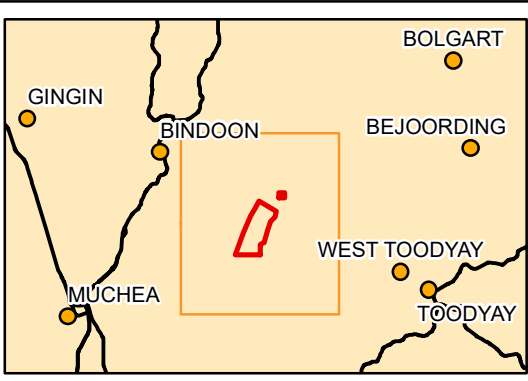
| | | |
|------------|--------------------------|-------------------|
| Study Area | Surface Hydrology | Water Body |
| Local Road | Minor | COBBLER POOL |
| | Major | GAKALING SWAMP |
| | | LONG POOL |

0 2 4 Km

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 01/06/2021

N

Scale: 1:75,000



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**Figure 2.4: Hydrology
 of the Study Area**

2.7 Flora and Vegetation

2.7.1 Vegetation Associations

The Study Area is located within the East Darling System, and under Shepherd *et al.* (2002) comprises:

- 4.5 Chittering: Jarrah, marri and wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*.
- 968.0 East Darling: Jarrah, marri and wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*.
- 968.2 Chittering: Jarrah, marri and wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*.

The current extent remaining of the vegetation system association exceeds 77% across the four regional scales: State, bioregion (Jarrah Forest), subregion (Northern Jarrah Forest) and Local Government Authority (Shire of Toodyay) (Government of Western Australia, 2018) (Table 2.4). Reservation of the vegetation system associations is good, with the East Darling 968 vegetation system association having greater than 32% of its current extent located within the National Reserve System across the four regional scales (Government of Western Australia, 2018) (Table 2.4).

Vegetation associations of the Study Area were originally mapped by Beard (1975a). Shepherd *et al.* (2002) reinterpreted and updated the vegetation association mapping to reflect the National Vegetation Information System (NVIS Technical Working Group) standards (ESCAVI, 2003). The update also accounts for extensive clearing since the Beard (1975a) mapping. Shepherd *et al.* (2002) created a series of 'systems' to assist in removing mosaic vegetation associations originally mapped by Beard (1975a); however, some mosaics still occur.

Table 2.4: Regional and local extent of vegetation system associations within the Study Area (Shepherd *et al.* (2002)).

| Scale | Extent (ha / %) | | |
|------------------------|-----------------|----------------|-----------------------|
| | Pre-European | Current | Remaining in Reserves |
| Code: 4.0 | | | |
| State | 15,467 | 9,097 / 58.82 | 224 / 2.46 |
| Jarrah Forest | 15,457 | 9,097 / 58.86 | 224 / 2.46 |
| Northern Jarrah Forest | 15,457 | 9,097 / 58.86 | 224 / 2.46 |
| LGA | 4,964 | 4,669 / 94.07 | - |
| Code: 968.0 | | | |
| State | 12,680 | 9,767 / 77.03 | 4,677 / 47.88 |
| Jarrah Forest | 12,680 | 9,767 / 77.03 | 4,677 / 47.88 |
| Northern Jarrah Forest | 12,680 | 9,767 / 77.03 | 4,677 / 47.88 |
| LGA | 7,995 | 6,311 / 78.93 | 2,576 / 40.81 |
| Code: 968.2 | | | |
| State | 45,068 | 31,580 / 70.07 | 40.53 / 0.13 |
| Jarrah Forest | 45,068 | 31,580 / 70.07 | 40.53 / 0.13 |
| Northern Jarrah Forest | 45,068 | 31,580 / 70.07 | 40.53 / 0.13 |
| LGA | 26,257 | 24,763 / 94.31 | 35.30 / 0.14 |

2.7.2 Vegetation Complexes

Mattiske and Havel (1998) mapped vegetation complexes across the south-west forest region at a scale of 1:50,000 as part of the Regional Forest Agreement (RFA). More recently this dataset has been reviewed to correct errors while the mapping along the Whicher Scarp has been updated to ensure a continuation of complexes defined by Mattiske and Havel (1998) (see Webb *et al.*, 2016).

The survey area coincides with the Pindalup (Pn), Yalanbee (Y5) and the Coolakin (Ck) vegetation complexes (Webb *et al.*, 2016). The Pindalup (PN) vegetation complex is described as: Open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla* on slopes and open woodland of *Eucalyptus wandoo* with some *Eucalyptus patens* on the lower slopes in semiarid and arid zones. The Yalanbee (Y5) vegetation complex is described as: Mixture of open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla* and woodland of *Eucalyptus wandoo* on lateritic uplands in semiarid to perarid zones. Lastly, the Coolakin vegetation complex is described as: Woodland of *Eucalyptus wandoo* with mixtures of *Eucalyptus patens*, *Eucalyptus marginata* subsp. *thalassica* and *Corymbia calophylla* on the valley slopes in arid and perarid zones.

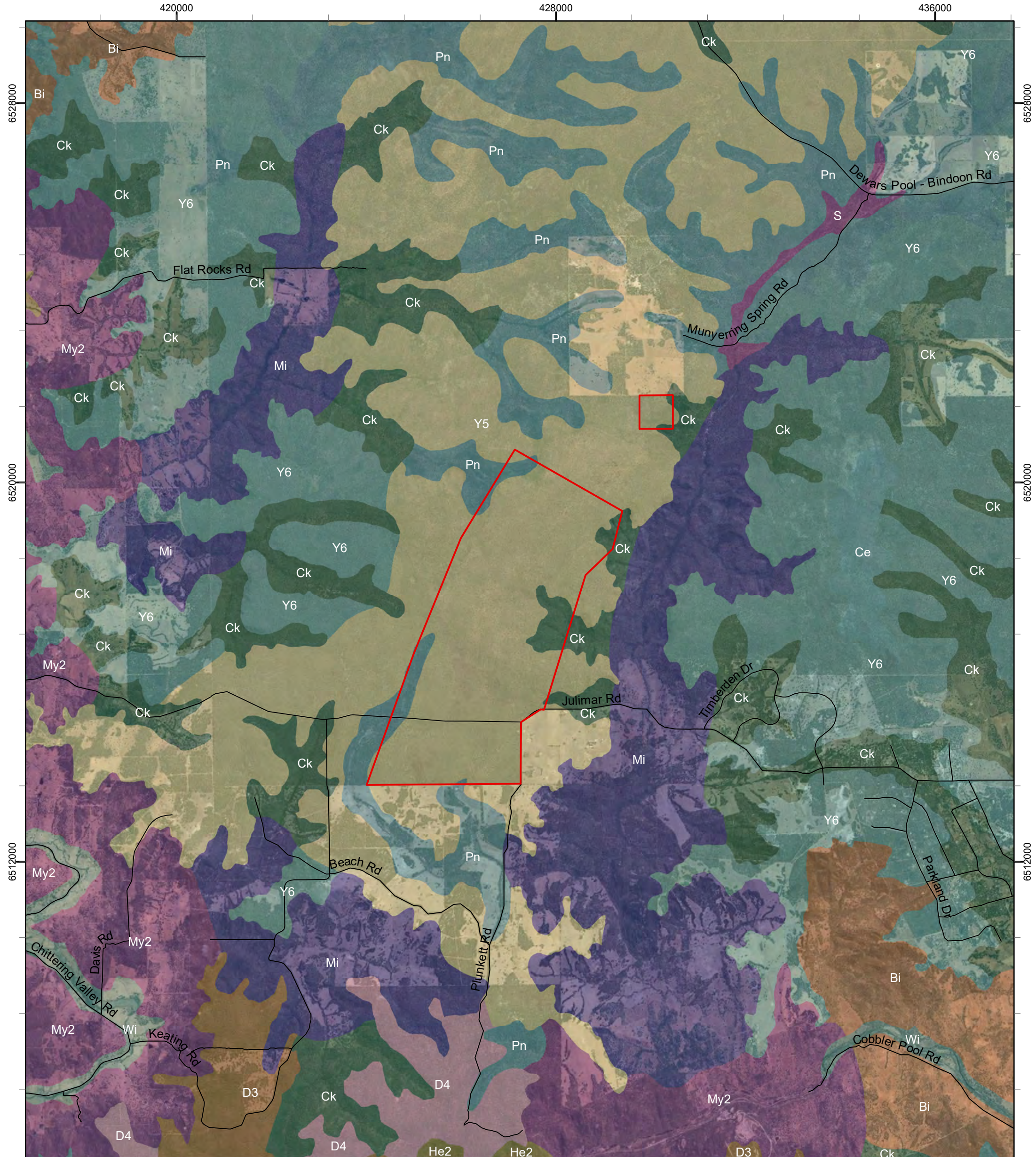
The Government of Western Australia reports annually on the statistics of the pre-European and current extent for the vegetation complexes of the south-west of Western Australia (Government of Western Australia, 2019). The updated statistics provide details on the progress towards achieving a conservation reserve system that is comprehensive, adequate and representative (CAR Reserve) and the statistics for each local government area (LGA; Shire of Toodyay).

The Coolakin (Ck), Pindalup (Pn) and Yalanbee (Y5) vegetation complexes occur across the Darling Plateau, mostly in the Northern Jarrah Forest subregion, covering 64,205 ha, 128,358 ha, and 83,829 ha, respectively (Government of Western Australia, 2019) (Table 2.5). This represents 39.15%, 76.8%, and 66.2% of the pre-European extent for both vegetation complexes. The Study Area is mostly consists of the Yalanbee (Y5) complex (1815 ha, 89.79 %) followed by the Coolakin (Ck) complex (107.87 ha, 5.34 %) and the Pindalup (Pn) complex (98.49 ha, 4.87 %)

Area

| Vegetation complex & code | Scale | Pre-European extent (ha) | Current extent remaining (ha / %) | Current extent protected (ha / %) ¹ |
|---------------------------|-------|--------------------------|-----------------------------------|--|
| Coolakin (Ck) | State | 163,992 | 64,205 / 39.15 | 6,384 / 3.9 |
| | LGA | 24,258 | 12,276 / 50.61 | N/A |
| Pindalup (Pn) | State | 167,151 | 128,358 / 76.8 | 23,935 / 14.3 |
| | LGA | 7,886 | 6,311 / 80.0 | N/A |
| Yalanbee (Y5) | State | 126,610 | 83,829 / 66.2 | 7,695 / 6.1 |
| | LGA | 21,389 | 18,455 / 86.3 | N/A |

¹ – Protected refers to lands protected within IUCN Class I-IV reserves for conservation
LGA: Local Government Authority – Shire of Toodyay



Legend

- Study Area
- Local Road

Vegetation Complexes of the South West forest

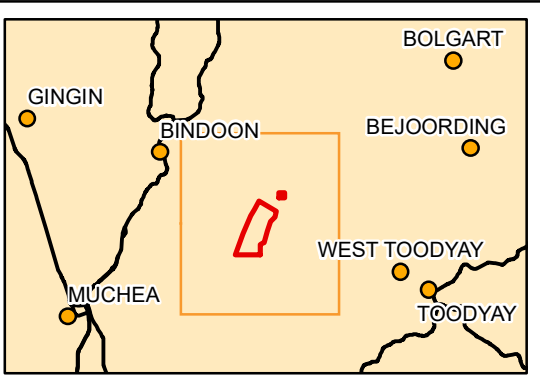
| | | |
|---|--|--|
| <p>Darling Plateau - Uplands</p> <ul style="list-style-type: none"> Cooke, Ce Dwellingup, D3 Dwellingup, D4 | <p>Darling Plateau - Depressions and Swamps on Uplands</p> <ul style="list-style-type: none"> Yalanbee, Y5 Yalanbee, Y6 Swamp, S <p>Darling Plateau - Valleys</p> <ul style="list-style-type: none"> Bindoon, Bi Coolakin, Ck | <p>Darling Plateau - Valley Floors and Swamps</p> <ul style="list-style-type: none"> Helena 2, He2 Michibin, Mi Murray 2, My2 Pindalup, Pn Nooning, No Williams, Wi |
|---|--|--|

0 2 4 Km

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 01/06/2021



Scale: 1:75,000



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**Figure 2.5: Vegetation
 complexes of the Study Area**

2.7.3 Bioregional Significance

Under the Convention of Biological Diversity, Australia has worked towards a target of 17% of the continent to be protected as part of the National Reserve System (NRS). In building the NRS, priority is given to under-represented bioregions that have less than 10% of their remaining area protected in reserves (NRSTG, 2009). The Jarrah Forest bioregion is currently adequately represented under the NRS, with greater than 10% of its total area protected in reserves. The Northern Jarrah Forest subregion is also adequately represented, with more than 10% of the subregional area protected in reserves.

The Study Area is located within Julimar State Forest which is crown land. It is also listed on the EPA Redbook Recommended Nature Reserves (C21, The Darking System; (DBCA, 2021d), and as an Environmentally sensitive area under section 51B of the Environmental Protection Act 1986 (EP Act; (DWER, 2021).

2.7.4 Introduced Taxa

Weeds of National Significance

The Commonwealth of Australia, in collaboration with the states and territories, has identified 32 Weeds of National Significance (WoNS) based on an assessment process that prioritises these weeds according to their invasiveness, potential for spread and environmental, social and economic impacts. A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

Landowners and land managers at all levels are responsible for managing WoNS. State and territory governments are responsible for legislation, regulation and administration of weeds. The WoNS were selected as they require coordination among all levels of government, organisations and individuals with weed management responsibilities.

Declared Plant Pests

To protect Western Australian agriculture the Department of Primary Industries and Regional Development (DPIRD) (formerly the Department of Agriculture and Food Western Australia, DAFWA) regulates harmful plants under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Plants that are prevented entry into the state or have control or keeping requirements within the state are known as declared pests. The main purposes of the BAM Act and its regulations related to Declared Plant Pests (DPP) are to prevent new plant pests from entering Western Australia, manage the impact and spread of those pests already present in the state and safely manage the use of agricultural chemicals.

The BAM Act has categorised the weeds of Western Australia into four main classifications:

- Declared Pests (under Section 22 of the Act);
- Permitted (under Section 11 of the Act);
- Prohibited (under Section 12 of the Act); and
- Permitted requiring a permit (Section 73, BAM Regulations 2013).

Under the BAM Act all declared plant pests are placed in one of three categories:

- C1 (Exclusion) — Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State;
- C2 (Eradication) — Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still feasible; and
- C3 (Management) — Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Weed Prioritisation

In 2008 Parks and Wildlife developed and implemented an integrated approach to weed management on Parks and Wildlife-managed lands in WA, the Weed Prioritisation Process. It was updated in 2013 and further revised in 2016. Parks and Wildlife prioritised weeds in each region, based on:

- Invasiveness;
- Ecological impact;
- Potential and current distribution; and
- Feasibility of control.

The resulting priorities focus on weeds considered to be high impact, rapidly invasive and still at a population size that can feasibly be eradicated or contained to a manageable size. This means that weed species that are already widespread may not be ranked as a high priority. The weed prioritisation for the South Coast bioregion has recently been revised by Parks and Wildlife. The key priorities are now centred on 'Priority Alert' weeds and weeds that receive a rating for 'Ecological Impact' and 'Invasiveness'.

3 METHODOLOGY

3.1 Desktop Assessment

3.1.1 Literature Review

Background information on the Study Area and surrounds was compiled prior to, during and after the field survey. Historic vegetation mapping conducted by Beard (1975a), Shepherd *et al.* (2002) and Mattiske and Havel (1998), and the IBRA classification system (Williams & Mitchell, 2001), were consulted to provide broad contextual knowledge of the vegetation types likely to be encountered within the Study Area.

A review of publicly available literature relevant to the Study Area was undertaken to compile a list of conservation significant flora and ecological communities with the potential to occur within the Study Area. The eleven reports that were reviewed are listed in Table 3.1.

Table 3.1: Literature review relevant to the Study Area.

| Survey Title | Reference | Survey Type | Distance from Study Area (km) |
|--|-------------------------------|--|-------------------------------|
| Assessment of Potential Flora, Vegetation and Fauna Values Julimar Project, Bindoon | Mattiske (2019) | Desktop Assessment | Within and surrounding |
| Julimar exploration project: reconnaissance and targeted flora survey | Biologic (2020) | Reconnaissance and Targeted Flora Survey | Adjacent to the south |
| Flora and fauna assessment for Muchea North and Chittering study area: Great northern Highway, Muchea to Wubin Upgrade Stage 2 Project | Phoenix (2015) | Flora and Fauna Assessment | 12.7 km northwest |
| Great Northern Highway, Muchea to Wubin Upgrades, Stage 2 – Bindoon Options. | Focused Vision (2017) | Level 2 Flora and Vegetation Assessment and Targeted <i>Thelymitra stellata</i> Survey | 13 km west northwest |
| Detailed Flora and Vegetation Assessment, Bindoon Bypass, Great Northern Highway | Focused Vision (2018) | Detailed Flora and Vegetation Assessment | 14.7 km west |
| Instant Product Group: Muchea Lot 195 Detailed (Level 2) Flora and Vegetation Assessment | Maia (2017) | Detailed Flora and Vegetation Assessment | 16.8 km west southwest |
| Toodyay Road Widening Metro and Wheatbelt Regions Biological Surveys | AECOM (2016) | Biological Assessment | 20.7 km southeast |
| Flora and fauna assessment for Calingri to Wubin study areas: Great northern Highway, Muchea to Wubin Upgrade Stage 2 Project | Phoenix (2016) | Flora and Fauna Assessment | 20.8 km north northwest |
| A biological survey of the agricultural zone: vegetation and vascular flora of Drummond Nature Reserve | Keighery <i>et al.</i> (2002) | Biological Survey | 21 km northeast |
| Bindoon Defence Training Area Flora Surveys 2011: DFSW Range, DEMS Range, Static Grenade Range No. 2 | Ecoscope (2012) | Flora and Vegetation Survey | 22.5 km north |
| Flora and Vegetation: Reserve 2145 and Percy Cullen Oval Gidgegannup | Bennett Environmental (2006) | Flora and Vegetation Survey | 31.8 km south |

3.1.2 Database Searches

Database searches were undertaken to generate a list of vascular flora taxa previously recorded in the vicinity of the Study Area, including introduced species and taxa of conservation significance. The database searches also identified ecological communities and vegetation types of conservation significance that occur, or may occur, within, and near, the Study Area. Three of the database searches were conducted around a central coordinate (31°26'12.98"S; 116°16'27.98"E), with varying buffers as deemed appropriate (Table 3.2).

Table 3.2: Details of database searches conducted.

| Provider | Reference | Database | Parameters |
|---|---------------------|---|--|
| Atlas of Living Australia (ALA) | ALA (2021) | Species occurrence search. | Circle of radius 10 km centred on the coordinates: 31°26'12.98"S; 116°16'27.98"E |
| Department of Agriculture, Water and the Environment (DAWE) | DAWE (2021) | Protected Matters Search Tool. | Circle of radius 10 km centred on the coordinates: 31°26'12.98"S; 116°16'27.98"E |
| Department of Biodiversity Conservation and Attractions | DBCA (2021b, 2021c) | Threatened and Priority Ecological Communities. | Buffer of 15 km from supplied Study Area polygon |
| | | Threatened and Priority Flora. | Buffer of 10 km from supplied Study Area polygon |
| Department of Biodiversity Conservation and Attractions | DBCA (2021a) | NatureMap – species occurrence search | Circle of radius 10 km centred on the coordinates: 31°26'12.98"S; 116°16'27.98"E |
| Department of Primary Industries and Regional Development (DPIRD) | DPIRD (2021c) | Declared Plants Database – Western Australian Organism List (WAOL). | Search of the entire Shire of Toodyay |

3.1.3 Likelihood Ranking

The conservation significant flora taxa identified from the database searches were assessed and ranked on the likelihood of occurring within the Study Area. The rankings were assigned using the following definitions presented in the decision matrix (Table 3.3).

Interpretation of likelihood criteria may vary between species due to several factors influencing species occurrence known distribution, known range, preferred habitat, ecology and/or dispersal capabilities. The assessment of occurrence also takes into consideration how well distributed a species is within known localities. Where necessary, justification for the likelihood ranking will be provided per species. Likelihood rankings will be re-assessed post field survey and may change taking ground truthing into consideration.

Table 3.3: Flora likelihood decision matrix

| | | Habitat categories (within the Study Area) | | | |
|---|--|--|---|--|--|
| | | Core/ critical habitat present | Suitable habitat present/ within known distribution | Marginal habitat present/ adjacent to known distribution | No suitable habitat present/ outside of known distribution |
| Species Records / Occurrence Categories | Recorded in the Study Area | Confirmed | Confirmed | Confirmed | Confirmed |
| | Recorded within <2 km | Highly Likely | Likely | Possible | Possible |
| | Recorded within 2-5 km | Likely | Possible | Possible | Unlikely |
| | Recorded within 5 -20 km | Possible | Possible | Unlikely | Unlikely |
| | Recorded >20 km | Possible | Unlikely | Unlikely | Highly Unlikely |
| | Species considered locally/ regionally extinct | Unlikely | Unlikely | Highly Unlikely | Highly Unlikely |

3.2 Field Survey

3.2.1 Survey Type, Timing and Weather

A single season reconnaissance flora and vegetation survey was requested by MBS on behalf of Chalice. A reconnaissance survey was also deemed the most appropriate survey approach, considering the timing of the survey (i.e. April / May), the size and condition of the Study Area and the scope. The reconnaissance field survey was undertaken over five days, between the 20th and the 22nd of April, and the 7 and 13 of May 2021. The daytime climatic conditions during the field survey (cool temperatures with minimal rain; BoM, 2021) were adequate to complete the survey with minimal constraints and limitations.

In the thirteen months prior to the field survey (May 2020 to May 2021), the Julimar Forest weather station, located 10 km east of the Study Area, recorded 699.6 mm of rainfall (Figure 3.1) (BoM, 2021). This was above the long-term average (LTA) rainfall for the same period (518.9 mm; BoM, 2021).

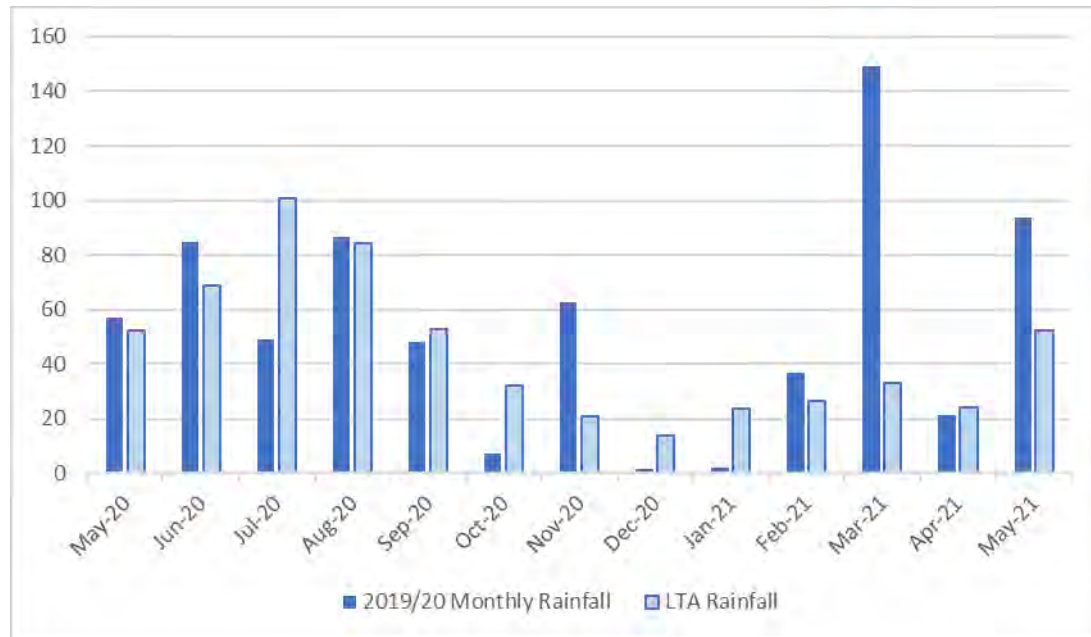


Figure 3.1: Comparative rainfall data for Julimar State Forest(Station 9268; BoM, 2021)

3.2.2 Survey Team and Licensing

The field survey was conducted over five days, totalling 18 person days in April and May of 2021. Specifically, the field days were 20-22 April, 7 and 13 May. The field team was led by Senior Botanist, Samuel Coultas, supported by five Botanists: Emily Eakin-Busher, Clare Whyte, Heather Edwards, Kaylin Geelhoed, Darcy Reith and Ecologist, Mary van Wees.

Table 3.4: Field survey personnel

| Biologic Personnel | Project Involvement | Flora Licences | Relevant Botanical Experience |
|-------------------------------------|---|----------------------------|-------------------------------|
| Senior Botanist / Ecologists | | | |
| Samuel Coultas | Field survey – 20-22 April & 7 May | FB6200017-2 TFL 60-1819 | 6+ years |
| Mary van Wees | Field survey – 13 May | - | 7+ years |
| Botanists | | | |
| Emily Eakin-Busher | Field survey – 21-22 April & 7 May | FB62000160 TFL 53-1920 | 3 years |
| Clare Whyte | Field survey – 20-22 April, 7 & 13 May; Reporting | FB62000274 | 3 years |
| Heather Edwards | Field survey – 13 May | FB62000281 | 5 years |
| Kaylin Geelhoed | Field survey – 21-22 April & 13 May | FB62000238 | < 2 years |
| Darcy Reith | Field survey – 7 May | - | < 2 years |

3.2.3 Flora and Vegetation Survey Design

Floristic Sample Sites

Sixty-one relevé sites were recorded from the Study Area. Broad preliminary vegetation units and potential sites therein were determined prior to field mobilisation. These were derived from

a combination of aerial photography (Scale 1:15,000) of the Study Area, Google Earth Pro®, previous vegetation mapping (Beard, 1975b; Mattiske & Havel, 1998; Shepherd *et al.*, 2002) and soil landscape mapping (Northcote *et al.*, 1968). Reconnaissance surveys are traditionally sampled at a low intensity via relevés (unmarked area within which data is collected, EPA, 2016b) and mapping points (unmarked area within which the vegetation unit and condition is broadly described).

Where practical, at least one relevé site was established in each of the preliminary vegetation unit areas (Figure 3.2), to ensure that all vegetation units were captured by the survey and described appropriately in accordance with EPA (2016b) guidelines. The entire Study Area was accessible via vehicle and on foot, with all the major landforms and vegetation units traversed and sampled.

All vascular flora taxa within each relevé, including the height and approximate cover for the dominant species, and additional taxa found during mapping notes and opportunistic searches while traversing the Study Area, were recorded. A brief summary of the vegetation assemblage at each site was also recorded to aid in producing vegetation unit descriptions (NVIS Technical Working Group, 2017) (Appendix B). In addition, the following information was recorded at each site:

- Unique site identification number;
- Date of survey;
- Personnel;
- Central GPS coordinate (GDA 94);
- Site photograph of the representative vegetation unit;
- Soil characteristics (texture and colour);
- Geology (type, size and nature of any rocks, stones, gravel, or outcropping);
- Topography (landform type and aspect);
- Vegetation condition (Appendix C);
- Vegetation structure, including the dominant flora species in the three traditional strata, upper, mid and lower (Appendix B);
- Disturbance (if present);
- Approximate time since last fire; and
- GPS coordinates for conservation significant or introduced flora.

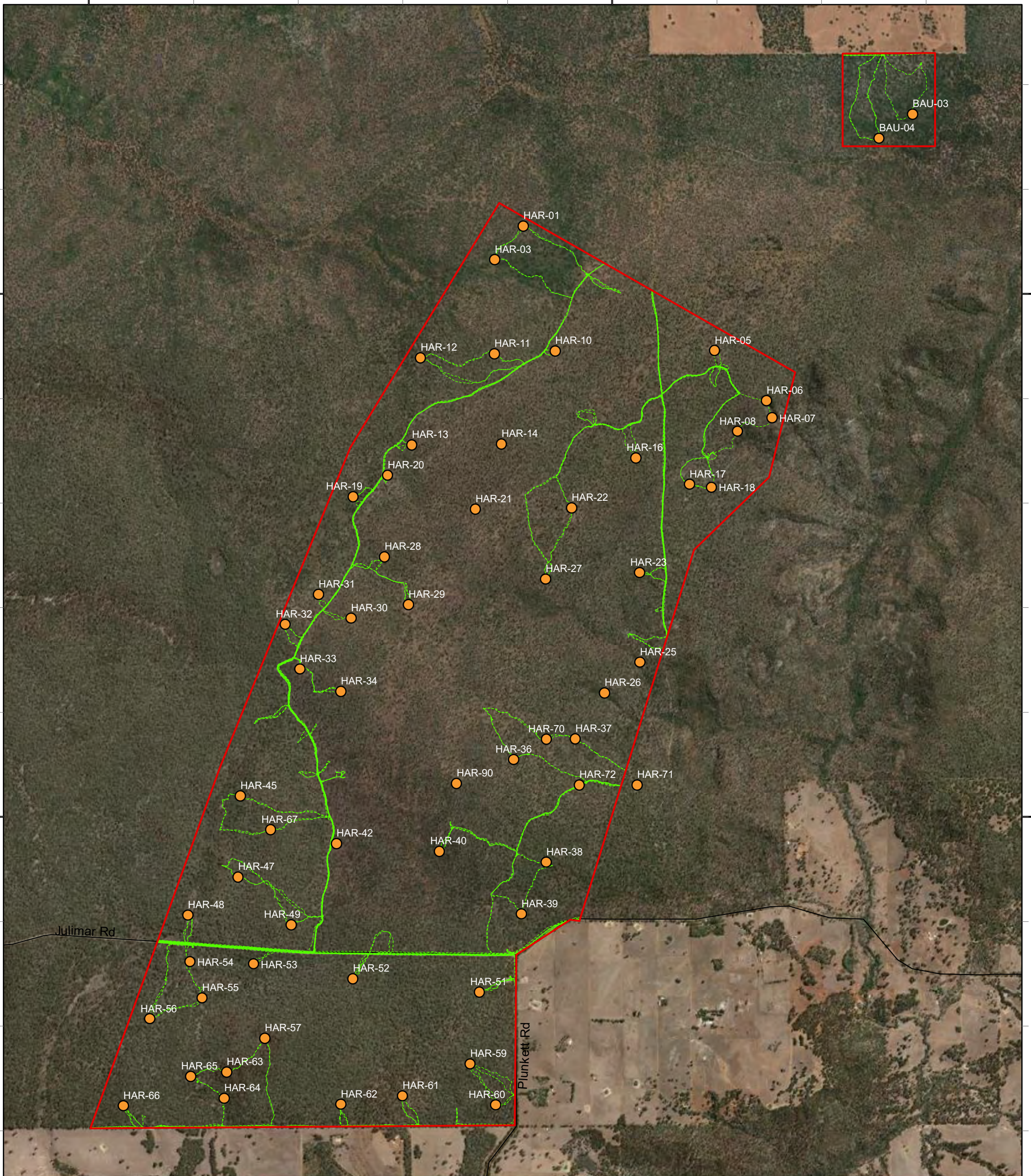
Targeted Searching

Prior to the survey, a list of 78 conservation significant flora and ecological communities with the likelihood or potential to occur within the Study Area was compiled from the desktop assessment. Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa and communities before conducting the survey. Once on the ground, active searching was completed across the Study Area whilst traversing between sites (Figure 3.2).

Where conservation significant flora taxa or introduced flora taxa were located in the field, a GPS coordinate of the individual was taken, or, if the taxon existed within a small population, a central coordinate with an approximate 20 m radius was used. Generalised information was collected for each occurrence, including an estimate of the number of individuals, photographs, reproductive status, condition and vegetation description.

Where conservation significant vegetation was located in the field, a central GPS coordinate of the community was taken and the boundary was mapped. Information was collected for each occurrence, including condition, photographs and vegetation description, while technical advice was consulted where necessary.

It should be noted that presence or absence of significant flora considered cryptic, herbs or perennial herbs was unable to be conclusively confirmed from this survey due to inappropriate survey timing. Additionally, this targeted survey forms a preliminary assessment of significant flora occurring within the Study Area and should not be considered conclusive. The southwest botanical region, inclusive of the Jarrah bioregion is a known biodiversity hotspot. As such it is expected to record a higher diversity of flora and significant flora taxa than other botanical regions in Western Australia.



Legend

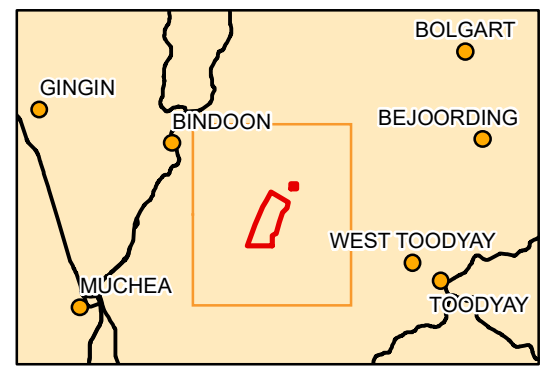
| | |
|---|---|
| Study Area | Sampling Type |
| Local Road | ● Relevé |
| | Traverse |

0 0.5 1 1.5 Km

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 11/06/2021

N

Scale: 1:28,000



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Figure 3.2: Flora sample sites and traverses

3.2.4 Identification of Flora Specimens

Plant taxa that could not be identified during the field survey were collected for subsequent identification. Identifications were carried out by Biologic taxonomist Dr. Rachel Meissner with assistance from Botanists Clare Whyte and Darcy Reith, using the Western Australian Herbarium's (WAH) reference collection, taxonomic keys and reference material. All taxa were checked against Florabase© (version 2.9.39; WAH, 1998-) to ensure their currency and validity. Any conservation significant flora taxa, including potential threatened and priority species, range extensions and potential new taxa will be verified and vouchered (if appropriate) at the WAH.

3.2.5 Vegetation Type and Condition Mapping

Broad vegetation mapping was conducted in the field, with relevés placed in vegetation communities that were clearly observable from aerial photography. Boundaries between vegetation types were delineated from field observations as well as by utilising regional aerial photography from various years, and interpreting landforms from 2m contour lines (DPIRD, 2021a; Landgate, 2021). Following the completion of the relevé sampling and taxonomic identifications, the broad vegetation types were further refined based on the review of the floristic data collected from the relevés. The vegetation type mapping was digitised using geographic information systems (GIS) software.

The vegetation types have been described to Level 5 (vegetation association), where possible, in the National Vegetation Information System (NVIS) hierarchical structure (NVIS Technical Working Group, 2017). The vegetation structure information collected was reviewed to describe the vegetation type based on the dominant taxa, foliage cover and height of the three traditional strata (upper, mid and lower/ground). The mapping reliability was completed to a level expected from a reconnaissance survey.

Vegetation condition was defined within the Study Area using the vegetation condition scale adapted from Keighery (1994) and presented in EPA (2016b) (Appendix C). The vegetation condition was determined based on the level of disturbance observed in the Study Area. Condition was recorded at relevés, while additional notes were taken while traversing the Study Area to broadly map vegetation condition boundaries. The vegetation condition mapping was then digitised using GIS software.

3.2.6 Potential Limitations and Constraints

There are a number of possible limitations and constraints that can impinge on the adequacy of vegetation and flora surveys. The limitations of the current assessment are presented in accordance with the Technical Guidance (EPA, 2016b) (Table 3.5).

Table 3.5: Potential limitations and constraints

| Limitation | Constraint | Comment |
|--|------------|---|
| Experience of personnel | No | The field survey was led by Sam Coultas, a senior botanist with over 6 years consulting experience, as well as by senior ecologist Mary van Wees and botanist Clare Whyte, all of whom have direct and relevant experience in the Northern Jarrah Forest subregion. |
| Scope (floral groups sampled and whether any constraints affect this) | Yes | The scope was a reconnaissance and targeted flora and vegetation survey. The survey was completed in line with EPA (2016a) guidelines for a reconnaissance survey. The survey was undertaken over five days in autumn (20-22 April, 7 & 13 May 2021) reducing the ability to record a comprehensive list of flora present. However, the assemblages and flora present could be interpreted enough to map vegetation types across the Study Area. Threatened and priority flora identified in the desktop assessment were actively searched for whilst traversing the Study Area. According to EPA (2016a), a targeted survey should aim to locate and record the size and extent of all significant flora populations within the Study Area. Given the size of the Study Area and the number of potential conservation significant flora, five days was not adequate to meet this aim. Additionally, the survey was not conducted within the recommended season for south-west WA (i.e. spring) and therefore threatened and priority flora were less detectable and identifiable (i.e. with flowers or fruit). |
| Proportion of flora identified | Yes | The field survey occurred in April and May which is outside of the optimal period to complete flora surveys within the Jarrah Forest bioregion (i.e. spring). The majority of flora present were sterile and lacking in flowers and/or fruit, which are key characters required for confident identification of flora specimens. One specimen was only identified to family level, as well as 16 specimens only identified down to genus, four specimens tentatively identified to species level. However the scope was a reconnaissance survey which does not necessarily require a complete compilation of flora species present within the Study Area. |
| Sources of information (recent or historic) and availability of contextual information | No | The Jarrah Forest bioregion has been subjected to numerous biological surveys, and a sufficient amount of contextual work was available to complete the assessment, including within the adjacent Julimar State Forest. |
| Proportion of the task achieved | No | The entire task achieved within the allotted survey period. |
| Disturbances (e.g. fire or flood) | No | Recent fires, likely prescribed burns, had altered the structure and cover of vegetation in some areas. This made interpretation of aerial imagery more difficult; however, the vegetation communities were still able to be delineated by using multiple years of regional imagery in combination with floristic data and field observations. |

| Limitation | Constraint | Comment |
|--|------------|---|
| Intensity of survey | Yes | Sixty-one releves were recorded during the field survey and the Study Area was comprehensively traversed ensuring the intensity met the requirements of a reconnaissance flora and vegetation survey. However, the intensity is not considered adequate for a targeted flora survey, especially given the number of conservation significant flora identified from the desktop assessment and the location within the southwest botanical region (See Section 3.2.3, Targeted Searching). |
| Completeness of survey | No | The survey was adequately completed to meet the requirements of the scope. However, additional detailed and targeted surveys during appropriate survey timing are recommended to better determine potential impacts to the flora and vegetation. |
| Resources (e.g. degree of expertise available) | No | All resources required to complete the survey were available. |
| Remoteness or access issues | No | The Study Area was accessible either by vehicle or on foot, thus the sampling techniques used during this survey were unconstrained by accessibility or remoteness. |
| Problems with data and analysis, including sampling biases | No | The majority of collections were sufficiently identified to species level or further and the remaining specimens that had insufficient material for taxonomic purposes are not considered a limitation of the survey. |

4 RESULTS AND DISCUSSION

The following section presents and discusses the results of the Survey and places the significant results in a regional and local context, consistent with the requirements of EPA (2016a).

4.1 Desktop Assessment

4.1.1 Flora of Conservation Significance

A total of 78 conservation significant flora were identified from the desktop assessment (literature review and database search) as occurring in the vicinity of Study Area. Of the 78 significant taxa, 15 are listed as Threatened flora (EPBC Act and BC Act), while the remaining Priority species are: seven Priority 1, 19 Priority 2, 16 Priority 3 and 21 Priority 4. The locations are presented in Figure 4.1. Likelihood of occurrence was assessed for each significant flora. A condensed list containing the confirmed, highly likely and possible classifications is presented at Table 4.1 and the full likelihood assessment is provided in Appendix F.

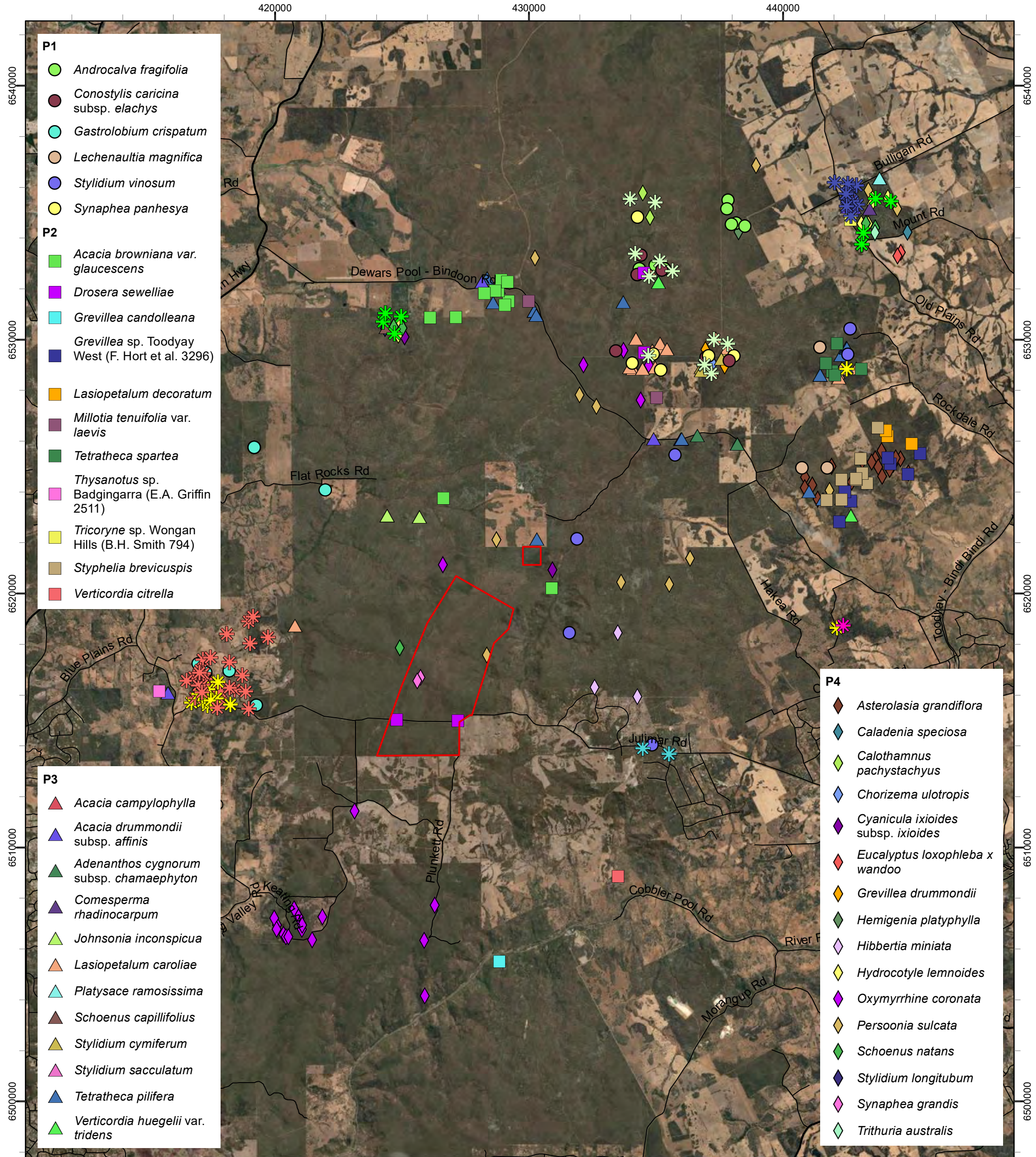
Results from Mattiske (2019) have not been included as this was only a desktop assessment of potential values, and did not include any observed records of conservation significant flora. The literature review identified twenty significant taxa not identified in the database searches. Eight of these taxa are not known to occur in the Northern Jarrah Forest subregion and as such have not been included in the likelihood assessment. The remaining twelve taxa were added to desktop results and form part of the total 78 significant flora identified in the desktop assessment.

The desktop assessment identified three taxa occurring within the Study Area: *Drosera sewelliae* (P2), *Persoonia sulcata* (P4) and *Synaphea grandis* (P4). A further two taxa are considered Highly Likely to occur within the Study Area, *Oxymyrrhine coronata* (P4) and *Schoenus natans* (P4), as well as 31 taxa classified as Possible (Table 4.1). The remaining 42 taxa are considered either Unlikely or Highly Unlikely to occur (Appendix F).

Table 4.1: Conservation significant flora of the desktop assessment

| Taxon | Description (WAH, 1998-) | Distance from Study Area |
|----------------------|--|--------------------------|
| Confirmed | | |
| P2 | <i>Drosera sewelliae</i> | Within |
| P4 | <i>Persoonia sulcata</i> , <i>Synaphea grandis</i> | |
| Highly Likely | | |
| P4 | <i>Oxymyrrhine coronata</i> , <i>Schoenus natans</i> | <2 km |
| Possible | | |
| T | <i>Eleocharis keigheryi</i> , <i>Grevillea bracteosa</i> subsp. <i>bracteosa</i> , <i>Grevillea corrugata</i> , <i>Grevillea curviloba</i> , <i>Thelymitra stellata</i> | 2 – 20 km |
| P1 | <i>Androcalva fragifolia</i> , <i>Conostylis caricina</i> subsp. <i>elachys</i> , <i>Gastrolobium crispatum</i> , <i>Lechenaultia magnifica</i> , <i>Stylidium vinosum</i> | |

| Taxon | Description (WAH, 1998-) | Distance from Study Area |
|-------|--|--------------------------|
| P2 | <i>Acacia browniana</i> var. <i>glaucescens</i> , <i>Gastrolobium nudum</i> , <i>Millotia tenuifolia</i> var. <i>laevis</i> , <i>Synaphea rangiferops</i> ^, <i>Verticordia citrella</i> | |
| P3 | <i>Acacia drummondii</i> subsp. <i>affinis</i> , <i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (R.J. Cumming 882), <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> , <i>Johnsonia inconspicua</i> , <i>Lasiopetalum caroliae</i> , <i>Schoenus capillifolius</i> , <i>Tetradlea pilifera</i> , <i>Verticordia huegelii</i> var. <i>tridens</i> , <i>Verticordia serrata</i> var. <i>linearis</i> ^ | |
| P4 | <i>Calothamnus pachystachyus</i> , <i>Chorizema ulotropis</i> , <i>Cyanicula ixioides</i> subsp. <i>ixioides</i> , <i>Hemigenia platyphylla</i> , <i>Hibbertia miniata</i> , <i>Hydrocotyle lemnoides</i> , <i>Stylidium longitubum</i> | |



- P1**
- *Androcalva fragifolia*
 - *Conostylis caricina* subsp. *elachys*
 - *Gastrolobium crispatum*
 - *Lechenaultia magnifica*
 - *Stylidium vinosum*
 - *Synaphea panhesya*
- P2**
- *Acacia browniana* var. *glaucescens*
 - *Drosera sewelliae*
 - *Grevillea candolleana*
 - *Grevillea* sp. Toodyay West (F. Hort et al. 3296)
 - *Lasiopetalum decoratum*
 - *Millotia tenuifolia* var. *laevis*
 - *Tetratheca spartea*
 - *Thysanotus* sp. Badgingarra (E.A. Griffin 2511)
 - *Tricoryne* sp. Wongan Hills (B.H. Smith 794)
 - *Styphelia brevicuspis*
 - *Verticordia citrella*

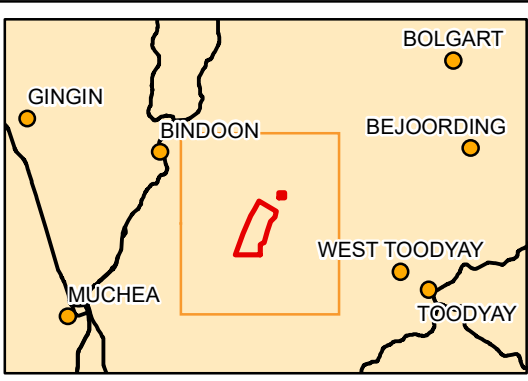
- P3**
- ▲ *Acacia campylophylla*
 - ▲ *Acacia drummondii* subsp. *affinis*
 - ▲ *Adenanthos cygnorum* subsp. *chamaephyton*
 - ▲ *Comesperma rhadinocarpum*
 - ▲ *Johnsonia inconspicua*
 - ▲ *Lasiopetalum caroliae*
 - ▲ *Platysace ramosissima*
 - ▲ *Schoenus capillifolius*
 - ▲ *Stylidium cymiferum*
 - ▲ *Stylidium sacculatum*
 - ▲ *Tetratheca pilifera*
 - ▲ *Verticordia huegelii* var. *tridens*

- P4**
- ◆ *Asterolasia grandiflora*
 - ◆ *Caladenia speciosa*
 - ◆ *Calothamnus pachystachyus*
 - ◆ *Chorizema ulotropis*
 - ◆ *Cyanicula ixioides* subsp. *ixioides*
 - ◆ *Eucalyptus loxophleba* x *wandoo*
 - ◆ *Grevillea drummondii*
 - ◆ *Hemigenia platyphylla*
 - ◆ *Hibbertia miniata*
 - ◆ *Hydrocotyle lemnoides*
 - ◆ *Oxymyrrhine coronata*
 - ◆ *Persoonia sulcata*
 - ◆ *Schoenus natans*
 - ◆ *Stylidium longitubum*
 - ◆ *Synaphea grandis*
 - ◆ *Trithuria australis*

- Legend**
- Study Area
 - Local Road
 - State Road
- T,EN**
- ✳ *Acacia chapmanii* subsp. *australis*
 - ✳ *Grevillea bracteosa* subsp. *bracteosa*
- T,VU**
- ✳ *Grevillea curviloba*
 - ✳ *Hypocalymma sylvestre*
 - ✳ *Thelymitra stellata*
 - ✳ *Eleocharis keigheryi*
 - ✳ *Grevillea corrugata*

0 2 4 6 Km

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 09/06/2021



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Figure 4.1: Conservation significant flora database search results

4.1.2 Vegetation of Conservation Significance

Searches of the DAWE database with regard to matters of national environmental significance, as listed under the EPBC Act (DAWE, 2021) and the Threatened and Priority Ecological Communities database (DBCA, 2021b) identified four ecological communities of conservation significance occurring within twenty-five kilometres of the Study Area (Figure 4.2, Table 4.2).

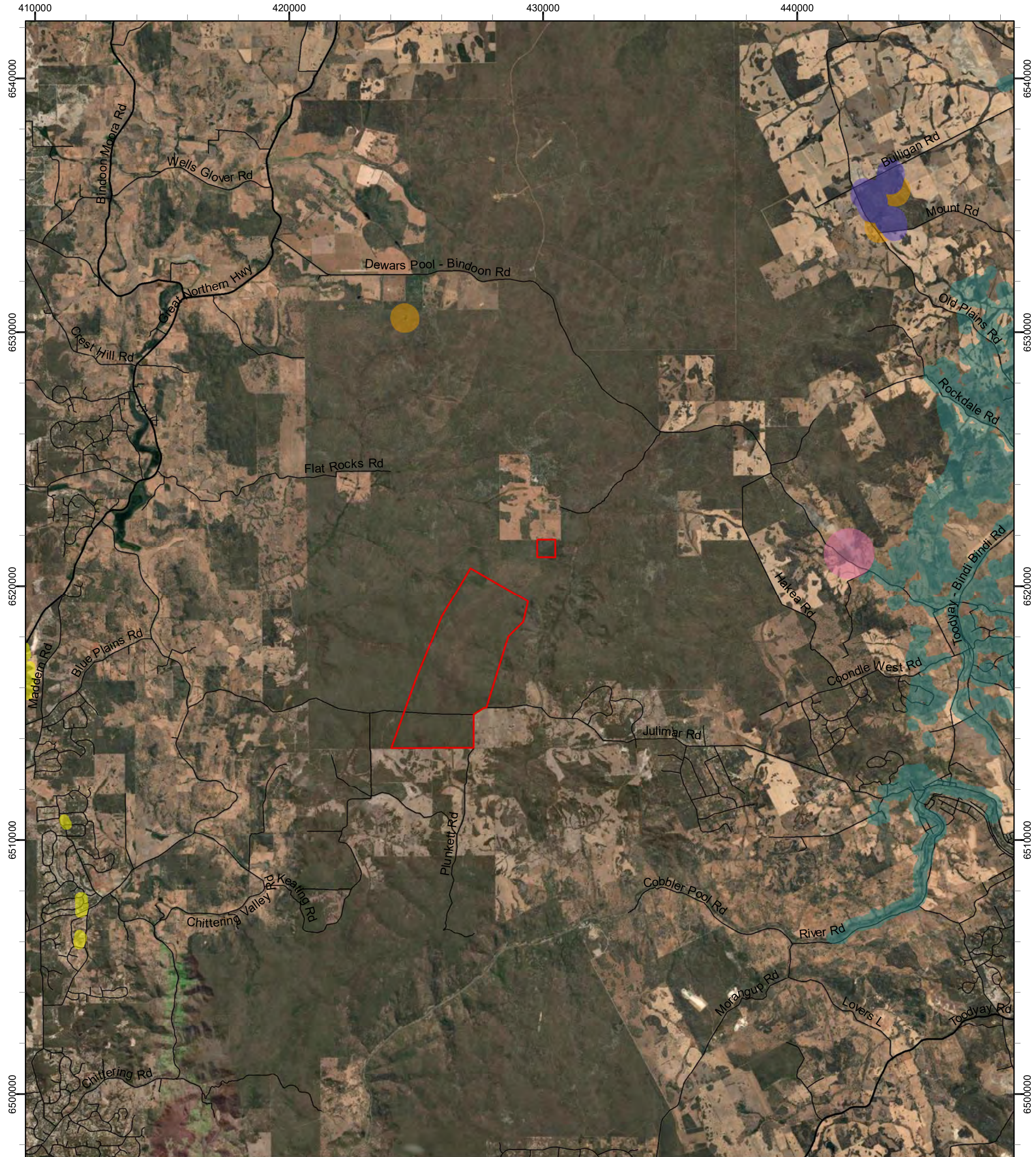
The ‘Banksia dominated woodlands of the Swan Coastal Plain IBRA region’ TEC was identified by both Maia (2017) and Focused Vision (2018). This TEC (and associated sub-community PECs) occurs in the adjacent Swan Coastal Plain bioregion and is not expected to occur within the Study Area. Similarly, the ‘Eucalypt woodlands of the Western Australian Wheatbelt’ PEC/TEC is not expected to occur within the Study Area, as it does not meet the 300 to 600 mm average annual rainfall isohyet criteria outlined in the conservation advice (DoE, 2015). This leaves two TECs/PECs with the potential to occur within the Study Area:

- Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs
- Wandoo woodland over dense low sedges of *Mesomelaena preissii*

Table 4.2: TEC & PEC desktop results

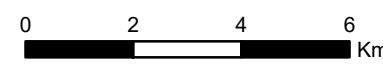
| Community | DBCA conservation code | EPBC | Description | Distance from Study Area |
|---|------------------------|-----------------|--|--------------------------|
| Claypans with mid dense shrublands of <i>Melaleuca lateritia</i> over herbs | Priority 1 | Threatened - CR | Claypans (predominantly basins) usually dominated by a shrubland of <i>Melaleuca lateritia</i> with dense herbs occurring both on the Swan Coastal Plain and Jarrah Forest IBRA regions. These claypans are characterized by aquatic (<i>Hydrocotyle lemnoides</i> (P4)) and amphibious flora (e.g. <i>Glossostigma diandrum</i> , <i>Liparophyllum capitatum</i> and <i>Eleocharis keigheryi</i> (T)). | 9.7 km N |
| Wandoo woodland over dense low sedges of <i>Mesomelaena preissii</i> | Priority 2 | - | Wandoo woodland on clay flats in valleys over dense low sedges of <i>Mesomelaena preissii</i> . | 18.5 km NE |
| Eucalypt woodlands of the Western Australian Wheatbelt | Priority 3 | Threatened - CR | Eucalypt-dominated woodlands in the Western Australian Wheatbelt region (including outlying patches in the eastern parts of the Northern Jarrah Forest subregion adjacent to the Avon Wheatbelt IBRA region that are off the Darling Range and have annual rainfall <600 mm). Structure is a mature woodland with crown cover of the tree canopy >10%. | 11.9 km E |

| Community | DBCA conservation code | EPBC | Description | Distance from Study Area |
|---|------------------------------|-----------------|---|--------------------------|
| Banksia dominated woodlands of the Swan Coastal Plain IBRA region | Threatened & Priority listed | Threatened – EN | <p>Consists of several sub-communities:</p> <ul style="list-style-type: none"> • <i>Banksia attenuata</i> woodlands over species rich dense shrublands ('community type 20a') (T – EN (DBCA)) • Low lying <i>Banksia attenuata</i> woodlands or shrublands ('community type 21c') (P3 (DBCA)) • Banksia woodlands of the Gingin area restricted to soils dominated by yellow to orange sands (P2 (DBCA)) • Northern Swan Coastal Plain <i>Banksia attenuata</i> – <i>Banksia menziesii</i> woodlands ('community type 23b') (P3 (DBCA)) | 13 km SW |

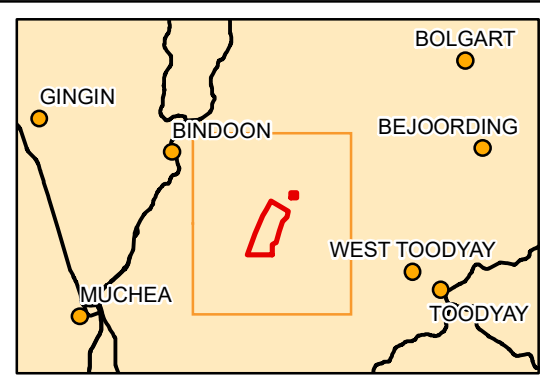


Legend

- Study Area
- Local Road
- State Road
- Threatened and Priority Ecological Community**
- Community - State category, Commonwealth Category**
- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region - Priority 3, Endangered
- Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs - Priority 1, Critically Endangered
- Eucalypt woodlands of the Western Australian Wheatbelt - Priority 3, Critically Endangered
- Wandoo woodland over dense low sedges of *Mesomelaena preisii* - Priority 2
- York Gum Woodlands of the wheatbelt - Priority 3, Critically Endangered



Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 08/06/2021



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Figure 4.2: Threatened and Priority Ecological Communities database search results

4.1.3 Introduced flora

The NatureMap (DBCA, 2020), Atlas of Living Australia (ALA, 2020), Protected Matters (DAWE, 2020) and WAOL (DPIRD, 2020) database searches identified a list of 86 introduced taxa that may potentially occur within the Study Area. The list of introduced taxa known to occur or potentially occur within the Study Area (Appendix G) was reviewed to identify WoNS and DPPs. The literature review also identified one other taxa (*Rumex hypogaeus*) not identified in the desktop survey.

Weeds of National Significance

Of the list of introduced taxa identified during the desktop assessment as occurring in or near the Study Area, 33 are listed as WoNS (Appendix G). Twenty-eight of the WoNS were identified from the WAOL database search for the entire Shire of Toodyay and occur or may potentially occur within the shire boundaries, while the remaining five were identified by the Protected Matters (DAWE, 2020) database search. The 33 taxa include numerous *Rubus*, *Opuntia*, *Austrocyllindropuntia* and *Cylindropuntia* species that are grouped together in the WoNS listing.

Declared Pests

The desktop assessment identified 50 DPs (including numerous cacti species that are all listed as DPs, (Appendix G), previously recorded or potentially located within the Shire of Toodyay.

Priority Alert Weeds

Sixteen introduced taxa have been identified by Parks and Wildlife as 'Priority Alerts' for the South West region, **Asclepias curassavica*, **Baeometra uniflora*, **Casuarina glauca*, **Cenchrus setaceus*, **Commelina benghalensis*, **Cymbalaria muralis* subsp. *muralis.*, **Galium aparine*, **Gaura lindheimeri*, **Gazania linearis*, **Hydrocotyle bonariensis*, **Lachenalia bulbifera*, **Lachenalia mutabilis*, **Lachenalia reflexa*, **Moraea miniata*, **Solanum hoplopetalum* and **Tribulus terrestris*. Two of these, **Galium aparine* and **Moraea miniata*, were identified from the WAOL database search. The remaining Priority Alert weeds have not previously been recorded from within or near the Study Area, are not expected to occur in the Study Area.

4.2 Field Survey Results

4.2.1 Flora Composition

A total of 130 vascular flora taxa from 29 families and 62 genera were recorded from the Study Area during the field survey (Appendix H). The total number of vascular flora taxa recorded comprised 127 native taxa and 3 introduced taxa (Appendix H).

The dominant families equate to 48% of the total taxa recorded and comprised Proteaceae (Banksia family; 25 taxa), Myrtaceae (Eucalypt family; 19 taxa) and Fabaceae (Wattle/ Pea family; 18 taxa). Of the 29 families, 11 were represented by one taxon, which equates to 8.4% of the total taxa recorded. The dominant genera make up 29% of the total taxa recorded and comprised *Styphelia* (seven taxa), *Banksia* (seven taxa) and *Hakea*, *Hibbertia*, *Lomandra* and *Acacia*, all of

which had six taxa. Of the 62 genera recorded, 33 were represented by one taxon, which equates to 25% of the total taxa recorded.

Twenty-one taxa observed and collected from the field were difficult to confidently identify to species or infraspecies level. This was mainly due to the specimens/ individuals lacking suitable flowering and/ or fruiting material for confident taxonomic identification. Four taxa have been tentatively identified to species level, fifteen specimens have been identified to genus level, one specimen tentatively identified to genus level (?*Grevillea*. sp. indet) and one specimen tentatively identified to family level (?Fabaceae sp. indet). An additional six specimens tentatively identified down to species or subspecies level had corresponding specimens which were able to be confidently identified. These indeterminate specimens are not considered to be analogous with the 15 conservation significant listed flora considered likely or possible to occur in the Study Area (Table 4.1).

4.2.2 Flora of Conservation Significance

The desktop assessment identified 15 Threatened federal and state listed flora species as occurring in, or near the Study Area. Prior to the field survey, two threatened flora species, *Eleocharis keigheryi* and *Thelymitra stellata*, were considered possible to occur in the Study Area. Following the completion of the field survey, one threatened flora taxa was recorded from the Study Area. Ground-truthing of the known locations and potential habitat of significant flora in the Study Area indicate threatened flora are unlikely to occur.

The desktop assessment identified 53 priority listed taxa as potentially occurring within the Study Area. Prior to the field trip, two were considered Highly Likely to occur and 26 were considered Possible to occur within the Study Area (Appendix F). Following the completion of the field survey, three priority listed flora taxa were recorded from the Study Area, one of these taxa was not previously identified in the desktop assessment. Coordinates for all threatened and priority flora taxa are listed in Appendix I.

Conservation significant flora are normally submitted to the WAH for formal identification; however, due to the specimens lacking flowers and/or fruit it is suggested that these locations be revisited in spring and specimens submitted for formal identification.

Drosera sewelliae (P2)

Drosera sewelliae (P2) is a small, rosetted carnivorous perennial herb with orange flowers. It generally occurs on lateritic soils in Jarrah and Marri woodland, with records previously found within the Study Area (WAH, 1998-). This taxon has eleven herbarium records, all of which are located within 25 km of the Study Area, including two records which occur inside of the Study Area (WAH, 1998-). The survey occurred outside of the flowering time for this taxon, however it was readily observable in the field as it was very common, especially in patches of lateritic gravel with reduced leaf litter (Plate 4.1). There are several other pygmy *Drosera* known from the Northern Jarrah Forest subregion, most of which require flowers for confident identification. For this reason, the specimens collected from the Study Area have been tentatively identified as *Drosera ?sewelliae*. 1551 individuals from 56 point locations were recorded in the current survey.

In addition to this, another 43 individuals were recorded from the two DBCA locations (the identity of these individuals are assumed to be correct and are referred to as *Drosera sewelliae*). It is recommended to revisit the Study Area in spring so that several flowering specimens can be collected for re-identification.



Plate 4.1: *Drosera ?sewelliae* (P2) habit & lateritic gravel habitat (Biologic photos)

Beaufortia eriocephala (P3)

Beaufortia eriocephala (P3) is an erect shrub growing up to 0.6 m high. It occurs on lateritic sandy soils and commonly has red flowers in September to November (WAH, 1998-). There are currently 28 WAH records for this taxon with the closest record occurring 31 km east of the Study Area (WAH, 1998-). This species has a disjunct distribution, with most occurring from Gingin northwest to Warradarge, and the remainder occurring from Toodyay through to York and Greenhills. The collection of *Beaufortia eriocephala* also represents a slight locality hole (see section 4.2.4). Approximately 10 individuals were recorded from site HAR-47 and was the dominant understorey plant in this location (Plate 4.2). Whilst this species was confidently identified from a sterile specimen, it is recommended to re-collect from the population during spring so that a formal identification can be made at the WAH.



Plate 4.2: *Beaufortia eriocephala* (P3) habitat, flowers & habit (L: Biologic photo. R: Florabase photo (WAH, 1998-))

Conospermum densiflorum subsp. *unicephalum* (T)

Conospermum densiflorum subsp. *unicephalum* (T) is a much-branched shrub growing to 0.6 m high. It has cream/ white and blue flowers in September to November and grows on clay soils (WAH, 1998-). There are currently 16 WAH records for this taxon (WAH, 1998-) with the closest record being 33.3 km north of the Study Area. This threatened taxon is distributed from Wannamal north to Coomberdale. An additional record also exists within the Moore River National Park collected by the NSW Herbarium (ALA, 2021). The collection of *Conospermum densiflorum* subsp. *unicephalum* also represents a slight range extension (see section 4.2.4). During the current survey, one individual was recorded from HAR-39 (vegetation type V8). Whilst this species was confidently identified from a sterile specimen, it is recommended to re-collect from the population during spring so that a formal identification can be made at the WAH.



Plate 4.3: *Conospermum densiflorum* subsp. *densiflorum* (T) habit & habitat (L: Biologic photo. R: Florabase photo (WAH, 1998-))

Lasiopetalum caroliae (P3)

Lasiopetalum caroliae (P3) was previously known as *Lasiopetalum* sp. Toodyay (F. Hort 2689) but was recently formally described (Shepherd & Wilkins, 2017). This taxon is a procumbent, trailing subshrub with relatively small leaves of <4 mm long, and is known to display pale to bright mauve-pink flowers between September and November (Shepherd & Wilkins, 2017; WAH, 1998-). It is found in a variety of habitats including gullies, slopes, and creeklines in sandy clays and loams over laterite and/or granite (WAH, 1998-). There are nineteen records held at the WAH for this species (WAH, 1998-). Most of these records are within 35 km of the Study Area with the exception of two close populations known from the North Bannister area. *Lasiopetalum caroliae* was found from two point locations in valley vegetation in the northeast of Hartog, totalling two individuals. Whilst this species was confidently identified from a sterile specimen, it is recommended to re-collect from the population during spring so that a formal identification can be made at the WAH.



Plate 4.4: *Lasiopetalum caroliae* (P3) habitat & flowers (L: Biologic photo. R: photo from (Shepherd & Wilkins, 2017))

4.2.3 Review of Likelihood of Occurrence

Existing DBCA records for *Drosera sewelliae* (P2), *Persoonia sulcata* (P4) and *Synaphea grandis* (P4) were visited during the field survey to further assess these populations. *Drosera sewelliae* was confirmed pending additional collection of flowering material during spring and thus a confident confirmation of the presence of this taxon in the Study Area. A collection made from the vicinity of the *Persoonia sulcata* (P4) record has subsequently been identified as *Persoonia angustiflora*. This species is common throughout the Northern Jarrah Forest and is not conservation significant. Similarly, a collection made from the vicinity of the *Synaphea grandis* (P4) record was later identified as *Synaphea* sp. Udumung (A.S. George 17058), which is not considered conservation significant. The likelihood of these two taxa have been left as Confirmed, as there is potential that more than one *Synaphea* species co-occur in close proximity. These locations should be revisited in spring when individuals are flowering and in-field differentiation between species is easier. Flowering specimens should also be submitted to the WAH for further investigation and formal identification.

The majority of the 78 conservation significant species identified by the desktop assessment would not have been flowering or fruiting. Many perennial species collected were able to be confidently identified with sterile material, however there were several perennial shrubs that could not be confidently identified without flowers and/or fruit. This was taken into account when completing the review of likelihood of occurrence.

Table 4.3: Review of likelihood of occurrence post-survey

| Taxon | Likelihood Pre-Survey | Likelihood Post-Survey | Reasoning |
|----------------------------------|-----------------------|------------------------|--|
| <i>Drosera sewelliae</i> (P2) | Confirmed | Confirmed | Recorded during the current survey. |
| <i>Persoonia sulcata</i> (P4) | Confirmed | Confirmed | Record ground-truthed during current survey and not recorded. |
| <i>Synaphea grandis</i> (P4) | Confirmed | Confirmed | |
| <i>Oxymyrrhine coronata</i> (P4) | Highly Likely | Possible | Suitable habitat present |
| <i>Schoenus natans</i> (P4) | Highly Likely | Highly Likely | An annual taxon present between Sept-Dec. Suitable habitat found (W1). |

| Taxon | Likelihood Pre-Survey | Likelihood Post-Survey | Reasoning |
|---|-----------------------|------------------------|---|
| <i>Acacia browniana</i> var. <i>glaucescens</i> (P2) | Possible | Unlikely | Suitable habitat present. Not flowering. Medium-sized shrub. |
| <i>Acacia drummondii</i> subsp. <i>affinis</i> (P3) | Possible | Unlikely | |
| <i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (R.J. Cumming 882) (P3) | Possible | Unlikely | |
| <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> (P3) | Possible | Unlikely | Suitable habitat present. Not flowering. Prostrate shrub. The other subspecies found, <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> , is easily distinguishable by its upright habit. |
| <i>Androcalva fragifolia</i> (P1) | Possible | Possible | Suitable habitat present. Not flowering. Prostrate shrub. |
| <i>Calothamnus pachystachyus</i> (P4) | Possible | Unlikely | Suitable habitat present. Not flowering. Large conspicuous shrub. |
| <i>Chorizema ulotropis</i> (P4) | Possible | Possible | Suitable habitat present. Not flowering. Prostrate shrub. |
| <i>Conostylis caricina</i> subsp. <i>elachys</i> (P1) | Possible | Possible | Suitable habitat present. Not flowering. Small inconspicuous herb. |
| <i>Cyanicula ixioides</i> subsp. <i>ixioides</i> (P4) | Possible | Possible | |
| <i>Eleocharis keigheryi</i> (T) | Possible | Highly Unlikely | No surface water present. |
| <i>Gastrolobium crispatum</i> (P1) | Possible | Unlikely | Some suitable habitat present. Not flowering. Large conspicuous shrub. |
| <i>Gastrolobium nudum</i> (P2) | Possible | Unlikely | Suitable habitat present. Not flowering. Large conspicuous shrub. |
| <i>Grevillea bracteosa</i> subsp. <i>bracteosa</i> (T) | Possible | Unlikely | |
| <i>Grevillea corrugata</i> (T) | Possible | Unlikely | |
| <i>Grevillea curviloba</i> (T) | Possible | Highly Unlikely | No suitable habitat present (winter-wet heath) |
| <i>Hemigenia platyphylla</i> (P4) | Possible | Unlikely | Some suitable habitat present. Not flowering. Large conspicuous shrub. |
| <i>Hibbertia miniata</i> (P4) | Possible | Unlikely | Suitable habitat present. Not flowering. Medium-sized shrub. |
| <i>Hydrocotyle lemnoides</i> (P4) | Possible | Highly Unlikely | No surface water present |
| <i>Johnsonia inconspicua</i> (P3) | Possible | Possible | Some suitable habitat present. Not flowering. Small inconspicuous herb. |
| <i>Lasiopetalum caroliae</i> (P3) | Possible | Confirmed | Recorded during the current survey. |
| <i>Lechenaultia magnifica</i> (P1) | Possible | Unlikely | Suitable habitat present. Not flowering. Medium-sized shrub. |
| <i>Millotia tenuifolia</i> var. <i>laevis</i> (P2) | Possible | Possible | Suitable habitat present. Not flowering. Small inconspicuous herb. |
| <i>Schoenus capillifolius</i> (P3) | Possible | Possible | Annual sedge – would not have been present at time of survey |

| Taxon | Likelihood Pre-Survey | Likelihood Post-Survey | Reasoning |
|--|-----------------------|------------------------|---|
| <i>Stylidium longitubum</i> (P4) | Possible | Possible | Annual herb – would not have been present at time of survey |
| <i>Stylidium vinosum</i> (P1) | Possible | Possible | Some suitable habitat present. Not flowering. Small inconspicuous herb. |
| <i>Synaphea rangiferops</i> (P2) | Possible | Possible | Suitable habitat present. Not flowering. Small shrub. |
| <i>Tetradthea pilifera</i> (P3) | Possible | Possible | Suitable habitat present. Not flowering. Small inconspicuous shrub. |
| <i>Thelymitra stellata</i> (T) | Possible | Possible | |
| <i>Verticordia citrella</i> (P2) | Possible | Possible | Indeterminate <i>Verticordia</i> sp. Has the potential to be this taxa. |
| <i>Verticordia huegelii</i> var. <i>tridens</i> (P3) | Possible | Unlikely | Suitable habitat present. Not flowering. Medium-sized shrub. |
| <i>Verticordia serrata</i> var. <i>linearis</i> (P3) | Possible | Unlikely | Some suitable habitat present. Not flowering. Large conspicuous shrub. |
| <i>Beaufortia eriocephala</i> (P3) | Unlikely | Confirmed | Recorded during the current survey. |
| <i>Conospermum densiflorum</i> subsp. <i>unicephalatum</i> (T) | Unlikely | Confirmed | |

4.2.4 Flora of “Other” Significance

The EPA (2016a) advises that flora species, subspecies, varieties, hybrids, and ecotypes may be considered significant for reasons other than listing as a Threatened or Priority Flora taxa. This may include, but is not limited to, range extensions, keystone species, relic status, local endemism, and anomalous features. Such records contribute to a better understanding of the known distributions of taxa by extending the known range and by filling holes in the existing known distributions.

Based on these features, six species are considered to be range extensions and a further five species represent a locality hole (Table 4.4). Some of the locality holes are for relatively common species which have many records throughout the Swan Coastal Plain but which have less collections for adjacent bioregions.

Table 4.4: Flora of “other” significance recorded from the Study Area

| Family | Taxon | Significance | Comment |
|------------|--|--------------|--|
| Cyperaceae | <i>Lepidosperma</i> aff. <i>drummondii</i> | Other | <i>Lepidosperma drummondii</i> has a wide and relatively scattered distribution and is known from the Northern Jarrah Forest. The nomenclature “aff.” indicates that the specimen is related to or has an affinity to but is not identical to <i>Lepidosperma drummondii</i> . The <i>Lepidosperma</i> genus has undergone and is still subject to substantial taxonomic revision. The specimen collected may represent a new species or subspecies and may require further investigation and/or submission for formal identification. |

| Family | Taxon | Significance | Comment |
|-------------------|---|--------------|---|
| Ericaceae | <i>Leucopogon</i> sp. Newdegate (M. Hislop 3585) | LH | Represents a slight locality hole between Bindoon and populations in adjacent IBRA regions. Additionally, the majority of records are found in the Geraldton Sandplains, Avon Wheatbelt, Mallee and Esperance bioregions, with only four records known from the Northern Jarrah Forest subregion. |
| Hemerocallidaceae | <i>Johnsonia pubescens</i> | RE | Slight range extension to the east. Closest record is approx. 23.6 km west of Study Area. |
| Loranthaceae | <i>Nuytsia floribunda</i> | LH | Represents a locality hole between the Swan Coastal Plain and records further east of the Study Area. <i>Nuytsia floribunda</i> (Australian Christmas Tree) is a common and well-known species and is likely to have been under-collected. |
| Olacaceae | <i>Olax scalariformis</i> | RE | May represent the most eastern record for this species. Closest record is approx. 38.7 km northwest of Study Area. |
| Dilleniaceae | <i>Hibbertia</i> <i>?semipilosa</i> | RE | May represent the most northern record for this species. Closest record is approx. 22.3 km northwest of Study Area. |
| Iridaceae | <i>Patersonia occidentalis</i> | LH | Represents a slight locality hole between Avon Valley National Park to the south and just south of Calingiri to the north. This is likely reflective of less collections made outside of the Swan Coastal Plain where the majority of records are for this species. |
| Myrtaceae | <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> | LH | Represents a slight locality hole between the Swan Coastal Plain, Toodyay to the south and Mogumber and Calingiri to the north. |
| Myrtaceae | <i>Beaufortia eriocephala</i> (P3) | LH | Represents a slight locality hole between Wongamine to the east and Boonanarring Nature Reserve to the northwest. |
| Proteaceae | <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | RE | Slight range extension. May represent the most northern record for this species. Closest record is approx. 10.8 km south of the Study Area. |
| | <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | RE | Not found within Shire of Toodyay. Represents a slight range extension to the southeast. Closest record to the Study Area is approx. 17.2 km west-northwest. |
| | <i>Conospermum densiflorum</i> subsp. <i>unicephalatum</i> | RE | Represents a slight range extension to the south – specimen collected may be the most southern record. Closest record to the Study Area is approx. 28.1 km north. |

424000

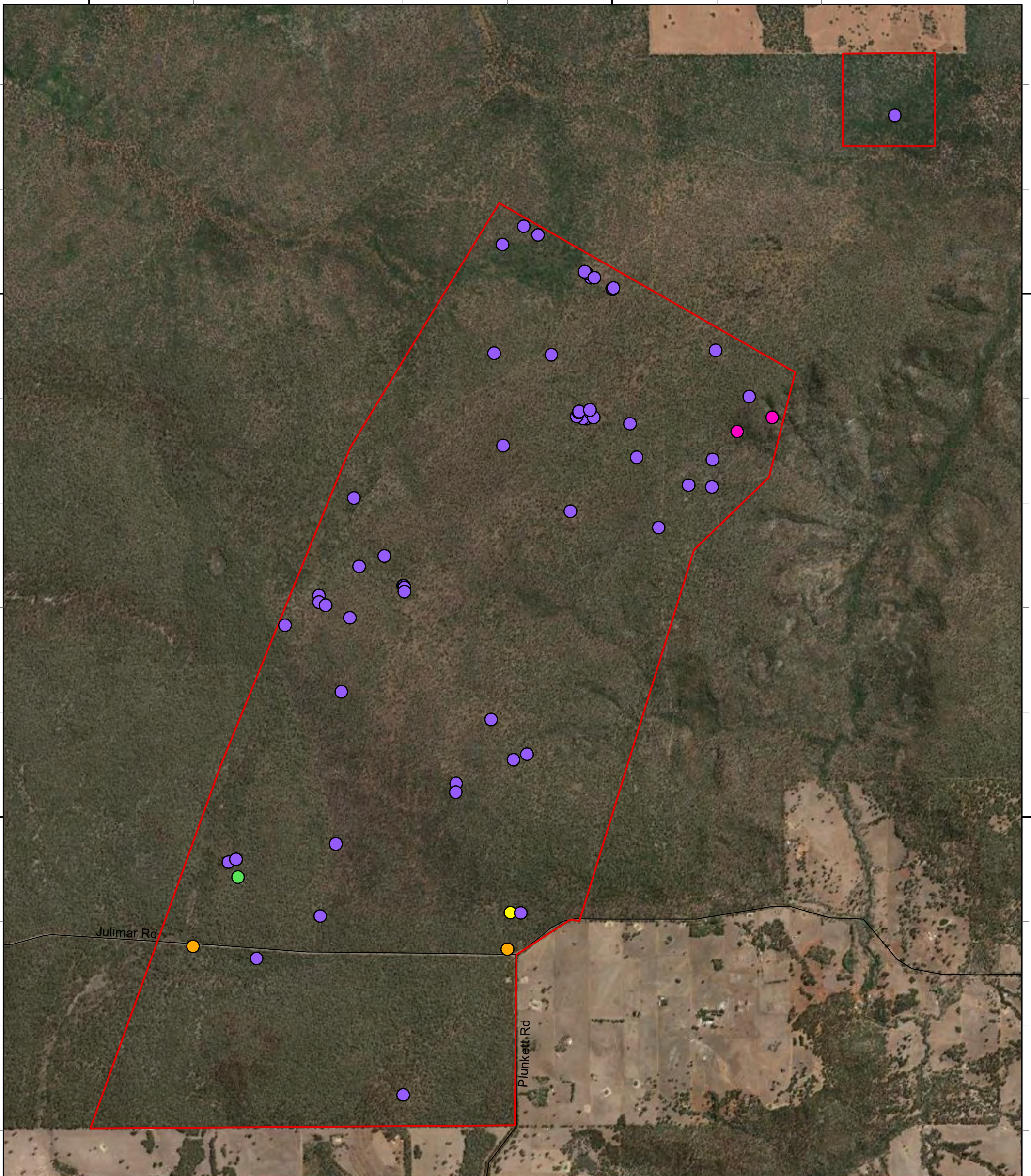
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6520000

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6516000

6516000



Legend

- Study Area
- Local Road

Taxon

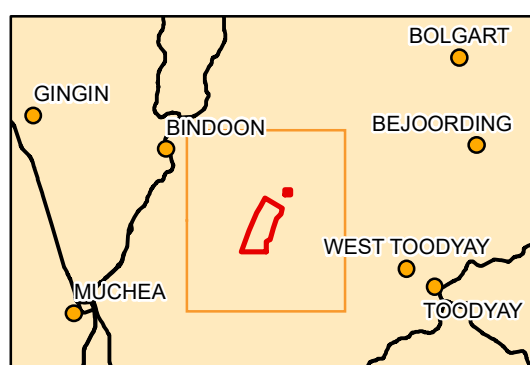
- *Conospermum densiflorum* subsp. *unicephalatum* - T
- *Drosera sewelliae* - P2
- *Drosera ?sewelliae* - P2
- *Beaufortia eriocephala* - P3
- *Lasiopetalum caroliae* - P3

0 0.5 1 1.5 Km

Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 11/06/2021

N

Scale: 1:28,000



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Reconnaissance and
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Figure 4.3: Flora of conservation significance recorded in the Study Area

4.2.5 Introduced Flora Taxa

A total of three introduced taxa, **Aira caryophyllaceus*, **Ursinia anthemoides* and **Solanum nigrum* were recorded from the Study Area (Figure 4.4). The introduced taxa are not listed as WoNS, DPs or 'Priority Alert' weeds by Parks and Wildlife. Overall, the majority of the Study Area was free of any introduced weed species.

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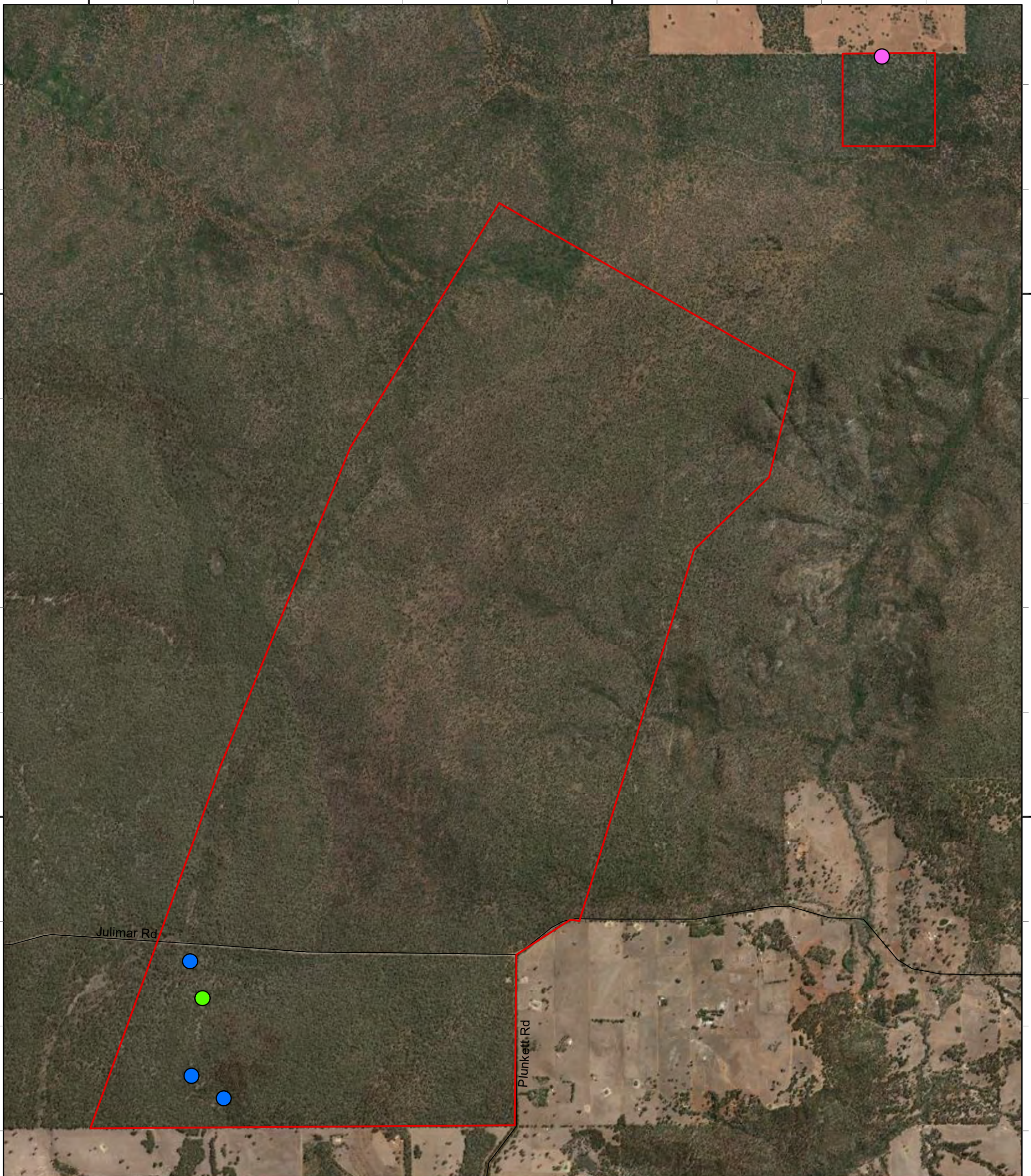
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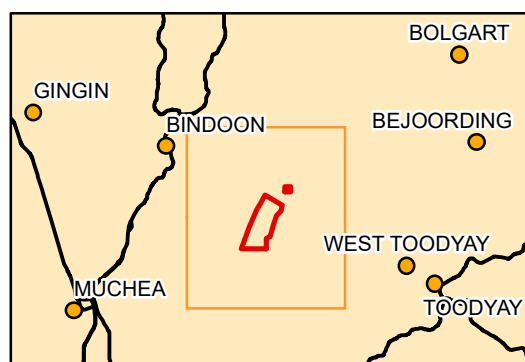
Legend

- Study Area
- Local Road

Taxon

- **Aira caryophyllea*
- **Solanum nigrum*
- **Ursinia anthemoides*

0 0.5 1 1.5 Km
 Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 11/06/2021



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Reconnaissance and
Targeted Flora Survey

Figure 4.4: Introduced flora recorded in the Study Area

4.2.6 Vegetation Types

Broad Landforms

Landform and landscape position are the main driver of water availability within the Jarrah Forest and strongly influence the patterns of vegetation found across the landscape. Four broad landforms were identified within the Study Area (Table 4.5):

- Hills
- Valleys
- Drainage Lines
- Wetland

The dominant broad landform was Hills (1797 ha or 89% of the Study Area) which supported seven vegetation types, followed by Valleys (196 ha or 9.70%) with eight vegetation types, Drainage Lines (15.0 ha or 0.70%) with three vegetation types, and one small 0.09 ha Wetland area which was bare of vegetation at the time of the survey.

Hills consisted of low undulating hills, and included lower, mid and upper slopes as well as broad plateaus. Vegetation across different hillslope positions was relatively uniform consisting of eucalypt woodland and forest, with the exception of small patches that were lacking this eucalypt overstorey (vegetation types H6 and H7). Upper slopes and broad plateaus had a more open vegetation structure and appeared to be more affected by recent prescribed burns with frequent fire scars and bare gravel (corresponding to vegetation type H2).

Valleys were depressed areas at the bottom of hillslopes, including broad floodplains on the western and northern edges of the Study Area (V5, V6) as well as steeper valleys on the eastern side of the Study Area. Vegetation was highly variable across this landform, with most valleys having their own unique vegetation type.

Drainage Lines consisted of defined creeklines where the vegetation was observably different from the adjacent valley vegetation in either composition, structure or cover. It was noted that there were narrow shallow creeklines running through two of the valley vegetation types (V2 and V7); however the vegetation did not differ between the creekline and adjacent valley.

The broad landforms observed roughly correspond to the underlying regolith geology (see Figure 2.2). Exposed bedrock along the eastern side of the Study Area correspond to a number of the mapped Valley vegetation types. Exposed granite outcropping was also noted in this area. The Valley vegetation on the western side of the Study Area broadly matches the underlying alluvial/ fluvial regolith.

Vegetation Types

A total of nineteen vegetation types, inclusive of W1 which was currently devoid of vegetation, were described and delineated from the Study Area (Table 4.5, Figure 4.5) based on the four broad landforms.

Boundaries between vegetation types, especially for eucalypt woodland and forest vegetation types, were difficult to assess using aerial imagery alone. Regional imagery was highly variable between years due to repeated prescribed burns across the Study Area affecting the structure and density of the vegetation. Therefore a combination of regional imagery, ArcGIS imagery, 2 m contour lines, relevé floristic data and other field observations were used to guide vegetation mapping and description of the vegetation types.

The most common vegetation type was H1 comprising 1402 ha or 69% of the Study Area. There were small patches throughout this vegetation type where either only *Eucalyptus marginata* (jarrah) or *Corymbia calophylla* (marri) were present, however delineating the boundaries between these using aerial imagery was not possible. The understorey flora composition was highly consistent across both vegetation type H1 and H2. Vegetation types H1 and H2 were found on sandy loams with pebbles and occasional lateritic outcropping; this broadly corresponds to the underlying ferruginous duricrust regolith unit (see Figure 2.2).




During the current survey vegetation type W1 was a claypan bare of any vegetation, but it is highly likely that following winter rainfall annual flora will germinate and grow. There is a potential that *Schoenus natans* (P4) identified by the desktop assessment may be found in W1 during spring, as its habitat includes claypans and winter-wet depressions.




The vegetation types described for the Study Area broadly correspond to the Pindalup (Pn), Yalanbee (Y5) and the Coolakin (Ck) vegetation complexes. The vegetation broadly represent *Eucalyptus marginata* and *Corymbia calophylla* woodlands with *Eucalyptus wandoo* present. This broad upper stratum combination is consistent with the Pindalup (Pn), Yalanbee (Y5) and Cookakin (Ck) vegetation complexes (Mattiske & Havel, 1998).




The survey occurred out of season for south-west Western Australia, resulting in a low number of taxa flowering and/ or fruiting. There is also likely to be several annual herbs and sedges that were not present at the time of survey. This may have affected description of the vegetation types, especially for vegetation of Valleys and Drainage Lines.




In addition to the eighteen vegetation types and W1 described and delineated from the Study Area, an additional unit, “Cleared” (Cl), was mapped within the Study Area. The Cleared unit coincided with roads, informal tracks and firebreaks. The cleared unit occurred across 12.83 ha or 0.63% of the Study Area (Figure 4.5). Intact native vegetation (all vegetation types and W1) covered 99.37% of the survey area (2009 ha).




Table 4.5: Vegetation type and extent recorded from the Study Area.




| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|--------------|-------------------------|--|--|-----------------|--|-----------------------|---|
| HILLS | | | | | | | |
| H1 | EmCc BssXpBs HhSrBds | Mid open forest of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over mid-tall open shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> , <i>Xanthorrhoea preissii</i> and <i>Banksia sessilis</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Styphelia retrorsa</i> and <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | BAU-03, HAR-01, HAR-10, HAR-11, HAR-12, HAR-13, HAR-14, HAR-16, HAR-17, HAR-18, HAR-21, HAR-23, HAR-27, HAR-30, HAR-32, HAR-33, HAR-34, HAR-36, HAR-38, HAR-40, HAR-42, HAR-47, HAR-49, HAR-51, HAR-52, HAR-53, HAR-55, HAR-59, HAR-62, HAR-65, HAR-90 | 1402 / 69 | 1x location of <i>Beaufortia eriocephala</i> , 35x locations of <i>Drosera? Sewelliae</i> , 1x DBCA record of <i>Drosera sewelliae</i> | Good - Excellent |  |
| H2 | EmCc BssXpMr HhPcHl | Low open woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over tall open shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> , <i>Xanthorrhoea preissii</i> and <i>Macrozamia riedlei</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Phyllanthus calycinus</i> and <i>Hakea lissocarpa</i> | HAR-05, HAR-22, HAR-29 | 148 / 7 | 10x locations of <i>Drosera ?sewelliae</i> | Very Good - Excellent |  |
| H3 | CcEm AcBss AcBspHh | Low-mid open woodland of <i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> over tall shrubland of <i>Adenanthos cygnorum</i> and <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> over low sparse shrubland of <i>Adenanthos cygnorum</i> , <i>Banksia sphaerocephala</i> var. <i>pumilio</i> and <i>Hibbertia hypericoides</i> | HAR-19, HAR-20, HAR-28, HAR-31 | 58 / 2.85 | 6x locations of <i>Drosera ?sewelliae</i> | Excellent |  |



| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|----------|------------------------|---|--|-----------------|--|-----------------------|---|
| H4 | EwEmCc BssXp HhSrHI | Mid woodland of <i>Eucalyptus wandoo</i> , <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over mid-tall open shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> and <i>Xanthorrhoea preissii</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Styphelia retrorsa</i> and <i>Hakea lissocarpha</i> | HAR-56, HAR-60, HAR-61, HAR-62, HAR-66 | 158 / 7.8 | 1x location of <i>Drosera ?sewelliae</i> | Good - Excellent |  |
| H5 | EwEc Xp HhHIBbb | Mid woodland of <i>Eucalyptus wandoo</i> and <i>Eucalyptus accedens</i> over mid sparse shrubland of <i>Xanthorrhoea preissii</i> over low sparse shrubland of <i>Hibbertia hypericoides</i> , <i>Hakea lissocarpha</i> and <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | BAU-04, HAR-57, HAR-63 | 29.5 / 1.5 | | Very Good - Excellent |  |
| H6 | Xp BffCqqHh | Tall sparse shrubland of <i>Xanthorrhoea preissii</i> over low shrubland of <i>Banksia fraseri</i> var. <i>fraseri</i> , <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> and <i>Hibbertia hypericoides</i> | HAR-67 | 1.1 / 0.05 | | Excellent |  |

| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|----------------|-------------------|--|--------------|-----------------|---|-----------|---|
| H7 | AhXpBss PoHhBc Ls | Tall open shrubland of <i>Allocasuarina humilis</i> , <i>Xanthorrhoea preissii</i> and <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> over low open shrubland of <i>Patersonia occidentalis</i> , <i>Hibbertia hypericoides</i> and <i>Babingtonia camphorosmae</i> over low open herbland of <i>Laxmannia squarrosa</i> | HAR-72 | 1.2 / 0.06 | | Excellent |  |
| VALLEYS | | | | | | | |
| V1 | Ea XpMr BeHIBbb | Low open woodland of <i>Eucalyptus accedens</i> over tall sparse shrubland of <i>Xanthorrhoea preissii</i> and <i>Macrozamia riedlei</i> over low open shrubland of <i>Bossiaea eriocarpa</i> , <i>Hakea lissocarpa</i> and <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | HAR-07 | 27.3 / 1.35 | 1x location of <i>Lasiopetalum caroliae</i> | Excellent |  |
| V2 | EwEa AlsXp Hh | Mid woodland of <i>Eucalyptus wandoo</i> and <i>Eucalyptus accedens</i> over mid-tall open shrubland of <i>Acacia lasiocarpa</i> var. <i>sedifolia</i> and <i>Xanthorrhoea preissii</i> over low open shrubland of <i>Hibbertia hypericoides</i> | HAR-08 | 16.1 / 0.79 | 1x location of <i>Lasiopetalum caroliae</i> | Excellent |  |

| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|----------|--------------------------|--|--------------|-----------------|---|------------------|---|
| V3 | EmCcEw BsDaXp BcMtSr | Mid open woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> with isolated <i>Eucalyptus wandoo</i> trees over tall open <i>Banksia sessilis</i> shrubland over mid shrubland of <i>Daviesia angulata</i> and <i>Xanthorrhoea preissii</i> over low shrubland of <i>Babingtonia camphorosmae</i> , <i>Melaleuca trichophylla</i> and <i>Styphelia retrorsa</i> | Mapping note | 4.13 / 0.20 | 1x location of <i>Drosera ?sewelliae</i> | Excellent |  |
| V4 | Cc HuAc GcLe | Mid isolated <i>Corymbia calophylla</i> trees over tall scattered <i>Hakea undulata</i> and <i>Adenanthos cygnorum</i> shrubs over mid closed shrubland of <i>Gastrolobium calycinum</i> and <i>Leptospermum erubescens</i> | HAR-03 | 28.3 / 1.40 | 1x location of <i>Drosera ?sewelliae</i> | Excellent |  |
| V5 | EwCcEm LeBssAc BeBcSr | Mid open woodland to isolated trees of <i>Eucalyptus wandoo</i> , <i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> over tall open shrubland of <i>Leptospermum erubescens</i> , <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> and <i>Adenanthos cygnorum</i> over low open shrubland of <i>Bossiaea eriocarpa</i> , <i>Babingtonia camphorosmae</i> and <i>Styphelia retrorsa</i> | HAR-48 | 71.8 / 3.5 | 1x location of <i>Drosera ?sewelliae</i> , 1x DBCA record of <i>Drosera sewelliae</i> | Good – Excellent |  |

| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|----------|---------------|--|----------------|-----------------|--|-----------|---|
| V6 | BssBs HhCsCqq | Tall closed shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> and <i>Banksia sessilis</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Calytrix</i> sp. indet 2, and <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> | HAR-45, HAR-54 | 7.32 / 0.36 | | Excellent |  |
| V7 | Ew TooXp GcBe | Mid open forest of <i>Eucalyptus wandoo</i> over mid-tall open shrubland of <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Xanthorrhoea preissii</i> over low open shrubland of <i>Gastrolobium calycinum</i> and <i>Bossiaea eriocarpa</i> | HAR-37, HAR-70 | 39.9 / 1.97 | | Excellent |  |
| V8 | BssLeAh Bsp | Tall closed shrubland of <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> , <i>Leptospermum erubescens</i> and <i>Allocasuarina huegeliana</i> over low open shrubland of <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | HAR-39 | 1.17 / 0.06 | 1x location of <i>Conospermum densiflorum</i> subsp. <i>unicephalatum</i> , 1x location of <i>Drosera ?sewelliae</i> | Excellent |  |

| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|-----------------------|------------------------|---|--------------|-----------------|----------------------|-----------|---|
| DRAINAGE LINES | | | | | | | |
| D1 | EaEwCc TooXp PcHIHh | Mid woodland of <i>Eucalyptus accedens</i> , <i>Eucalyptus wandoo</i> and <i>Corymbia calophylla</i> over a tall shrubland of <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Xanthorrhoea preissii</i> over a low open shrubland of <i>Phyllanthus calycinus</i> , <i>Hakea lissocarpha</i> and <i>Hibbertia hypericoides</i> | HAR-25 | 11.5 / 0.57 | | Excellent |  |
| D2 | CcEw TooXp BeTooHs | Mid closed forest of <i>Corymbia calophylla</i> with isolated <i>Eucalyptus wandoo</i> trees over tall closed shrubland of <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Xanthorrhoea preissii</i> over low shrubland of <i>Bossiaea eriocarpa</i> , <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> and <i>Hibbertia semipilosa</i> | HAR-26 | 2.77 / 0.14 | | Very Good |  |
| D3 | Ea Ac HhXgHI | Low open woodland of <i>Eucalyptus accedens</i> over tall shrubland of <i>Acacia celastrifolia</i> over low open shrubland of <i>Hibbertia hypericoides</i> , <i>Xanthorrhoea gracilis</i> and <i>Hakea lissocarpha</i> | HAR-06 | 0.77 / 0.04 | | Excellent |  |

| Map Code | Veg Code | Description | Sample sites | Extent (ha / %) | Significant Features | Condition | Photo |
|-------------------------|----------|---|--------------|-----------------|----------------------|-----------|--|
| WETLAND | | | | | | | |
| W1 | W1 | Wetland – bare clearing of clay | Mapping note | 0.09 / 0.004 | | Very Good |  |
| MAPPING UNIT | | | | | | | |
| CI | CI | Cleared areas – roads, informal tracks and firebreaks | | 12.83 / 0.63 | | |  |
| Study Area Total | | | | 2021.47 / 100 | | | |

424000

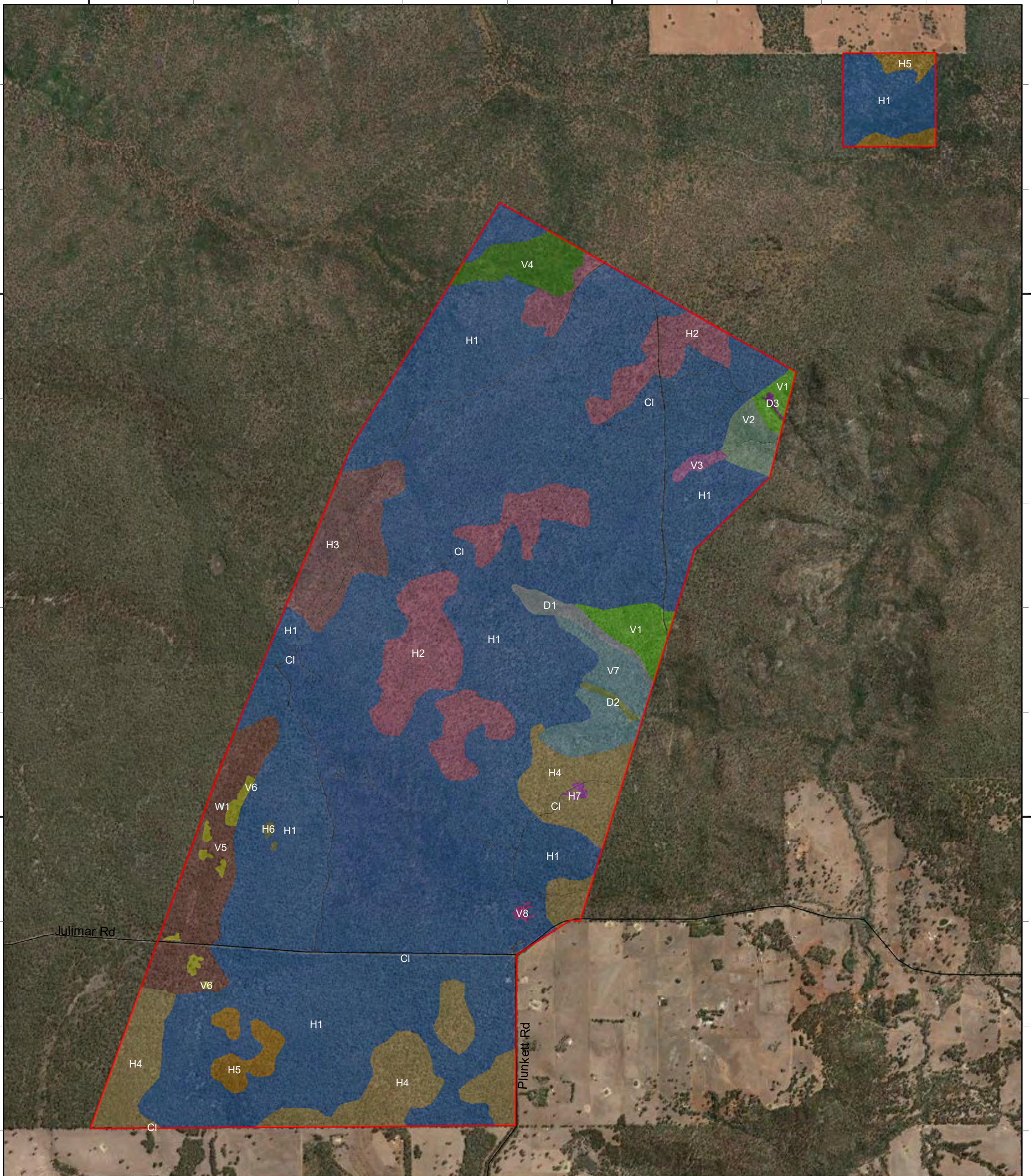
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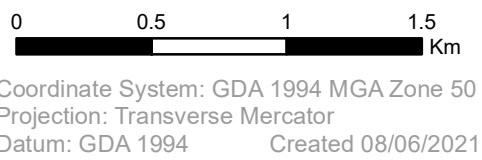


Legend

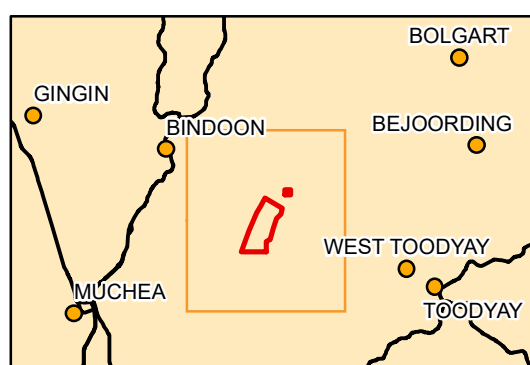
- Study Area
- Local Road

Vegetation Type

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> CI D1 D2 D3 H1 | <ul style="list-style-type: none"> H2 H3 H4 H5 H6 H7 V1 V2 | <ul style="list-style-type: none"> V3 V4 V5 V6 V7 V8 W1 |
|--|--|--|



Scale: 1:28,000



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Figure 4.5: Vegetation types
in the Study Area

4.2.7 Vegetation of Conservation Significance

TEC's & PEC's Within the Study Area

No vegetation associations described from the Study Area are defined as, or representative of the TEC's or PEC's known to occur in the Jarrah Forrest bioregion. No TEC's or PEC's identified in the database searches occur inside or within 9 km of the Study Area (see Section 4.1).

TEC's & PEC's in the Vicinity of the Study Area

Five conservation significant vegetation communities were previously recorded near the Study Area from the desktop assessment (see Table 4.2). Each of these communities are greater than 9 km from the Study Area and the vegetation types recorded in the Study Area lack the key diagnostic species or characteristics for these vegetation communities.

The “Claypans with mid dense shrublands of *Melaleuca lateritia* over herbs” community typically occurs on clay soils in low lying flats that are seasonally wet or inundated and requires clay soils, fresh surface water and a surrounding catchment area (DBCA, 2019; DPaW, 2015). The “Wandoo woodland over dense low sedges of *Mesomelaena preissii*” community is also associated with the “clay pans” PEC/ TEC, with similar habitat requirements (DBCA, 2019). Key diagnostic characteristics were not observed in the Study Area. Specifically, key characteristics include; clay based soil with either *Eucalyptus wandoo* over *Mesomelaena preissii* or a mid dense shrubland of *Melaleuca lateritia*.

The “Eucalypt woodlands of the Western Australian Wheatbelt” community and “York Gum woodlands” community require specific diagnostic species found within the Avon Wheatbelt bioregion and transitional regional areas. Outlier patches occurring within the Jarrah Forest generally occur south of Northam (DoEE, 2016). None of the key Eucalypt species were present in the Study Area. As a result, the Eucalypts woodlands of the Western Australian Wheatbelt TEC does not occur in the Study Area (DoEE, 2016).

The Banksia woodlands of the Swan Coastal Plain TEC is largely restricted to the Perth and Dandaragan subregions of the Swan Coastal Plain bioregion (TSSC, 2016). The community occasionally extends to the immediately adjacent areas on the Darling escarpment within the Northern Jarrah Forest subregion (TSSC, 2016). As the key *Banksia* species (*B. attenuata*, *B. menziesii*, *B. prionotes* and *B. ilicifolia*) were not recorded from the Study Area, the presence of the ecological community in the Study Area is highly unlikely.

4.2.8 Vegetation of “Other” Significance

The EPA (2016a) advises that vegetation may be of significance for reasons other than a listing as a TEC or a PEC. This may include, although is not limited to, scarcity, novel combination of species, role as a refuge, restricted distribution and vegetation extent being below a threshold level.

The following vegetation types have a role as a refuge for the four conservation significant flora found:

- *Conospermum densiflorum* subsp. *unicephalatum* was associated with vegetation type V8
- *Drosera ?sewelliae* was associated with vegetation types H1, H2, H3, H4, V3, V4, V5 and V8
- *Beaufortia eriocephala* was associated with vegetation type H1
- *Lasiopetalum caroliae* was associated with vegetation types V1 and V2

One individual of Threatened taxon *Conospermum densiflorum* subsp. *unicephalatum* was found within vegetation type V8. This was a dense shrubland in clay with granite-indicator species such as *Allocasuarina huegeliana*. The desktop assessment assessed *Conospermum densiflorum* subsp. *unicephalatum* as Unlikely to occur within the study area, hence it was not specifically targeted during the field survey. It is likely that other individuals may be found within vegetation type V8.

Vegetation in proximity to groundwater and surface water

The Study Area within Julimar State Forest is relatively high in the landscape and thus only supports minor upper catchment values. Drainage Line vegetation types as well as vegetation types V2 and V7 contained narrow dry creeklines. These drainage lines are ephemeral and likely only support surface water following winter rainfall or immediately following substantial rainfall events. As the drainage lines occur in the upper catchments, surface water persistency will be minor and likely only persist during rainfall events.

Vegetation type W1 was a bare clearing of dry clay, which may support a range of annual taxa after winter rains and soil saturation. Vegetation type H3, located on the western side of the Study Area, is likely to be important for surface water runoff into Gakaling Swamp. None of the vegetation within the Study Area is likely to be dependent upon continuous access to surface water or groundwater.

Several flora taxa which are known to grow in low-lying habitat with higher soil moisture levels were found in Valley and Drainage Line vegetation, including *Trymalium odoratissimum* subsp. *odoratissimum*, *Melaleuca incana*, *Calothamnus lateralis*, *Hakea varia* and *Jacksonia sternbergiana*. However, these species are not confined to major drainage lines and can grow on lower-mid slopes or seasonally wet flats and depressions. Taxa which are more typical of major rivers or wetlands in the Jarrah Forest bioregion, such as *Eucalyptus rudis*, *Eucalyptus patens*, *Melaleuca raphiophylla* and *Banksia littoralis* were not found. The drainage lines and valleys of the Study Area allow surface water runoff towards Spice Brook and the Brockman River to the west and Julimar Brook and the Avon River to the east and are important in maintaining hydrological connectivity across the landscape.

Local and Regional Significance

The three vegetation complexes recorded from the Study Area (Pindalup (Pn), Yalanbee (Y5) and the Coolakin (Ck)) were not considered to be locally or regionally significant (Mattiske & Havel, 1998). These vegetation complexes (Mattiske & Havel, 1998) are well represented

across the Northern Jarrah Forest subregion and the Shire of Toodyay, with greater than the 30% threshold for current remaining extent (see Table 2.5).

4.2.9 Vegetation Condition

The condition of the vegetation within the Study Area ranged from Good to Excellent (Table 4.6, Figure 4.6). The majority of the Study Area was in Excellent condition with three or more intact structural layers and species diversity consistent with what is expected for the Northern Jarrah Forest subregion. The main disturbance was from prescribed burns, with vegetation on hills being more fire-affected than the valleys. The condition of vegetation type H2 was downgraded to Very Good as fire frequency had started to affect vegetation structure and cover. Vegetation type D2 was downgraded to Very Good due to substantial crown dieback of mature *Corymbia calophylla* trees. This is likely to be due to water access and availability rather than any fungal pathogens or microbes (i.e., *Quambalaria coyrecup*; marri canker).

A few small areas adjacent to tracks and old borrow pits were also downgraded in condition. The small number of introduced weed species present were in vegetation adjacent to farmland, such as south of Julimar Rd and in Baudin. These weeds were not present in high densities warranting any downgrading of vegetation condition.

The cleared portion of the Study Area has not been assigned a vegetation condition rating as the unit did not support any native flora species.

Table 4.6: Vegetation condition extent in the Study Area

| Condition | Extent (ha / %) | Comment |
|-----------|-----------------|--|
| Excellent | 1898 / 94 | Occurred across the majority of the survey area, including all described vegetation types. |
| Very Good | 109 / 5 | Coincided with vegetation types H2 and D2, as well as a few small areas where tracks were more prevalent. Generally supported a vegetation structure that is consistent with undisturbed ecosystems (i.e., upper, mid and lower strata with native species dominating the strata). Weeds were absent. |
| Good | 2 / 0.1 | Coincided with a few small areas adjacent to roads and tracks, some of which had old borrow pits. Native vegetation was still present in these areas but certain species, e.g., <i>Banksia sessilis</i> , were growing abundantly in response to ground disturbance. The vegetation supported a structure that mostly resembled a natural ecosystem. |
| Cleared | 13 / 1 | Coincided with the cleared informal tracks, roads and firebreaks along fencelines. |

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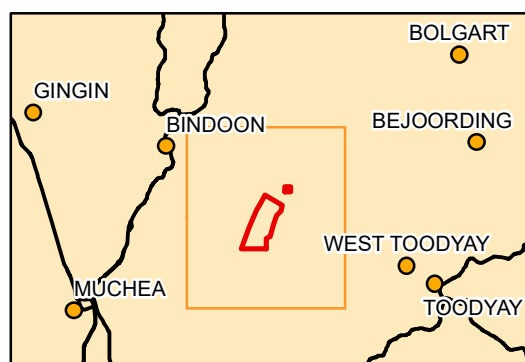
Legend

- Study Area
- Local Road

Vegetation Condition

- Excellent
- Very Good
- Good
- Cleared

0 0.5 1 1.5 Km
 Coordinate System: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994 Created 08/06/2021



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Figure 4.6: Vegetation condition in the Study Area

5 CONCLUSION

A single season reconnaissance flora and vegetation survey and targeted flora survey was completed over five days in April and May 2021 within the Study Area. The desktop assessment revealed substantial flora and vegetation values in the local region, including three priority flora taxa confirmed to occur within the Study Area and 33 taxa either Highly Likely or Possible to occur, as well as two conservation significant ecological communities with potential to occur.

A total of 130 native vascular plant taxa were found throughout the Study Area, from 29 families and 62 genera. Four conservation significant flora were found, as well as 12 taxa considered significant for other reasons as per EPA (2016a) guidelines;

- *Conospermum densiflorum* subsp. *unicephalatum* (T) – one individual from one point location;
- *Drosera ?sewelliae* (P2) – 1,551 individuals from 56 point locations;
- *Beaufortia eriocephala* (P3) – 10 individuals from one point location; and
- *Lasiopetalum caroliae* (P3) – two individuals from one point location

Specimens collected from the vicinity of existing DBCA records for *Synaphea grandis* (P4) and *Persoonia sulcata* (P4) were identified as common species from the *Synaphea* and *Persoonia* genera. Recollection of flowering and/or fruiting material from these locations is required to confirm the presence of these taxa within the Study Area.

Vegetation of the Study Area was mostly in Excellent condition with only three introduced weed species present. Large portions of the Study Area north of Julimar Road had recent evidence of fire, associated with state prescribed burns. Nineteen vegetation types were mapped and delineated across four broad landforms; hills, valleys, drainage lines and wetland. None of these vegetation types are considered to represent any of the TECs/PECs identified by the desktop assessment. Vegetation types H1, H2, H3, H4, V1, V2, V3, V4, V5 and V8 hold importance as refuge for the conservation significant flora found within the Study Area.

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7 APPENDICES



Appendix A: State and Federal Conservation Codes

International Union for Conservation of Nature

| Category | Definition |
|-----------------------------------|---|
| Extinct (EX) | A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon’s life cycle and life form. |
| Extinct in the Wild (EW) | A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon’s life cycle and life form. |
| Critically Endangered (CR) | A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild. |
| Endangered (EN) | A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild. |
| Vulnerable (VU) | A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild. |
| Near Threatened (NT) | A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. |
| Least Concern (LTC) | A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category. |
| Data Deficient (DD) | A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified. |
| Not Evaluated (NE) | A taxon is Not Evaluated when it has not yet been evaluated against the criteria. |

Environment Protection and Biodiversity Conservation Act 1999

| Category | Definition |
|------------------------------------|--|
| Threatened Flora Species | |
| Extinct (EX) | A native species is eligible to be included in the Extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died. |
| Extinct in the Wild (EW) | A native species is eligible to be included in the Extinct in the Wild category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form. |
| Critically Endangered (CR) | A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria. |
| Endangered (EN) | A native species is eligible to be included in the endangered category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria. |
| Vulnerable (VU) | A native species is eligible to be included in the vulnerable category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria. |
| Conservation Dependent (CD) | A native species is eligible to be included in the Conservation Dependent category at a particular time if, at that time: <ul style="list-style-type: none"> (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming Vulnerable, Endangered or Critically Endangered; or (b) the following subparagraphs are satisfied: <ul style="list-style-type: none"> (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species. |

| Category | Definition |
|--|--|
| Threatened Ecological Communities | |
| Critically Endangered | An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria. |
| Endangered | An ecological community is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria. |
| Vulnerable | An ecological community is eligible to be included in the vulnerable category at a particular time if, at that time: (a) it is not critically endangered nor endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria. |

Biodiversity Conservation Act 2016

| Category | Definition |
|-----------------------------------|---|
| Threatened Flora Species | |
| Critically Endangered (CR) | Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”. Published under schedule 1 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for critically endangered flora. |
| Endangered (EN) | Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”. Published under schedule 2 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for endangered flora. |
| Vulnerable (VU) | Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”. Published under schedule 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for vulnerable flora. |
| Extinct (EX) | Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for extinct flora. |
| Extinct in the Wild (EW) | Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened flora species listed as extinct in the wild. |

| Category | Definition |
|--|---|
| Threatened Ecological Communities | |
| Critically Endangered (CR) | <p>An ecological community is eligible for listing in the category of critically endangered ecological community at a particular time if, at that time —</p> <p>(a) it is facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines; and</p> <p>(b) listing in that category is otherwise in accordance with the ministerial guidelines.</p> |
| Endangered (EN) | <p>An ecological community is eligible for listing in the category of endangered ecological community at a particular time if, at that time —</p> <p>(a) it is not a critically endangered ecological community; and</p> <p>(b) it is facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future, as determined in accordance with criteria set out in the ministerial guidelines; and</p> <p>(c) listing in that category is otherwise in accordance with the ministerial guidelines.</p> |
| Vulnerable (VU) | <p>An ecological community is eligible for listing in the category of vulnerable ecological community at a particular time if, at that time —</p> <p>(a) it is not a critically endangered ecological community or an endangered ecological community; and</p> <p>(b) it is facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines; and</p> <p>(c) listing in that category is otherwise in accordance with the ministerial guidelines.</p> |
| Collapsed | <p>An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time —</p> <p>(a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed; or</p> <p>(b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover —</p> <p style="padding-left: 40px;">(i) its species composition or structure; or</p> <p style="padding-left: 40px;">(ii) its species composition and structure.</p> |

Department of Biodiversity, Conservation and Attractions Priority Definitions

| Category | Definition |
|---------------------------------|--|
| Threatened Flora Species | |
| Priority 1 (P1) | <p>Poorly-known Species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 2 (P2) | <p>Poorly-known Species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 3 (P3) | <p>Poorly-known Species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p> |
| Priority 4 (P4) | <p>Rare, Near Threatened and other species in need of monitoring</p> <p>(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p> |

| Category | Definition |
|--|--|
| Threatened Ecological Communities | |
| Priority 1 (P1) | <p>Poorly-known ecological communities</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p> |
| Priority 2 (P2) | <p>Poorly-known Ecological Communities</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p> |
| Priority 3 (P3) | <p>Poorly-known Ecological Communities</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p> |

| Category | Definition |
|-------------------------------|--|
| <p>Priority 4 (P4)</p> | <p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p> |
| <p>Priority 5 (P5)</p> | <p>Conservation Dependent Ecological Communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p> |



Appendix B: Vegetation Structural Formation Terminology

NVIS Vegetation Structural Classifications

| Cover Characteristics | | | | | | | | |
|--------------------------------|-------------------|------------------------------|--------------------|-----------------------|-------------------------|------------------------|----------------------------------|---------------|
| Foliage cover * | 70-100 | 30-70 | 10-30 | <10 | ≈0 | 0-5 | unknown | |
| Crown cover ** | >80 | 50-80 | 20-50 | 0.25-20 | <0.25 | 0-5 | unknown | |
| % Crown cover *** | >80 | 50-80 | 20-50 | 0.25-20 | <0.25 | 0-5 | unknown | |
| Cover code | d | c | i | r | bi | bc | unknown | |
| Growth Form | Height ranges (m) | Structural Formation Classes | | | | | | |
| tree, palm | >30 Tall | closed forest | open forest | woodland | open woodland | isolated trees | isolated clumps of trees | trees |
| | 10-30 Mid | | | | | | | |
| | <10 Low | | | | | | | |
| tree mallee | 10-30 Tall | closed mallee forest | open mallee forest | mallee woodland | open mallee woodland | isolated mallee trees | isolated clumps of mallee trees | mallee trees |
| | <10 Mid | | | | | | | |
| | <3 Low | | | | | | | |
| shrub, cycad, grass-tree, fern | >2 Tall | closed shrubland | shrubland | open shrubland | sparse shrubland | isolated shrubs | isolated clumps of shrubs | shrubs |
| | 1-2 Mid | | | | | | | |
| | <1 Low | | | | | | | |
| mallee shrub | 10-30 Tall | closed mallee shrubland | mallee shrubland | open mallee shrubland | sparse mallee shrubland | isolated mallee shrubs | isolated clumps of mallee shrubs | mallee shrubs |
| | <10 Mid | | | | | | | |
| | <3 Low | | | | | | | |

| Growth Form | Height ranges (m) | Structural Formation Classes | | | | | | | |
|----------------|-------------------|------------------------------|--------------------|-------------------------|---------------------------|--------------------------|-------|------------------------------------|-----------------|
| | | | | | | | | | |
| heath shrub | >2 Tall | closed heathland | heathland | open heathland | sparse heathland | isolated shrubs | heath | isolated clumps of heath shrubs | heath shrubs |
| | 1-2 Mid | | | | | | | | |
| | <1 Low | | | | | | | | |
| chenopod shrub | >2 Tall | closed chenopod shrubland | chenopod shrubland | open chenopod shrubland | sparse chenopod shrubland | isolated chenopod shrubs | | isolated clumps of chenopod shrubs | chenopod shrubs |
| | 1-2 Mid | | | | | | | | |
| | <1 Low | | | | | | | | |
| samphire shrub | >0.5 Low | closed samphire shrubland | samphire shrubland | open samphire shrubland | sparse samphire shrubland | isolated samphire shrubs | | isolated clumps of samphire shrubs | samphire shrubs |
| | <0.5 Low | | | | | | | | |
| hummock grass | >2 Tall | closed hummock grassland | hummock grassland | open hummock grassland | sparse hummock grassland | isolated hummock grasses | | isolated clumps of hummock grasses | hummock grasses |
| | <2 Tall | | | | | | | | |
| tussock grass | >0.5 Mid | closed tussock grassland | tussock grassland | open tussock grassland | sparse tussock grassland | isolated tussock grasses | | isolated clumps of tussock grasses | tussock grasses |
| | <0.5 Low | | | | | | | | |
| other grass | >0.5 Mid | closed grassland | grassland | open grassland | sparse grassland | isolated grasses | | isolated clumps of grasses | other grasses |
| | <0.5 Low | | | | | | | | |
| sedge | >0.5 Mid | closed sedgeland | sedgeland | open sedgeland | sparse sedgeland | isolated sedges | | isolated clumps of sedges | sedges |
| | <0.5 Low | | | | | | | | |
| rush | >0.5 Mid | closed rushland | rushland | open rushland | sparse rushland | isolated rushes | | isolated clumps of rushes | rushes |
| | <0.5 Low | | | | | | | | |
| forb | >0.5 Mid | closed forbland | forbland | open forbland | sparse forbland | isolated forbs | | isolated clumps of forbs | forbs |
| | <0.5 Low | | | | | | | | |

| Growth Form | Height ranges (m) | Structural Formation Classes | | | | | | |
|-------------|-------------------|------------------------------|----------------|---------------------|-----------------------|---------------------|-------------------------------|------------|
| fern | >2 Tall | closed fernland | fernland | open fernland | sparse fernland | isolated ferns | isolated clumps of ferns | ferns |
| | 1-2 Tall | | | | | | | |
| | <1 Low | | | | | | | |
| bryophyte | <0.5 | closed bryophyte land | bryophyte land | open bryophyte land | sparse bryophyte land | isolated bryophytes | isolated clumps of bryophytes | bryophytes |
| lichen | <0.5 | closed lichenland | lichenland | open lichenland | sparse lichenland | isolated lichens | isolated clumps of lichens | lichens |
| vine | >30 Tall | closed vineland | vineland | open vineland | sparse vineland | isolated vines | isolated clumps of vines | vines |
| | 10-30 Med | | | | | | | |
| | <10 Low | | | | | | | |
| aquatic | <1 Tall | closed aquatic bed | aquatic bed | open aquatic bed | sparse aquatics | isolated aquatics | isolated clumps of aquatics | aquatics |
| | 0-0.5 Low | | | | | | | |
| seagrass | <1 Tall | closed seagrass bed | Seagrass bed | open seagrass bed | sparse seagrass bed | isolated seagrasses | isolated clumps of seagrasses | seagrasses |
| | 0-0.5 Low | | | | | | | |

From: NVIS Structural Formation Terminology (Australian Vegetation Attribute Manual Version 7.0 November 2017 <https://www.environment.gov.au/land/publications/australian-vegetation-attribute-manual-version-7>)

* Foliage Cover is defined for each stratum as 'the proportion of the ground, which would be shaded if sunshine came from directly overhead'. It includes branches and leaves and is obtained by multiplying Crown Cover with Crown type (Hnatiuk *et al.*, 2009). It is applied to a stratum in a plot, rather than an individual crown, with the NVIS measure for a vegetation type ideally being a summary of several plots. Foliage Projective Cover, which considers only the vertical projection of photosynthetic components (generally leaves), can be measured by line interception methods for tree, shrub and ground layer vegetation (Specht & Specht, 1999).

** Crown Cover (canopy cover) as per Hnatiuk *et al.* (2009). Although relationships between this attribute and Foliage Cover are dependent on season, species, species age etc., the crown cover category classes have been adopted as the defining measure.

*** The percentage cover is defined as the percentage of a strictly defined plot area, covered by vegetation. This can be an estimate and is a less precise measure than using, for example, a point intercept transect method on ground layer, or overstorey vegetative cover. That is, for precisely measured values (e.g. crown densitometer or point intercept transects) the value measured would be 'foliage' cover. Where less precise or qualitative measures are used these will most probably be recorded as 'percentage' cover.



Appendix C: Vegetation Condition Rating Scale

Keighery (1994) Vegetation Condition Rating Scale

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

Appendix D: Literature Review Key Findings

| Study Details | Methods | Results | Significant Findings | Limitations |
|--|--|--|---|---|
| <p>Mattiske (2019) Client: Chalice Gold Type: Desktop Assessment Location: Julimar Project (within and surrounding) Timing: April 2019</p> | <ul style="list-style-type: none"> • Desktop Assessment | <ul style="list-style-type: none"> • 1057 potential flora taxa from 343 genera and 99 families • 112 introduced weed taxa from 87 genera and 36 families • Three vegetation types | <ul style="list-style-type: none"> • 85 threatened and priority species that could potentially occur (22 threatened and 63 priority) • Three PECs and two TECs that could potentially occur: <ul style="list-style-type: none"> ○ Claypans with mid dense shrublands of <i>Melaleuca lateritia</i> over herbs (PEC–P1, TEC–CR) ○ Wandoo woodland over dense low sedges of <i>Mesomelaena preissii</i> (PEC–P2) ○ Eucalypt woodlands of the Western Australian Wheatbelt (PEC–P3, TEC–CR) • Six weeds of National Significance: <ul style="list-style-type: none"> ○ <i>*Asparagus asparagoides</i> ○ <i>*Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> ○ <i>*Genista monspessulana</i> ○ <i>*Rubus fruticosus</i> ○ <i>*Salvina molesta</i> ○ <i>*Lantana camara</i> | <p>No significant limitations</p> |
| <p>Biologic (2020) Client: MBS Environmental / Chalice Gold Type: Reconnaissance and targeted flora survey Location: Julimar Project (adjacent to the south) Timing: July 2020</p> | <ul style="list-style-type: none"> • 15 relevés, 16 mapping points • Targeted searches | <ul style="list-style-type: none"> • 73 vascular flora taxa from 25 families and 52 genera • Six vegetation units • Completely degraded to very good condition | <ul style="list-style-type: none"> • No TECs/PECs or conservation significant flora were recorded • Two vegetation types supporting riparian and riverine vegetation | <p>Survey was out of season (in winter)</p> |
| <p>Phoenix (2015) Client: Main Roads WA Type: Flora and Fauna Assessment Location: Muchea North and Chittering (12.7 km NW) Timing: October 2014 and September 2015</p> | <ul style="list-style-type: none"> • 32 detailed floristic sites (quadrats) • 17 relevé plots • Targeted searches | <ul style="list-style-type: none"> • 273 flora taxa from 153 genera and 52 families • vegetation communities • 51 introduced weed species | <ul style="list-style-type: none"> • Seven conservation significant flora taxa recorded: <ul style="list-style-type: none"> ○ <i>Darwinia foetida</i> (T) ○ <i>Eucalyptus caesia</i> (P4) (no longer a priority taxon) ○ <i>Haemodorum loratum</i> (P3) ○ <i>Acacia drummondii</i> subsp. <i>affinis</i> (P3) ○ <i>Stylidium squamellosum</i> (P2) ○ <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> (P4) ○ <i>Verticordia serrata</i> var. <i>linearis</i> (P3) • Three Declared Plant Pests: <ul style="list-style-type: none"> ○ <i>*Asparagus asparagoides</i> ○ <i>*Echium plantagineum</i> ○ <i>*Moraea miniata</i> | <p>No significant limitations</p> |

| Study Details | Methods | Results | Significant Findings | Limitations |
|--|---|---|--|-----------------------------------|
| <p>Focused Vision (2017) Client: Main Roads WA Type: Level 2 Flora and Vegetation Assessment and Targeted Survey Location: Muchea to Wubin, Great Northern Highway (13 km W) Timing: Spring 2016</p> | <ul style="list-style-type: none"> 46 detailed floristic sites (quadrats) Two relevé plots Targeted searches | <ul style="list-style-type: none"> 350 flora taxa from 183 genera and 56 families 13 vegetation communities 40 introduced weed species | <ul style="list-style-type: none"> Seven priority flora taxa recorded: <ul style="list-style-type: none"> <i>Gastrolobium ? crispatum</i> (P1) <i>Synaphea panhesya</i> (P1) <i>Drosera sewelliae</i> (P2) <i>Acacia drummondii</i> subsp. <i>affinis</i> (P3) <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> (P3) <i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i> (P4) (listed as P3 at time of survey) <i>Hibbertia miniata</i> (P4) | <p>No significant limitations</p> |
| <p>Focused Vision (2018) Client: Main Roads WA Type: Detailed Flora and Vegetation Survey Location: Bindoon Bypass, Great Northern Highway (14.7 km W) Timing: 2017</p> | <ul style="list-style-type: none"> 117 detailed floristic sites (quadrats) Two relevé plots Targeted searches | <ul style="list-style-type: none"> 12 vegetation units | <ul style="list-style-type: none"> Eight priority flora taxa recorded: <ul style="list-style-type: none"> <i>Drosera sewelliae</i> (P2) <i>Hibbertia glomerata</i> subsp. <i>ginginensis</i> (P2) <i>Acacia drummondii</i> subsp. <i>affinis</i> (P3) <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> (P3) <i>Hypolaena robusta</i> (P4) <i>Hibbertia miniata</i> (P4) <i>Jacksonia ? sericea</i> (P4) <i>Verticordia paludosa</i> (P4) One Declared Plant Pest: <ul style="list-style-type: none"> *<i>Chondrilla juncea</i> One TEC and two PECs known to occur within or closely adjacent to the Study Area (representative of the Commonwealth-listed Banksia Woodlands of the Swan Coastal Plain TEC) | <p>No significant limitations</p> |
| <p>Maia (2017) Client: Instant Products Group Type: Level 2 Flora and Vegetation Survey Location: Muchea Lot 195 (16.8 km WSW) Timing: March & October 2016</p> | <ul style="list-style-type: none"> Nine detailed floristic sites (quadrats) Eight relevé plots Targeted searches | <ul style="list-style-type: none"> 199 taxa from 130 genera and 52 families Three vegetation types 24 introduced weed species | <ul style="list-style-type: none"> Two priority flora taxa recorded: <ul style="list-style-type: none"> <i>Acacia drummondii</i> subsp. <i>affinis</i> (P3) <i>Haemodorum loratum</i> (P3) One Priority Ecological Community: Low lying <i>Banksia attenuata</i> woodlands and shrublands (P3) | <p>No significant limitations</p> |

| Study Details | Methods | Results | Significant Findings | Limitations |
|--|---|--|---|-----------------------------------|
| <p>AECOM (2016) Client: Main Roads Western Australia Type: Biological Survey Location: Toodyay Road (20.7 km SE) Timing: September and November 2015</p> | <ul style="list-style-type: none"> • Desktop Assessment • 75 detailed floristic sites (quadrats) • Seven relevé plots • Targeted searches | <ul style="list-style-type: none"> • 362 flora taxa from 161 genera and 54 families • Four vegetation associations • 38 introduced weed species | <ul style="list-style-type: none"> • Seven priority flora taxa recorded: <ul style="list-style-type: none"> ○ <i>Banksia nivea</i> subsp. Morangup (M. Pieroni 94/2) (P2) ○ <i>Boronia scabra</i> subsp. <i>condensata</i> (P2) ○ <i>Calytrix oncophylla</i> (P2) ○ <i>Grevillea candolleana</i> (P2) ○ <i>Verticordia citrella</i> (P2) ○ <i>Hibbertia montana</i> (P4) – no longer a priority flora taxon ○ <i>Caladenia integra</i> (P4) • Two Declared Plant Pests recorded: <ul style="list-style-type: none"> ○ *<i>Asparagus asparagoides</i> • *<i>Gomphocarpus fruticosus</i> | <p>No significant limitations</p> |
| <p>Phoenix (2016) Client: Main Roads WA Type: Flora and Fauna Assessment Location: Calingiri to Wubin (southernmost point of Study Area was 20.8 km NW) Timing: October 2014, February to June 2015 and September to December 2015</p> | <ul style="list-style-type: none"> • 109 detailed floristic sites (quadrats) • 34 relevé plots • Targeted searches | <ul style="list-style-type: none"> • 524 flora taxa from 188 genera and 64 families • 25 vegetation associations • 53 introduced weed species | <ul style="list-style-type: none"> • 13 priority flora taxa recorded: <ul style="list-style-type: none"> ○ <i>Acacia browniana</i> var. <i>glaucescens</i> (P2) ○ <i>Acacia drummondii</i> subsp. <i>affinis</i> (P3) ○ <i>Acacia isoneura</i> subsp. <i>nimia</i> (P3) ○ <i>Acacia scalena</i> (P3) ○ <i>Banksia benthamiana</i> (P4) ○ <i>Banksia serratulooides</i> subsp. <i>serratulooides</i> (T) ○ <i>Calothamnus pachystachyus</i> (P4) ○ <i>Daviesia debilior</i> subsp. <i>sinuans</i> (P3) ○ <i>Grevillea asparagoides</i> (P3) ○ <i>Hibbertia miniata</i> (P4) ○ <i>Persoonia sulcata</i> (P4) ○ <i>Synaphea rangiferops</i> (P2) ○ <i>Verticordia venusta</i> (P3) • Five Declared Pests: <ul style="list-style-type: none"> ○ *<i>Asparagus asparagoides</i> (also WoNS) ○ *<i>Echium plantagineum</i> ○ *<i>Rumex hypogaeus</i> ○ *<i>Lycium ferocissimum</i> (also WoNS) ○ *<i>Opuntia monacantha</i> (also WoNS) | <p>No significant limitations</p> |

| Study Details | Methods | Results | Significant Findings | Limitations |
|--|--|--|---|-----------------------------------|
| <p>Keighery <i>et al.</i> (2002) Client: Not Applicable (Journal Article) Type: Biological Survey Location: Drummond Nature Reserve (21 km NE) Timing: 1999, 2000, 2001</p> | <ul style="list-style-type: none"> Detailed floristic sites (quadrats) | <ul style="list-style-type: none"> 439 plant taxa 10 vegetation units 34 introduced weed species | <ul style="list-style-type: none"> Nine Threatened and Priority taxa recorded: <ul style="list-style-type: none"> <i>Trithuria australis</i> (P4) (known as <i>Hydatella leptogyne</i> (T) at time of survey) <i>Eleocharis keigheryi</i> (T) <i>Hydrocotyle lemnoides</i> (P4) <i>Schoenus natans</i> (P4) <i>Acacia chapmanii</i> subsp. <i>australis</i> (T) (listed as P3 at time of survey) <i>Stenanthemum tridentatum</i> (P3) – no longer a priority flora taxon <i>Comesperma rhadinocarpum</i> (P3) (listed as P2 at time of survey) <i>Platysace ramosissima</i> (P3) <i>Tricoryne</i> sp. Wongan Hills (B.H. Smith 794) (P2) (known as <i>Tricoryne arenicola</i> at time of survey) | <p>No significant limitations</p> |
| <p>Ecoscope (2012) Client: Department of Defence Type: Flora and Vegetation Assessment Location: Bindoon Defence Training Area (22.5 km N) Timing: November 2011</p> | <ul style="list-style-type: none"> Desktop Assessment Targeted searches | <ul style="list-style-type: none"> Direct Fire Support Weapon Range Extension (DSFW): <ul style="list-style-type: none"> Four vegetation types DEMS Firebreak: <ul style="list-style-type: none"> Three vegetation types Static Grenade Range Number 2 Extension (SGR2): <ul style="list-style-type: none"> One vegetation type | <ul style="list-style-type: none"> DSFW recorded three Priority taxa: <ul style="list-style-type: none"> <i>Persoonia sulcata</i> (P4) <i>Synaphea panhesya</i> (P1) DEMS Firebreak recorded four priority taxa: <ul style="list-style-type: none"> <i>Lasiopetalum caroliae</i> (P3) (previously known as <i>Lasiopetalum</i> sp. Toodyay (F. Hort 2689) (P1)) <i>Calothamnus pachystachyus</i> (P4) <i>Persoonia sulcata</i> (P4) DSFW, DEMS Firebreak and SGR2 all recorded <i>Astroloma</i> sp. Cataby (E.A. Griffin 1022) (P4) – now known as <i>Styphelia oblongifolia</i> which is not a priority taxon | <p>No significant limitations</p> |
| <p>Bennett Environmental (2006) Client: City of Swan Type: Level 2 Flora and Vegetation Survey Location: Reserve 2145 and Percy Cullen Oval (31.8 km S) Timing: September 2006</p> | <ul style="list-style-type: none"> Detailed floristic sites (quadrats) Targeted searches | <ul style="list-style-type: none"> 174 flora taxa from 110 genera and 42 families Five vegetation units Eight introduced weed species | <ul style="list-style-type: none"> Three priority flora taxa recorded: <ul style="list-style-type: none"> <i>Tetrateca pilifera</i> (P3) <i>Templetonia drummondii</i> (P4) and <i>Hibbertia montana</i> (P4) – no longer priority flora | <p>No significant limitations</p> |



Appendix E: Database Search Results

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|---------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| Alismataceae | <i>Sagittaria platyphylla</i> | | | | | | • | | | | Y |
| Amaranthaceae | <i>Ptilotus declinatus</i> | • | • | | | | | | | | |
| | <i>Ptilotus drummondii</i> | • | • | | | | | | | | |
| | <i>Ptilotus manglesii</i> | • | • | | | | | | | | |
| Apiaceae | <i>Coriandrum sativum</i> | • | • | | | | | | | | Y |
| | <i>Daucus glochidiatus</i> | • | • | | | | | | | | |
| | <i>Eryngium pinnatifidum</i> | • | • | | | | | | | | |
| | <i>Eryngium pinnatifidum</i> subsp. Umbraphilum (G.J. Keighery 13967) | | | • | | | | P2 | | | |
| | <i>Homalosciadium homalocarpum</i> | • | • | | | | | | | | |
| | <i>Platysace ramosissima</i> | | | • | • | | | P3 | | | |
| | <i>Schoenolaena juncea</i> | • | • | | | | | | | | |
| | <i>Xanthosia candida</i> | • | • | | | | | | | | |
| | <i>Xanthosia ciliata</i> | • | • | | | | | | | | |
| | <i>Xanthosia huegelii</i> | • | • | | | | | | | | |
| Apocynaceae | <i>Calotropis procera</i> | | | | | | • | | | | Y |
| | <i>Cryptostegia madagascariensis</i> | | | | | | • | | | | Y |
| | <i>Gomphocarpus fruticosus</i> | | | | | | • | | | | Y |
| Araceae | <i>Pistia stratiotes</i> | | | | | | • | | | | Y |
| | <i>Zantedeschia aethiopica</i> | | | | | | • | | | | Y |
| Araliaceae | <i>Hydrocotyle alata</i> | | • | | | | | | | | |
| | <i>Hydrocotyle callicarpa</i> | • | • | | | | | | | | |
| | <i>Hydrocotyle lemnoides</i> | | | • | • | | | P4 | | | |
| | <i>Hydrocotyle ranunculoides</i> | | | | | | • | | | | Y |
| | <i>Trachymene pilosa</i> | • | • | | | | | | | | |
| Asparagaceae | <i>Asparagus asparagoides</i> | | | | | • | • | | | | Y |
| | <i>Dichopogon capillipes</i> | • | • | | | | | | | | |
| | <i>Dichopogon preissii</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Laxmannia grandiflora</i> | | • | | | | | | | | |
| | <i>Laxmannia grandiflora</i> subsp. <i>grandiflora</i> | • | | | | | | | | | |
| | <i>Laxmannia omnifertilis</i> | • | • | | | | | | | | |
| | <i>Laxmannia squarrosa</i> | • | • | | | | | | | | |
| | <i>Lomandra caespitosa</i> | • | • | | | | | | | | |
| | <i>Lomandra hermaphrodita</i> | • | • | | | | | | | | |
| | <i>Lomandra micrantha</i> | • | • | | | | | | | | |
| | <i>Lomandra micrantha</i> subsp. <i>micrantha</i> | • | | | | | | | | | |
| | <i>Lomandra preissii</i> | • | • | | | | | | | | |
| | <i>Lomandra sericea</i> | • | • | | | | | | | | |
| | <i>Lomandra spartea</i> | • | • | | | | | | | | |
| | <i>Sowerbaea laxiflora</i> | • | • | | | | | | | | |
| | <i>Thysanotus dichotomus</i> | | • | | | | | | | | |
| | <i>Thysanotus multiflorus</i> | • | • | | | | | | | | |
| | <i>Thysanotus patersonii</i> | • | • | | | | | | | | |
| | <i>Thysanotus sparteus</i> | • | • | | | | | | | | |
| | <i>Thysanotus tenellus</i> | • | • | | | | | | | | |
| | <i>Thysanotus thyrsoideus</i> | • | • | | | | | | | | |
| | <i>Thysanotus</i> sp. Badgingarra (E.A. Griffin 2511) | | | • | | | | P2 | | | |
| Asteraceae | <i>Blennospora drummondii</i> | • | • | | | | | | | | |
| | <i>Brachyscome glandulosa</i> | • | • | | | | | | | | |
| | <i>Brachyscome iberidifolia</i> | • | • | | | | | | | | |
| | <i>Chondrilla juncea</i> | | | | | | • | | | | Y |
| | <i>Chrysanthemoides monilifera</i> | | | | | • | | | | | Y |
| | <i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> | | | | | • | | | | | Y |
| | <i>Gnephosis drummondii</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Gnephosis tenuissima</i> | | • | | | | | | | | |
| | <i>Helichrysum leucopsidium</i> | • | • | | | | | | | | |
| | <i>Hyalosperma cotula</i> | • | • | | | | | | | | |
| | <i>Hyalosperma demissum</i> | • | • | | | | | | | | |
| | <i>Hypochaeris glabra</i> | • | • | | | | | | | | Y |
| | <i>Lagenophora huegelii</i> | • | • | | | | | | | | |
| | <i>Lagenophora platysperma</i> | | • | | | | | | | | |
| | <i>Lawrencella rosea</i> | • | • | | | | | | | | |
| | <i>Millotia tenuifolia</i> | • | • | | | | | | | | |
| | <i>Millotia tenuifolia</i> var. <i>laevis</i> | • | | • | • | | | P2 | | | |
| | <i>Myriocephalus appendiculatus</i> | | • | | | | | | | | |
| | <i>Onopordum acaulon</i> | | | | | | • | | | | Y |
| | <i>Pithocarpa pulchella</i> | • | • | | | | | | | | |
| | <i>Pithocarpa pulchella</i> var. <i>pulchella</i> | • | | | | | | | | | |
| | <i>Podolepis canescens</i> | | • | | | | | | | | |
| | <i>Podolepis gracilis</i> | | • | | | | | | | | |
| | <i>Podolepis lessonii</i> | • | • | | | | | | | | |
| | <i>Podotheca angustifolia</i> | • | • | | | | | | | | |
| | <i>Podotheca gnaphalioides</i> | | • | | | | | | | | |
| | <i>Pterochaeta paniculata</i> | • | • | | | | | | | | |
| | <i>Quinetia urvillei</i> | • | • | | | | | | | | |
| | <i>Rhodanthe corymbosa</i> | • | • | | | | | | | | |
| | <i>Rhodanthe manglesii</i> | • | • | | | | | | | | |
| | <i>Senecio multicaulis</i> | | • | | | | | | | | |
| | <i>Senecio multicaulis</i> subsp. <i>multicaulis</i> | • | | | | | | | | | |
| | <i>Senecio pinnatifolius</i> | | • | | | | | | | | |
| | <i>Senecio pinnatifolius</i> var. <i>latilobus</i> | • | | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Siloxerus multiflorus</i> | | • | | | | | | | | |
| | <i>Silybum marianum</i> | | | | | | • | | | | Y |
| | <i>Trichocline spathulata</i> | • | • | | | | | | | | |
| | <i>Ursinia anthemoides</i> | • | • | | | | | | | | Y |
| | <i>Ursinia anthemoides</i> subsp. <i>anthemoides</i> | • | | | | | | | | | Y |
| | <i>Waitzia nitida</i> | • | • | | | | | | | | |
| | <i>Waitzia suaveolens</i> | • | • | | | | | | | | |
| | <i>Waitzia suaveolens</i> var. <i>suaveolens</i> | • | | | | | | | | | |
| | <i>Xanthium spinosum</i> | | | | | | • | | | | Y |
| | <i>Xanthium strumarium</i> | | | | | | • | | | | Y |
| Boraginaceae | <i>Echium plantagineum</i> | | | | | | • | | | | Y |
| Boryaceae | <i>Borya sphaerocephala</i> | • | • | | | | | | | | |
| Cactaceae | <i>Austrocylindropuntia cylindrica</i> | | | | | | • | | | | Y |
| | <i>Austrocylindropuntia subulata</i> | | | | | | • | | | | Y |
| | <i>Cylindropuntia fulgida</i> | | | | | | • | | | | Y |
| | <i>Cylindropuntia imbricata</i> | | | | | | • | | | | Y |
| | <i>Cylindropuntia kleiniae</i> | | | | | | • | | | | Y |
| | <i>Cylindropuntia pallida</i> | | | | | | • | | | | Y |
| | <i>Cylindropuntia tunicata</i> | | | | | | • | | | | Y |
| | <i>Opuntia elata</i> | | | | | | • | | | | Y |
| | <i>Opuntia elatior</i> | | | | | | • | | | | Y |
| | <i>Opuntia engelmannii</i> | | | | | | • | | | | Y |
| | <i>Opuntia ficus-indica</i> | | | | | | • | | | | Y |
| | <i>Opuntia microdasys</i> | | | | | | • | | | | Y |
| | <i>Opuntia monacantha</i> | | | | | | • | | | | Y |
| | <i>Opuntia polyacantha</i> | | | | | | • | | | | Y |
| | <i>Opuntia puberula</i> | | | | | | • | | | | Y |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|------------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Opuntia stricta</i> | | | | | | • | | | | Y |
| | <i>Opuntia tomentosa</i> | | | | | | • | | | | Y |
| Campanulaceae | <i>Isotoma hypocrateriformis</i> | • | • | | | | | | | | |
| | <i>Isotoma pusilla</i> | | • | | | | | | | | |
| | <i>Lobelia rarifolia</i> | • | • | | | | | | | | |
| | <i>Lobelia rhombifolia</i> | • | • | | | | | | | | |
| | <i>Lobelia tenuior</i> | | • | | | | | | | | |
| | <i>Monopsis debilis</i> | | • | | | | | | | | Y |
| | <i>Wahlenbergia gracilentia</i> | | • | | | | | | | | |
| | <i>Wahlenbergia preissii</i> | • | • | | | | | | | | |
| Caryophyllaceae | <i>Spergularia marina</i> | | • | | | | | | | | |
| Casuarinaceae | <i>Allocasuarina humilis</i> | • | • | | | | | | | | |
| | <i>Allocasuarina thuyoides</i> | • | • | | | | | | | | |
| Celastraceae | <i>Stackhousia monogyna</i> | | • | | | | | | | | |
| | <i>Stackhousia pubescens</i> | • | • | | | | | | | | |
| | <i>Tripterococcus brunonis</i> | • | • | | | | | | | | |
| Centrolepidaceae | <i>Aphelia cyperoides</i> | | • | | | | | | | | |
| | <i>Aphelia drummondii</i> | • | • | | | | | | | | |
| | <i>Aphelia</i> sp. Albany (B.G.Briggs 596) | | • | | | | | | | | |
| | <i>Centrolepis alepyroides</i> | | • | | | | | | | | |
| | <i>Centrolepis aristata</i> | • | • | | | | | | | | |
| | <i>Centrolepis drummondiana</i> | • | • | | | | | | | | |
| | <i>Centrolepis glabra</i> | | • | | | | | | | | |
| | <i>Centrolepis pilosa</i> | | • | | | | | | | | |
| | <i>Centrolepis polygyna</i> | | • | | | | | | | | |
| Colchicaceae | <i>Burchardia multiflora</i> | • | • | | | | | | | | |
| | <i>Wurmbea dioica</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Wurmbea dioica</i> subsp. <i>alba</i> | • | | | | | | | | | |
| | <i>Wurmbea tenella</i> | • | • | | | | | | | | |
| Crassulaceae | <i>Crassula closiana</i> | | • | | | | | | | | |
| | <i>Crassula peduncularis</i> | | • | | | | | | | | |
| Cyperaceae | <i>Baumea juncea</i> | • | | | | | | | | | |
| | <i>Chorizandra enodis</i> | | • | | | | | | | | |
| | <i>Cyathochaeta avenacea</i> | • | • | | | | | | | | |
| | <i>Eleocharis keigheryi</i> | | • | • | • | • | | T | VU | VU | |
| | <i>Isolepis cernua</i> | | • | | | | | | | | |
| | <i>Isolepis levynsiana</i> | | • | | | | | | | | Y |
| | <i>Isolepis marginata</i> | | • | | | | | | | | |
| | <i>Isolepis stellata</i> | | • | | | | | | | | |
| | <i>Lepidosperma apricola</i> | • | • | | | | | | | | |
| | <i>Lepidosperma asperatum</i> | • | • | | | | | | | | |
| | <i>Lepidosperma drummondii</i> | • | • | | | | | | | | |
| | <i>Lepidosperma longitudinale</i> | • | | | | | | | | | |
| | <i>Lepidosperma pruinatum</i> | • | • | | | | | | | | |
| | <i>Lepidosperma pubisquamatum</i> | • | • | | | | | | | | |
| | <i>Lepidosperma</i> sp. | • | | | | | | | | | |
| | <i>Lepidosperma squamatum</i> | • | • | | | | | | | | |
| | <i>Schoenus breviculmis</i> | • | • | • | | | | | | | |
| | <i>Schoenus capillifolius</i> | | | • | | | | P3 | | | |
| | <i>Schoenus clandestinus</i> | • | • | | | | | | | | |
| | <i>Schoenus nanus</i> | | • | | | | | | | | |
| | <i>Schoenus natans</i> | • | | • | • | | | P4 | | | |
| | <i>Schoenus odontocarpus</i> | | • | | | | | | | | |
| | <i>Schoenus sculptus</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------------------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Schoenus</i> sp. Toodyay (G.J. Keighery & N. Gibson 2918) | | | • | | | | P1 | | | |
| | <i>Schoenus unispiculatus</i> | • | • | | | | | | | | |
| | <i>Tetraria octandra</i> | • | • | | | | | | | | |
| | <i>Tetraria</i> sp. Jarrah Forest (R.Davis 7391) | • | • | | | | | | | | |
| Dilleniaceae | <i>Hibbertia commutata</i> | • | • | | | | | | | | |
| | <i>Hibbertia cuneiformis</i> | | • | | | | | | | | |
| | <i>Hibbertia diamesogenos</i> | • | • | | | | | | | | |
| | <i>Hibbertia glomerata</i> subsp. <i>ginginensis</i> | | | • | | | | P2 | | | |
| | <i>Hibbertia hibbertioides</i> | | • | | | | | | | | |
| | <i>Hibbertia huegelii</i> | • | • | | | | | | | | |
| | <i>Hibbertia hypericoides</i> | • | • | | | | | | | | |
| | <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | • | | | | | | | | | |
| | <i>Hibbertia lasiopus</i> | • | • | | | | | | | | |
| | <i>Hibbertia miniata</i> | • | | • | | | | P4 | | | |
| | <i>Hibbertia montana</i> | • | | | | | | | | | |
| | <i>Hibbertia polystachya</i> | • | • | | | | | | | | |
| | <i>Hibbertia</i> sp. | • | | | | | | | | | |
| <i>Hibbertia spicata</i> | • | • | | | | | | | | | |
| Droseraceae | <i>Drosera barbiger</i> | • | • | | | | | | | | |
| | <i>Drosera erythrorhiza</i> | • | • | | | | | | | | |
| | <i>Drosera gigantea</i> | • | • | | | | | | | | |
| | <i>Drosera glanduligera</i> | • | • | | | | | | | | |
| | <i>Drosera heterophylla</i> | • | • | | | | | | | | |
| | <i>Drosera leucoblata</i> | • | • | | | | | | | | |
| | <i>Drosera macrantha</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|----------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Drosera menziesii</i> | • | • | | | | | | | | |
| | <i>Drosera neesii</i> | • | | | | | | | | | |
| | <i>Drosera platystigma</i> | • | • | | | | | | | | |
| | <i>Drosera sewelliae</i> | • | | • | | | | P2 | | | |
| | <i>Drosera spilos</i> | • | • | | | | | | | | |
| | <i>Drosera stolonifera</i> | • | • | | | | | | | | |
| Elaeocarpaceae | <i>Tetradthea hirsuta</i> | | • | | | | | | | | |
| | <i>Tetradthea hirsuta</i> subsp. <i>hirsuta</i> | • | | | | | | | | | |
| | <i>Tetradthea pilifera</i> | • | | • | • | | | P3 | | | |
| | <i>Tetradthea spartea</i> | | | • | | | | P2 | | | |
| Ericaceae | <i>Astroloma ciliatum</i> | • | | | | | | | | | |
| | <i>Astroloma compactum</i> | • | • | | | | | | | | |
| | <i>Astroloma epacridis</i> | • | • | | | | | | | | |
| | <i>Astroloma macrocalyx</i> | • | • | | | | | | | | |
| | <i>Astroloma oblongifolium</i> | • | • | | | | | | | | |
| | <i>Astroloma pallidum</i> | • | • | | | | | | | | |
| | <i>Conostephium preissii</i> | • | • | | | | | | | | |
| | <i>Leucopogon nutans</i> | • | • | | | | | | | | |
| | <i>Leucopogon polymorphus</i> | | • | | | | | | | | |
| | <i>Leucopogon propinquus</i> | • | • | | | | | | | | |
| | <i>Leucopogon pulchellus</i> | • | • | | | | | | | | |
| | <i>Leucopogon</i> sp. Northern Scarp (M.Hislop 2233) | • | • | | | | | | | | |
| | <i>Styphelia brevicuspis</i> | | | • | • | | | P2 | | | |
| | <i>Styphelia tenuiflora</i> | • | • | | | | | | | | |
| Euphorbiaceae | <i>Jatropha gossypifolia</i> | | | | | | • | | | | Y |
| | <i>Monotaxis grandiflora</i> | • | • | | | | | | | | |
| | <i>Stachystemon virgatus</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|-------------------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| Fabaceae | <i>Acacia anomala</i> | | | • | | | | T | VU | VU | |
| | <i>Acacia applanata</i> | • | • | | | | | | | | |
| | <i>Acacia barbinervis</i> | | • | | | | | | | | |
| | <i>Acacia barbinervis</i> subsp. <i>barbinervis</i> | • | | | | | | | | | |
| | <i>Acacia baxteri</i> | • | • | | | | | | | | |
| | <i>Acacia browniana</i> | | • | | | | | | | | |
| | <i>Acacia browniana</i> var. <i>glaucescens</i> | • | | • | • | | | P2 | | | |
| | <i>Acacia campylophylla</i> | | | | • | | | P3 | | | |
| | <i>Acacia celastrifolia</i> | • | • | | | | | | | | |
| | <i>Acacia chapmanii</i> subsp. <i>australis</i> | | | • | • | | | T | EN | EN | |
| | <i>Acacia drummondii</i> | | • | | | | | | | | |
| | <i>Acacia drummondii</i> subsp. <i>affinis</i> | • | | • | • | | | P3 | | | |
| | <i>Acacia drummondii</i> subsp. <i>elegans</i> | • | | | | | | | | | |
| | <i>Acacia ericifolia</i> | | • | | | | | | | | |
| | <i>Acacia huegelii</i> | • | • | | | | | | | | |
| | <i>Acacia incrassata</i> | • | • | | | | | | | | |
| | <i>Acacia lateriticola</i> | • | • | | | | | | | | |
| | <i>Acacia multispicata</i> | • | • | | | | | | | | |
| | <i>Acacia nervosa</i> | • | • | | | | | | | | |
| | <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> | | | • | | | | P4 | | | |
| | <i>Acacia preissiana</i> | • | • | | | | | | | | |
| | <i>Acacia pulchella</i> | • | • | | | | | | | | |
| | <i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (R.J. Cumming 882) | | | • | | | | P3 | | | |
| <i>Acacia sessilis</i> | • | • | | | | | | | | | |
| <i>Acacia squamata</i> | • | • | | | | | | | | | |
| <i>Acacia urophylla</i> | • | • | | | | | | | | | |
| <i>Alhagi maurorum</i> | | | | | | | • | | | | Y |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Bossiaea eriocarpa</i> | • | • | | | | | | | | |
| | <i>Bossiaea ornata</i> | • | • | | | | | | | | |
| | <i>Chorizema dicksonii</i> | • | • | | | | | | | | |
| | <i>Chorizema ulotropis</i> | | | • | | | | P4 | | | |
| | <i>Daviesia angulata</i> | • | • | | | | | | | | |
| | <i>Daviesia benthamii</i> | | • | | | | | | | | |
| | <i>Daviesia decurrens</i> | | • | | | | | | | | |
| | <i>Daviesia decurrens</i> subsp. <i>decurrens</i> | • | | | | | | | | | |
| | <i>Daviesia hakeoides</i> | • | • | | | | | | | | |
| | <i>Daviesia hakeoides</i> subsp. <i>hakeoides</i> | • | | | | | | | | | |
| | <i>Daviesia preissii</i> | • | • | | | | | | | | |
| | <i>Gastrolobium acutum</i> | | • | | | | | | | | |
| | <i>Gastrolobium calycinum</i> | • | • | | | | | | | | |
| | <i>Gastrolobium crispatum</i> | • | • | • | • | | | P1 | | | |
| | <i>Gastrolobium dilatatum</i> | | • | | | | | | | | |
| | <i>Gastrolobium epacridoides</i> | • | • | | | | | | | | |
| | <i>Gastrolobium nudum</i> | | | • | • | | | P2 | | | |
| | <i>Gastrolobium rhombifolium</i> | • | • | | | | | | | | |
| | <i>Gastrolobium spathulatum</i> | • | • | | | | | | | | |
| | <i>Genista</i> sp. x <i>Genista monspessulana</i> | | | | | • | | | | | Y |
| | <i>Gompholobium knightianum</i> | • | • | | | | | | | | |
| | <i>Gompholobium marginatum</i> | • | • | | | | | | | | |
| | <i>Gompholobium polymorphum</i> | • | • | | | | | | | | |
| | <i>Gompholobium preissii</i> | • | • | | | | | | | | |
| | <i>Gompholobium tomentosum</i> | | • | | | | | | | | |
| | <i>Hovea chorizemifolia</i> | • | • | | | | | | | | |
| | <i>Hovea trisperma</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Jacksonia alata</i> | | • | | | | | | | | |
| | <i>Jacksonia floribunda</i> | • | • | | | | | | | | |
| | <i>Jacksonia sternbergiana</i> | | • | | | | | | | | |
| | <i>Kennedia prostrata</i> | | • | | | | | | | | |
| | <i>Kennedia stirlingii</i> | • | • | | | | | | | | |
| | <i>Labichea punctata</i> | • | • | | | | | | | | |
| | <i>Parkinsonia aculeata</i> | | | | | | • | | | | Y |
| | <i>Prosopis glandulosa x velutina</i> | | | | | | • | | | | Y |
| | <i>Senna alata</i> | | | | | | • | | | | Y |
| | <i>Senna obtusifolia</i> | | | | | | • | | | | Y |
| | <i>Sphaerolobium medium</i> | | • | | | | | | | | |
| | <i>Templetonia drummondii</i> | • | • | | | | | | | | |
| | <i>Ulex europaeus</i> | | | | | | • | | | | Y |
| | <i>Vicia benghalensis</i> | • | • | | | | | | | | Y |
| Gentianaceae | <i>Cicendia filiformis</i> | | • | | | | | | | | Y |
| Goodeniaceae | <i>Dampiera alata</i> | • | • | | | | | | | | |
| | <i>Dampiera incana</i> | • | • | | | | | | | | |
| | <i>Dampiera lavandulacea</i> | | • | | | | | | | | |
| | <i>Dampiera linearis</i> | • | • | | | | | | | | |
| | <i>Goodenia arthrotricha</i> | | | | | • | | T | EN | EN | |
| | <i>Goodenia claytoniacea</i> | | • | | | | | | | | |
| | <i>Goodenia coerulea</i> | • | • | | | | | | | | |
| | <i>Goodenia drummondii</i> | | • | | | | | | | | |
| | <i>Goodenia drummondii</i> subsp. <i>megaphylla</i> | • | | | | | | | | | |
| | <i>Goodenia micrantha</i> | • | • | | | | | | | | |
| | <i>Goodenia mimuloides</i> | | • | | | | | | | | |
| | <i>Goodenia pulchella</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|---------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Goodenia pulchella</i> subsp. Wheatbelt (L.W. Sage & F. Hort 795) | • | | | | | | | | | |
| | <i>Lechenaultia biloba</i> | • | • | | | | | | | | |
| | <i>Lechenaultia magnifica</i> | • | | • | • | | | P1 | | | |
| | <i>Scaevola glandulifera</i> | • | • | | | | | | | | |
| | <i>Scaevola phlebopetala</i> | | • | | | | | | | | |
| | <i>Scaevola platyphylla</i> | • | • | | | | | | | | |
| | <i>Velleia trinervis</i> | • | • | | | | | | | | |
| Haemodoraceae | <i>Anigozanthos bicolor</i> | | • | | | | | | | | |
| | <i>Anigozanthos bicolor</i> subsp. <i>bicolor</i> | • | | | | | | | | | |
| | <i>Anigozanthos humilis</i> | | • | | | | | | | | |
| | <i>Anigozanthos humilis</i> subsp. <i>humilis</i> | • | | | | | | | | | |
| | <i>Anigozanthos manglesii</i> | | • | | | | | | | | |
| | <i>Anigozanthos manglesii</i> subsp. <i>manglesii</i> | • | | | | | | | | | |
| | <i>Conostylis androstemma</i> | • | • | | | | | | | | |
| | <i>Conostylis aurea</i> | • | • | | | | | | | | |
| | <i>Conostylis candicans</i> | | • | | | | | | | | |
| | <i>Conostylis caricina</i> subsp. <i>elachys</i> | • | | • | • | | | P1 | | | |
| | <i>Conostylis prolifera</i> | • | • | | | | | | | | |
| | <i>Conostylis setigera</i> | • | • | | | | | | | | |
| | <i>Conostylis setigera</i> subsp. <i>setigera</i> | • | | | | | | | | | |
| | <i>Conostylis setosa</i> | • | • | | | | | | | | |
| | <i>Haemodorum laxum</i> | • | • | | | | | | | | |
| | <i>Haemodorum simplex</i> | • | • | | | | | | | | |
| | <i>Haemodorum</i> sp. | • | | | | | | | | | |
| | <i>Haemodorum sparsiflorum</i> | • | • | | | | | | | | |
| | <i>Tribonanthes longipetala</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced | |
|------------------------------|--|------------------------------|-----|---------|------|------|------|---------------------|--------|----------|------------|--|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | | |
| | <i>Tribonanthes porphyrea</i> | | • | | | | | | | | | |
| Haloragaceae | <i>Glischrocaryon aureum</i> | | • | | | | | | | | | |
| | <i>Gonocarpus cordiger</i> | • | • | | | | | | | | | |
| | <i>Myriophyllum drummondii</i> | | • | | | | | | | | | |
| | <i>Agrostocrinum hirsutum</i> | • | • | | | | | | | | | |
| Hemerocallidaceae | <i>Caesia micrantha</i> | • | • | | | | | | | | | |
| | <i>Caesia</i> sp. Wongan (K.F.Kenneally 8820) | | • | | | | | | | | | |
| | <i>Dianella revoluta</i> | • | • | | | | | | | | | |
| | <i>Dianella revoluta</i> var. <i>divaricata</i> | • | | | | | | | | | | |
| | <i>Dianella revoluta</i> var. <i>revoluta</i> | • | | | | | | | | | | |
| | <i>Johnsonia inconspicua</i> | • | | • | • | | | P3 | | | | |
| | <i>Stypandra glauca</i> | • | • | | | | | | | | | |
| | <i>Tricoryne elatior</i> | • | • | | | | | | | | | |
| | <i>Tricoryne</i> sp. Wongan Hills (B.H. Smith 794) | | | • | | | | P2 | | | | |
| | Hydatellaceae | <i>Trithuria australis</i> | | | • | • | | | P4 | | | |
| | | <i>Trithuria bibracteata</i> | | • | | | | | | | | |
| <i>Pauridia occidentalis</i> | | | • | | | | | | | | | |
| <i>Pauridia vaginata</i> | | | • | | | | | | | | | |
| Iridaceae | <i>Gladiolus caryophyllaceus</i> | • | • | | | | | | | | Y | |
| | <i>Moraea flaccida</i> | | | | | | • | | | | Y | |
| | <i>Moraea miniata</i> | | | | | | • | | | | Y | |
| | <i>Orthrosanthus laxus</i> | | • | | | | | | | | | |
| | <i>Orthrosanthus laxus</i> var. <i>gramineus</i> | • | | | | | | | | | | |
| | <i>Patersonia juncea</i> | • | • | | | | | | | | | |
| | <i>Patersonia rudis</i> | • | • | | | | | | | | | |
| | <i>Patersonia rudis</i> subsp. <i>rudis</i> | • | | | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|------------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Romulea rosea</i> | • | • | | | | | | | | Y |
| Juncaceae | <i>Juncus bufonius</i> | | • | | | | | | | | Y |
| | <i>Juncus capitatus</i> | | • | | | | | | | | Y |
| Juncaginaceae | <i>Cycnogeton lineare</i> | | • | | | | | | | | |
| | <i>Triglochin nana</i> | | • | | | | | | | | |
| Lamiaceae | <i>Hemigenia barbata</i> | • | • | | | | | | | | |
| | <i>Hemigenia platyphylla</i> | | | • | | | | P4 | | | |
| | <i>Hemigenia wandooana</i> | • | • | | | | | | | | |
| Lauraceae | <i>Cassytha glabella</i> | • | • | | | | | | | | |
| Lentibulariaceae | <i>Utricularia inaequalis</i> | | • | | | | | | | | |
| | <i>Utricularia multifida</i> | | • | | | | | | | | |
| Loganiaceae | <i>Logania micrantha</i> | • | • | | | | | | | | |
| Loranthaceae | <i>Amyema miquelii</i> | • | • | | | | | | | | |
| | <i>Amyema preissii</i> | • | • | | | | | | | | |
| Malvaceae | <i>Androcalva fragifolia</i> | | | • | • | | | P1 | | | |
| | <i>Lasiopetalum caroliae</i> | • | • | • | • | | | P3 | | | |
| | <i>Lasiopetalum decoratum</i> | | | • | | | | P2 | | | |
| | <i>Lasiopetalum glutinosum</i> | | • | | | | | | | | |
| | <i>Lasiopetalum glutinosum</i> subsp. <i>latifolium</i> | • | | | | | | | | | |
| Menyanthaceae | <i>Liparophyllum capitatum</i> | | • | | | | | | | | |
| Montiaceae | <i>Calandrinia corrigioloides</i> | | • | | | | | | | | |
| Myrtaceae | <i>Babingtonia camphorosmae</i> | • | • | | | | | | | | |
| | <i>Baeckea preissiana</i> | | • | | | | | | | | |
| | <i>Calothamnus pachystachyus</i> | | | • | | | | P4 | | | |
| | <i>Calothamnus sanguineus</i> | • | • | | | | | | | | |
| | <i>Calytrix angulata</i> | • | • | | | | | | | | |
| | <i>Calytrix flavescens</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Calytrix sylvana</i> | • | • | | | | | | | | |
| | <i>Calytrix variabilis</i> | • | • | | | | | | | | |
| | <i>Corymbia calophylla</i> | • | • | | | | | | | | |
| | <i>Darwinia carnea</i> | | | | | • | | T | CR | EN | |
| | <i>Ericomyrtus serpyllifolia</i> | | • | | | | | | | | |
| | <i>Eucalyptus aspersa</i> | • | • | | | | | | | | |
| | <i>Eucalyptus loxophleba</i> x <i>wandoo</i> | | | • | • | | | P4 | | | |
| | <i>Eucalyptus marginata</i> | • | • | | | | | | | | |
| | <i>Eucalyptus marginata</i> subsp. <i>thalassica</i> | • | | | | | | | | | |
| | <i>Eucalyptus rudis</i> | • | • | | | | | | | | |
| | <i>Eucalyptus wandoo</i> | • | • | | | | | | | | |
| | <i>Eucalyptus wandoo</i> subsp. <i>wandoo</i> | • | | | | | | | | | |
| | <i>Hypocalymma angustifolium</i> | • | • | | | | | | | | |
| | <i>Hypocalymma sylvestre</i> | | | • | • | • | | T | EN | EN | |
| | <i>Kunzea glabrescens</i> | | • | | | | | | | | |
| | <i>Kunzea praestans</i> | | • | | | | | | | | |
| | <i>Leptospermum erubescens</i> | • | • | | | | | | | | |
| | <i>Melaleuca aspalathoides</i> | • | • | | | | | | | | |
| | <i>Melaleuca holosericea</i> | • | • | | | | | | | | |
| | <i>Melaleuca sciotostyla</i> | | | | | • | | T | EN | EN | |
| | <i>Melaleuca teretifolia</i> | • | • | | | | | | | | |
| | <i>Melaleuca trichophylla</i> | • | • | | | | | | | | |
| | <i>Melaleuca viminea</i> | | • | | | | | | | | |
| | <i>Melaleuca viminea</i> subsp. <i>viminea</i> | • | | | | | | | | | |
| | <i>Oxymyrrhine coronata</i> | • | | • | • | | | P4 | | | |
| | <i>Rinzia crassifolia</i> | • | • | | | | | | | | |
| | <i>Tetrapora preissiana</i> | • | | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|-----------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Verticordia citrella</i> | | | • | | | | P2 | | | |
| | <i>Verticordia densiflora</i> | | • | | | | | | | | |
| | <i>Verticordia densiflora</i> var. <i>cespitosa</i> | • | | | | | | | | | |
| | <i>Verticordia huegelii</i> var. <i>tridens</i> | | | • | | | | P3 | | | |
| | <i>Verticordia nobilis</i> | • | • | | | | | | | | |
| | <i>Verticordia plumosa</i> | | • | | | | | | | | |
| | <i>Verticordia serrata</i> | | • | | | | | | | | |
| | <i>Verticordia serrata</i> var. <i>ciliata</i> | • | | | | | | | | | |
| | <i>Verticordia serrata</i> var. <i>serrata</i> | • | | | | | | | | | |
| Olacaceae | <i>Olex benthamiana</i> | • | • | | | | | | | | |
| Ophioglossaceae | <i>Ophioglossum lusitanicum</i> | • | • | | | | | | | | |
| Orchidaceae | <i>Caladenia arrecta</i> | • | • | | | | | | | | |
| | <i>Caladenia deformis</i> | | • | | | | | | | | |
| | <i>Caladenia denticulata</i> | | • | | | | | | | | |
| | <i>Caladenia discoidea</i> | | • | | | | | | | | |
| | <i>Caladenia filamentosa</i> | | • | | | | | | | | |
| | <i>Caladenia filifera</i> | • | • | | | | | | | | |
| | <i>Caladenia flava</i> | • | • | | | | | | | | |
| | <i>Caladenia longicauda</i> | | • | | | | | | | | |
| | <i>Caladenia reptans</i> | | • | | | | | | | | |
| | <i>Caladenia sericea</i> | | • | | | | | | | | |
| | <i>Caladenia speciosa</i> | | | • | | | | P4 | | | |
| | <i>Calochilus stramenicola</i> | • | • | | | | | | | | |
| | <i>Cyanicula ixiooides</i> | • | • | | | | | | | | |
| | <i>Cyanicula ixiooides</i> subsp. <i>ixiooides</i> | • | | • | | | | P4 | | | |
| | <i>Cyanicula sericea</i> | • | • | | | | | | | | |
| | <i>Disa bracteata</i> | • | • | | | | | | | | Y |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Diuris aff. corymbosa</i> | | • | | | | | | | | |
| | <i>Diuris corymbosa</i> | • | • | | | | | | | | |
| | <i>Diuris laxiflora</i> | • | • | | | | | | | | |
| | <i>Diuris longifolia</i> | | • | | | | | | | | |
| | <i>Diuris porrifolia</i> | • | | | | | | | | | |
| | <i>Drakaea gracilis</i> | • | | | | | | | | | |
| | <i>Elythranthera brunonis</i> | | • | | | | | | | | |
| | <i>Elythranthera emarginata</i> | | • | | | | | | | | |
| | <i>Ericksonella saccharata</i> | | • | | | | | | | | |
| | <i>Eriochilus dilatatus</i> | | • | | | | | | | | |
| | <i>Eriochilus dilatatus</i> subsp. <i>undulatus</i> | • | | | | | | | | | |
| | <i>Leporella fimbriata</i> | • | • | | | | | | | | |
| | <i>Lyperanthus nigricans</i> | | • | | | | | | | | |
| | <i>Oligochaetochilus vittatus</i> | | • | | | | | | | | |
| | <i>Paracaleana nigrita</i> | • | | | | | | | | | |
| | <i>Prasophyllum gracile</i> | • | • | | | | | | | | |
| | <i>Prasophyllum ovale</i> | | • | | | | | | | | |
| | <i>Pterostylis hamiltonii</i> | • | • | | | | | | | | |
| | <i>Pterostylis nana</i> | | • | | | | | | | | |
| | <i>Pterostylis recurva</i> | | • | | | | | | | | |
| | <i>Pterostylis vittata</i> | • | • | | | | | | | | |
| | <i>Pyrorchis nigricans</i> | • | • | | | | | | | | |
| | <i>Thelymitra antennifera</i> | | • | | | | | | | | |
| | <i>Thelymitra dedmaniarum</i> | | | | | • | | T | CR | EN | |
| | <i>Thelymitra stellata</i> | • | | | • | • | | T | EN | EN | |
| | <i>Thelymitra vulgaris</i> | • | • | | | | | | | | |
| | <i>Urochilus vittatus</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|----------------|-----------------------------------|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| Orobanchaceae | <i>Bellardia trixago</i> | • | • | | | | | | | | Y |
| | <i>Parentucellia latifolia</i> | • | • | | | | | | | | Y |
| Philydraceae | <i>Philydrella pygmaea</i> | | • | | | | | | | | |
| Phrymaceae | <i>Glossostigma diandrum</i> | | • | | | | | | | | |
| Phyllanthaceae | <i>Phyllanthus calycinus</i> | • | • | | | | | | | | |
| | <i>Poranthera microphylla</i> | • | • | | | | | | | | |
| Pinaceae | <i>Pinus radiata</i> | | | | | • | | | | | Y |
| Pittosporaceae | <i>Billardiera fraseri</i> | • | • | | | | | | | | |
| | <i>Marianthus bicolor</i> | • | • | | | | | | | | |
| Plantaginaceae | <i>Gratiola pubescens</i> | | • | | | | | | | | |
| Poaceae | <i>Aira caryophyllea</i> | • | • | | | | | | | | Y |
| | <i>Aira cupaniana</i> | • | • | | | | | | | | Y |
| | <i>Amphibromus nervosus</i> | | • | | | | | | | | |
| | <i>Amphipogon amphipogonoides</i> | • | • | | | | | | | | |
| | <i>Austrostipa campylachne</i> | • | • | | | | | | | | |
| | <i>Austrostipa hemipogon</i> | • | • | | | | | | | | |
| | <i>Austrostipa macalpinei</i> | | • | | | | | | | | |
| | <i>Austrostipa mollis</i> | • | • | | | | | | | | |
| | <i>Avellinia michelii</i> | • | • | | | | | | | | Y |
| | <i>Brachypodium distachyon</i> | • | • | | | | | | | | Y |
| | <i>Briza maxima</i> | • | • | | | | | | | | Y |
| | <i>Briza minor</i> | • | • | | | | | | | | Y |
| | <i>Dichelachne micrantha</i> | | • | | | | | | | | |
| | <i>Lachnagrostis filiformis</i> | | • | | | | | | | | |
| | <i>Microlaena stipoides</i> | | • | | | | | | | | |
| | <i>Neurachne alopecuroidea</i> | • | • | | | | | | | | |
| | <i>Pentameris airoides</i> | | • | | | | | | | | Y |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Pentameris airoides</i> subsp. <i>airoides</i> | • | | | | | | | | | Y |
| | <i>Poa drummondiana</i> | • | • | | | | | | | | |
| | <i>Polypogon monspeliensis</i> | | • | | | | | | | | Y |
| | <i>Rytidosperma acerosum</i> | • | • | | | | | | | | |
| | <i>Rytidosperma caespitosum</i> | • | • | | | | | | | | |
| | <i>Rytidosperma setaceum</i> | | • | | | | | | | | |
| Polygalaceae | <i>Comesperma calymega</i> | • | • | | | | | | | | |
| | <i>Comesperma ciliatum</i> | • | • | | | | | | | | |
| | <i>Comesperma rhadinocarpum</i> | | | • | | | | P3 | | | |
| Pottiaceae | <i>Barbula calycina</i> | • | | | | | | | | | |
| Primulaceae | <i>Lysimachia arvensis</i> | | • | | | | | | | | Y |
| Proteaceae | <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> | • | | • | • | | | P3 | | | |
| | <i>Adenanthos drummondii</i> | • | • | | | | | | | | |
| | <i>Banksia attenuata</i> | | • | | | | | | | | |
| | <i>Banksia bipinnatifida</i> | | • | | | | | | | | |
| | <i>Banksia bipinnatifida</i> subsp. <i>multifida</i> | • | | | | | | | | | |
| | <i>Banksia dallanneyi</i> | | • | | | | | | | | |
| | <i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var. <i>dallanneyi</i> | • | | | | | | | | | |
| | <i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var. <i>mellicula</i> | • | | | | | | | | | |
| | <i>Banksia fraseri</i> | • | • | | | | | | | | |
| | <i>Banksia grandis</i> | • | • | | | | | | | | |
| | <i>Banksia menziesii</i> | | • | | | | | | | | |
| | <i>Banksia nivea</i> | • | • | | | | | | | | |
| | <i>Banksia polycephala</i> | • | • | | | | | | | | |
| | <i>Banksia sessilis</i> | | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Banksia sessilis</i> var. <i>sessilis</i> | • | | | | | | | | | |
| | <i>Banksia sphaerocarpa</i> | | • | | | | | | | | |
| | <i>Banksia squarrosa</i> | | • | | | | | | | | |
| | <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | • | | | | | | | | | |
| | <i>Conospermum densiflorum</i> | • | • | | | | | | | | |
| | <i>Conospermum densiflorum</i> subsp. <i>unicephalum</i> | | | | | • | | T | EN | EN | |
| | <i>Conospermum polycephalum</i> | • | • | | | | | | | | |
| | <i>Conospermum stoechadis</i> | | • | | | | | | | | |
| | <i>Conospermum triplinervium</i> | • | • | | | | | | | | |
| | <i>Grevillea bracteosa</i> | | • | | | | | | | | |
| | <i>Grevillea bracteosa</i> subsp. <i>bracteosa</i> | • | | • | • | | | T | EN | | |
| | <i>Grevillea candolleana</i> | | | • | | | | | | | |
| | <i>Grevillea corrugata</i> | | | • | • | • | | T | VU | EN | |
| | <i>Grevillea curviloba</i> | | | • | | | | T | CR | EN | |
| | <i>Grevillea drummondii</i> | • | • | • | | | | P4 | | | |
| | <i>Grevillea pilulifera</i> | • | • | | | | | | | | |
| | <i>Grevillea scabra</i> | • | • | | | | | | | | |
| | <i>Grevillea</i> sp. Gunapin (F. Hort 308) | • | • | | | | | | | | |
| | <i>Grevillea</i> sp. Toodyay West (F. Hort et al. 3296) | | | • | | | | P2 | | | |
| | <i>Grevillea synapheae</i> | • | • | | | | | | | | |
| | <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | • | | | | | | | | | |
| | <i>Hakea lissocarpa</i> | • | • | | | | | | | | |
| | <i>Hakea prostrata</i> | | • | | | | | | | | |
| | <i>Hakea ruscifolia</i> | • | • | | | | | | | | |
| | <i>Hakea stenocarpa</i> | • | • | | | | | | | | |
| | <i>Hakea trifurcata</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Hakea undulata</i> | • | • | | | | | | | | |
| | <i>Hakea varia</i> | • | • | | | | | | | | |
| | <i>Persoonia angustiflora</i> | • | • | | | | | | | | |
| | <i>Persoonia elliptica</i> | • | • | | | | | | | | |
| | <i>Persoonia sulcata</i> | • | | • | • | | | P4 | | | |
| | <i>Persoonia trinervis</i> | • | • | | | | | | | | |
| | <i>Petrophile brevifolia</i> | • | • | | | | | | | | |
| | <i>Petrophile serruriae</i> | • | • | | | | | | | | |
| | <i>Petrophile striata</i> | • | • | | | | | | | | |
| | <i>Synaphea decorticans</i> | • | • | | | | | | | | |
| | <i>Synaphea grandis</i> | • | • | • | • | | | P4 | | | |
| | <i>Synaphea panhesya</i> | • | | • | • | | | P1 | | | |
| | <i>Synaphea</i> sp. Udumung (A.S. George 17058) | • | | | | | | | | | |
| Restionaceae | <i>Desmocladius asper</i> | • | • | | | | | | | | |
| | <i>Desmocladius fasciculatus</i> | • | • | | | | | | | | |
| | <i>Desmocladius flexuosus</i> | • | • | | | | | | | | |
| | <i>Lepidobolus preissianus</i> | • | • | | | | | | | | |
| | <i>Leptocarpus coangustatus</i> | • | • | | | | | | | | |
| Rhamnaceae | <i>Cryptandra nutans</i> | • | • | | | | | | | | |
| | <i>Stenanthemum coronatum</i> | • | • | | | | | | | | |
| | <i>Trymalium angustifolium</i> | • | • | | | | | | | | |
| | <i>Trymalium odoratissimum</i> | | • | | | | | | | | |
| | <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> | • | | | | | | | | | |
| | <i>Trymalium urceolare</i> | • | • | | | | | | | | |
| | <i>Ziziphus mauritiana</i> | | | | | | | • | | | Y |
| Rosaceae | <i>Rubus anglocandicans</i> | | | | | | | • | | | Y |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|------------------|---|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Rubus fruticosus aggregate</i> | | | | | • | | | | | Y |
| | <i>Rubus laudatus</i> | | | | | | • | | | | Y |
| | <i>Rubus rugosus</i> | | | | | | • | | | | Y |
| | <i>Rubus ulmifolius</i> | | | | | | • | | | | Y |
| Rubiaceae | <i>Galium aparine</i> | | | | | | • | | | | Y |
| | <i>Galium murale</i> | • | • | | | | | | | | Y |
| | <i>Galium spurium</i> | | | | | | • | | | | Y |
| | <i>Opercularia vaginata</i> | • | • | | | | | | | | |
| Ruppiaceae | <i>Ruppia polycarpa</i> | • | • | | | | | | | | |
| Rutaceae | <i>Asterolasia grandiflora</i> | | | • | • | • | | P4 | | | |
| | <i>Boronia busselliana</i> | • | | | | | | | | | |
| | <i>Boronia ovata</i> | | • | | | | | | | | |
| | <i>Boronia ramosa</i> | | • | | | | | | | | |
| | <i>Boronia ramosa</i> subsp. <i>anethifolia</i> | • | | | | | | | | | |
| | <i>Diplolaena andrewsii</i> | | | | | • | | T | EN | EN | |
| | <i>Philothea nodiflora</i> | | • | | | | | | | | |
| | <i>Philothea nodiflora</i> subsp. <i>nodiflora</i> | • | | | | | | | | | |
| | <i>Philothea spicata</i> | • | • | | | | | | | | |
| Salviniaceae | <i>Salvinia molesta</i> | | | | | • | | | | | Y |
| Santalaceae | <i>Santalum acuminatum</i> | • | • | | | | | | | | |
| Sapindaceae | <i>Diplopeltis huegelii</i> | | • | | | | | | | | |
| | <i>Diplopeltis huegelii</i> subsp. <i>lehmannii</i> | • | | | | | | | | | |
| Scrophulariaceae | <i>Phyllopodium cordatum</i> | • | • | | | | | | | | Y |
| Solanaceae | <i>Lycium ferocissimum</i> | | | | | • | | | | | Y |
| | <i>Solanum elaeagnifolium</i> | | | | | | • | | | | Y |
| | <i>Solanum linnaeanum</i> | | | | | | • | | | | Y |
| Stylidiaceae | <i>Levenhookia pusilla</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|--------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Levenhookia stipitata</i> | • | • | | | | | | | | |
| | <i>Stylidium adpressum</i> | • | • | | | | | | | | |
| | <i>Stylidium affine</i> | • | • | | | | | | | | |
| | <i>Stylidium albolilacinum</i> | • | • | | | | | | | | |
| | <i>Stylidium androsaceum</i> | • | • | | | | | | | | |
| | <i>Stylidium bindoon</i> | • | | | | | | | | | |
| | <i>Stylidium brunonianum</i> | • | • | | | | | | | | |
| | <i>Stylidium calcaratum</i> | • | • | | | | | | | | |
| | <i>Stylidium carnosum</i> | • | • | | | | | | | | |
| | <i>Stylidium ciliatum</i> | | • | | | | | | | | |
| | <i>Stylidium cilium</i> | • | • | | | | | | | | |
| | <i>Stylidium cymiferum</i> | • | • | • | • | | | P3 | | | |
| | <i>Stylidium despectum</i> | • | • | | | | | | | | |
| | <i>Stylidium dichotomum</i> | | • | | | | | | | | |
| | <i>Stylidium diuroides</i> | • | • | | | | | | | | |
| | <i>Stylidium diuroides</i> subsp. <i>diuroides</i> | • | | | | | | | | | |
| | <i>Stylidium ecorne</i> | • | • | | | | | | | | |
| | <i>Stylidium eriopodum</i> | • | • | | | | | | | | |
| | <i>Stylidium hispidum</i> | • | • | | | | | | | | |
| | <i>Stylidium longitubum</i> | | | | • | | | P4 | | | |
| | <i>Stylidium obtusatum</i> | | • | | | | | | | | |
| | <i>Stylidium petiolare</i> | • | • | | | | | | | | |
| | <i>Stylidium pulchellum</i> | • | • | | | | | | | | |
| | <i>Stylidium roseoalatum</i> | • | • | | | | | | | | |
| | <i>Stylidium sacculatum</i> | | | • | | | | P3 | | | |
| | <i>Stylidium salmoneum</i> | • | | | | | | | | | |
| | <i>Stylidium scariosum</i> | • | • | | | | | | | | |

| Family | Taxon | Source | | | | | | Conservation Status | | | Introduced |
|------------------|--|------------|-----|---------|------|------|------|---------------------|--------|----------|------------|
| | | Nature Map | ALA | WA Herb | TPFL | EPBC | WAOL | DBCA | BC Act | EPBC Act | |
| | <i>Stylidium schoenoides</i> | • | • | | | | | | | | |
| | <i>Stylidium</i> sp. | • | | | | | | | | | |
| | <i>Stylidium tenue</i> | | • | | | | | | | | |
| | <i>Stylidium tenue</i> subsp. <i>majusculum</i> | • | | | | | | | | | |
| | <i>Stylidium udusicola</i> | • | • | | | | | | | | |
| | <i>Stylidium vinosum</i> | • | | • | | | | P1 | | | |
| Tamaricaceae | <i>Tamarix aphylla</i> | | | | | • | • | | | | Y |
| Thymelaceae | <i>Pimelea argentea</i> | | • | | | | | | | | |
| | <i>Pimelea suaveolens</i> | | • | | | | | | | | |
| | <i>Pimelea suaveolens</i> subsp. <i>suaveolens</i> | • | | | | | | | | | |
| | <i>Pimelea sylvestris</i> | • | • | | | | | | | | |
| Verbenaceae | <i>Lantana camara</i> | | | | | • | • | | | | Y |
| Xanthorrhoeaceae | <i>Chamaescilla corymbosa</i> | • | • | | | | | | | | |
| | <i>Chamaescilla versicolor</i> | • | • | | | | | | | | |
| | <i>Xanthorrhoea gracilis</i> | • | • | | | | | | | | |
| | <i>Xanthorrhoea preissii</i> | • | • | | | | | | | | |
| Zamiaceae | <i>Macrozamia fraseri</i> | • | | | | | | | | | |



Appendix F: Conservation Significant Flora Likelihood of Occurrence

| Taxon | Conservation Status | | | Habit and Habitat | Habitat within Study Area | Within Current Known Distribution | Distance to Nearest Record | Likelihood of Occurrence pre-survey | Likelihood of Occurrence post-survey |
|--|---------------------|----------|--------|---|---------------------------|-----------------------------------|----------------------------|-------------------------------------|--------------------------------------|
| | DBCA | EPBC Act | BC Act | | | | | | |
| <i>Drosera sewelliae</i> | P2 | | | Fibrous-rooted, rosetted perennial, herb, to 0.06 m high, to 0.025 m wide. Fl. orange, Oct. Laterite & silica sand soils. | Yes | Yes | Within | Confirmed | Confirmed |
| <i>Persoonia sulcata</i> | P4 | | | Erect, spreading to decumbent shrub, 0.2-1 m high. Fl. yellow, Sep to Nov. Lateritic or granitic soils. | Yes | Yes | 1.3 km E | Confirmed | Confirmed |
| <i>Synaphea grandis</i> | P4 | | | Tufted shrub, ca 0.3 m high. Fl. yellow, Oct to Nov. Laterite. | Yes | Yes | Within | Confirmed | Confirmed |
| <i>Oxymyrrhine coronata</i> | P4 | | | Erect, open shrub, 0.7-1.5 m high. Fl. pink/white. Brown/yellow gravel over laterite. Slopes, hilltops, flats. | Yes | Yes | 1.4 km N | Highly Likely | Possible |
| <i>Schoenus natans</i> | P4 | | | Aquatic annual, grass-like or herb (sedge), 0.3 m high. Fl. brown, Oct. Winter-wet depressions. | Yes | Yes | 0.6 km W | Highly Likely | Highly Likely |
| <i>Acacia browniana</i> var. <i>glaucescens</i> | P2 | | | Multi-stemmed shrub, 0.2-0.5 m high, spreading by subterranean runners. Fl. yellow, Aug. Lateritic gravelly soils. | Yes | Adjacent | 2.8 km ENE | Possible | Unlikely |
| <i>Acacia drummondii</i> subsp. <i>affinis</i> | P3 | | | Erect shrub, 0.3-1 m high. Fl. yellow, Jul to Aug. Lateritic gravelly soils. | Possible | Yes | 9.0 km W | Possible | Unlikely |
| <i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (R.J. Cumming 882) | P3 | | | Shrub, 0.3-1 m high. Fl. yellow, Jul to Sep. Sandy loam or sandy clay over laterite. Woodland. | Yes | Yes | 12.5 km W | Possible | Unlikely |
| <i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i> | P3 | | | Prostrate, mat-forming, non-lignotuberous shrub, to 0.3 m high. Fl. white-cream-pink-green/green, Jul or Sep to Dec or Jan. Grey sand, lateritic gravel. | Yes | Yes | 11.3 km NE | Possible | Unlikely |
| <i>Androcalva fragifolia</i> | P1 | | | Prostrate shrub 5cm high up to 3m wide, with hairy stems. Fl. White-pink, Oct to Feb. Laterite, loamy sand or sandy clay on flats, slopes, road verges. | Yes | No | 14.7 km NNE | Possible | Possible |
| <i>Calothamnus pachystachyus</i> | P4 | | | Erect, much-branched, often straggly shrub, (0.3-) 0.6-1.7 m high. Fl. red-brown-black, Aug to Oct. Lateritic soils, often gravelly. Ridges, road verges. | Yes | No | 16.7 km NNE | Possible | Unlikely |
| <i>Chorizema ulotropis</i> | P4 | | | Sprawling, open, semi-prostrate shrub, to 0.45 m high. Fl. orange-yellow, Jul to Sep. Moist to dry soils, white sand with gravel, laterite, granite. Outcrops, winter damp to dry areas, flats. | Yes | Adjacent | 13.7 km NE | Possible | Possible |
| <i>Conostylis caricina</i> subsp. <i>elachys</i> | P1 | | | Rhizomatous, tufted perennial, grass-like or herb, 0.05-0.1 m high. Fl. cream-yellow, Jul to Aug. Gravel, clayey loam, sand. | Yes | Adjacent | 11.2 km NNE | Possible | Possible |
| <i>Cyanicula ixioides</i> subsp. <i>ixioides</i> | P4 | | | Tuberous, perennial, herb, 0.05-0.15 m high. Fl. yellow, Aug to Oct. Laterite, gravel. | No | Yes | 3.2 km ENE | Possible | Possible |
| <i>Eleocharis keigheryi</i> | T | VU | VU | Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green, Aug to Nov. Clay, sandy loam. Emergent in freshwater: creeks, claypans. | Yes | Yes | 11.0 km N | Possible | Highly Unlikely |
| <i>Gastrolobium crispatum</i> | P1 | | | Tall shrub, to 2.5 m high. Fl. yellow&orange&red, Sep to Oct. Yellow or brown sandy loam, red laterite soils. Steep gullies, slopes, ridges, breakaways. | Yes | Adjacent | 5.1 km W | Possible | Unlikely |
| <i>Gastrolobium nudum</i> | P2 | | | Spreading, twiggly shrub, to 0.8 m high. Fl. orange&red, Feb. Red-brown clay, brown loam, gravel, laterite, granite. Flats, slopes, hilltops, ridges, valleys, breakaways. | Possible | Yes | 10.0 km SSE | Possible | Unlikely |
| <i>Grevillea bracteosa</i> subsp. <i>bracteosa</i> | | EN | | Spindly shrub, 1-2 m high. Fl. Green or pink, Aug to Oct. Hilltops, flats, slopes, laterite clay-loam soils. | Yes | Adjacent | 11.9 km NE | Possible | Unlikely |
| <i>Grevillea corrugata</i> | | VU | EN | Shrub, 1.5-2.5 m high. Fl. white, ? Aug to Sep. Gravelly loam. Roadsides. | Possible | Yes | 6.7 km W | Possible | Unlikely |
| <i>Grevillea curviloba</i> | | CR | EN | Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream, Aug to Oct. Grey sand, sandy loam. Winter-wet heath. | No | Yes | 14.1 km E | Possible | Highly Unlikely |
| <i>Hemigenia platyphylla</i> | P4 | | | Spreading shrub, 0.2-1.5 m high. Fl. blue-purple, Sep to Nov. Sandy & loamy soils. Granite rocks, slopes. | Yes | Adjacent | 18.1 km NNE | Possible | Unlikely |
| <i>Hibbertia miniata</i> | P4 | | | Decumbent or erect shrub, 0.1-1 m high. Fl. orange/orange-red, Aug to Nov. Lateritic gravelly soils. | Yes | Yes | 6.0 km E | Possible | Unlikely |
| <i>Hydrocotyle lemnoides</i> | P4 | | | Aquatic, floating annual, herb. Fl. purple, Aug to Oct. Swamps. | Yes | Yes | 11.1 km N | Possible | Highly Unlikely |
| <i>Johnsonia inconspicua</i> | P3 | | | Rhizomatous, tufted perennial, grass-like or herb, 0.1-0.3 m high, to 0.2 m wide. Fl. green-white/pink, Oct to Nov. White-grey or black sand. Low dunes, winter-wet flats. | Yes | Yes | 3.4 km N | Possible | Possible |
| <i>Lasiopetalum caroliae</i> | P3 | | | Low shrub, to 0.3 m high. Fl. pink/purple, Sep to Oct. Brown sandy loam clay over laterite. Slopes, drainage lines, hilltops, outcrops. | Yes | Yes | 4.8 km W | Possible | Confirmed |
| <i>Lechenaultia magnifica</i> | P1 | | | Erect perennial, herb or shrub (subshrub), to 0.6 m high. Fl. White or blue, November. Brown, grey, yellow or white sand, brown sandy loam, laterite. Slopes and flats. | Yes | Adjacent | 14.1 km NE | Possible | Unlikely |
| <i>Millotia tenuifolia</i> var. <i>laevis</i> | P2 | | | Ascending to erect annual, herb, 0.02-0.1 m high. Fl. yellow, Sep to Oct. Granite or laterite soils. | Yes | Yes | 10.7 km NW | Possible | Possible |
| <i>Schoenus capillifolius</i> | P3 | | | Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green, Oct to Nov. Brown mud. Claypans. | Yes | Yes | 11.6 km N | Possible | Possible |
| <i>Stylidium longitubum</i> | P4 | | | Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink, Oct to Dec. Sandy clay, clay. Seasonal wetlands. | Yes | Yes | 10.9 km N | Possible | Possible |
| <i>Stylidium vinosum</i> | P1 | | | Perennial herb, 0.08-0.2 m high. Fl. white with pink/red throat markings, Sept-Nov. Grey/white sands over laterite. Slopes, flats. | Possible | Yes | 3.5 km E | Possible | Possible |
| <i>Synaphea rangiferops</i> ^A | P2 | | | Shrub, ca 0.3 m high. Fl. yellow, Jul to Sep. Sandy loam, gravel. | No | Yes | 13.7 km NW | Possible | Possible |
| <i>Tetratea pilifera</i> | P3 | | | Spreading shrub, 0.1-0.3 m high. Fl. purple, Aug to Oct. Gravelly soils. | Yes | Yes | 3.4 km NE | Possible | Possible |
| <i>Thelymitra stellata</i> | | EN | EN | Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown, Oct to Nov. Sand, gravel, lateritic loam. | Possible | Yes | 8.3 km E | Possible | Possible |
| <i>Verticordia citrella</i> | P2 | | | Erect, slender shrub, 0.3-1 m high. Fl. yellow, Oct to Nov. Gravelly loam or sand. Low-lying damp areas, swamps. | Yes | Adjacent | 8.7 km SE | Possible | Possible |
| <i>Verticordia huegelii</i> var. <i>tridens</i> | P3 | | | Shrub, 0.15-0.6 m high. Fl. green-yellow/red, Sep to Nov. Sandy or gravelly loam. Winter-wet areas, low hills. | Yes | Yes | 14.6 km NNE | Possible | Unlikely |
| <i>Verticordia serrata</i> var. <i>linearis</i> ^A | P3 | | | Shrub, to 1 m high. Fl. other, Sep to Oct. White sand, gravel. Open woodland. | Possible | Yes | 13.7 km SW | Possible | Unlikely |
| <i>Acacia anomala</i> | | VU | VU | Slender, rush-like shrub, 0.2-0.5 m high. Fl. yellow, Aug to Sep. Lateritic soils. Slopes. | No | No | 14.1 km SW | Unlikely | Highly Unlikely |
| <i>Acacia chapmanii</i> subsp. <i>australis</i> | | EN | EN | Upright, compact, intricate shrub, 0.3-1 m high. Fl. yellow, Aug to Sep. Sandy clay or gravel, grey sand. Plains, swampy areas. | Yes | No | 21.1 km NE | Unlikely | Highly Unlikely |
| <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> | P4 | | | Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Fl. yellow, Aug to Nov or Nov to Dec. Granitic soils, occasionally on laterite. | Possible | No | 10.8 km S | Unlikely | Highly Unlikely |
| <i>Asterolasia grandiflora</i> | P4 | | | Slender open shrub, 0.2-0.6(-0.8) m high. Fl. pink/white, Jul to Oct. Lateritic soils, clay over granite. Breakaways, hills. | Possible | No | 13.5 km ENE | Unlikely | Highly Unlikely |

| Taxon | Conservation Status | | | Habit and Habitat | Habitat within Study Area | Within Current Known Distribution | Distance to Nearest Record | Likelihood of Occurrence pre-survey | Likelihood of Occurrence post-survey |
|---|---------------------|----------|--------|---|---------------------------|-----------------------------------|----------------------------|-------------------------------------|--------------------------------------|
| | DBCA | EPBC Act | BC Act | | | | | | |
| <i>Beaufortia eriocephala</i> (not originally identified in desktop assessment) | P3 | | | Erect, compact shrub, 0.3-0.6 m high. Fl. red, Sep to Nov. Lateritic sandy soils. Slopes. | No | Yes | 36 km E | Unlikely | Confirmed |
| <i>Boronia scabra</i> subsp. <i>condensata</i> [^] | P2 | | | Erect shrub, 0.25-0.7 m high. Fl. pink, Aug. Sandy clay or gravel. Upper slopes, edges of lateritic breakaways. | No | Yes | 27.1 km SE | Unlikely | Highly Unlikely |
| <i>Caladenia speciosa</i> | P4 | | | Tuberous, perennial, herb, 0.35-0.6 m high. Fl. white-pink, Sep to Oct. White, grey or black sand. | Possible | Yes | 22.3 km NE | Unlikely | Unlikely |
| <i>Calytrix oncophylla</i> [^] | P2 | | | Shrub, 0.4-0.8 m high. Fl. purple-blue, Sep to Nov. Stony loam. Lateritic breakaways. | No | No | 17.8 km SE | Unlikely | Highly Unlikely |
| <i>Comesperma rhadinocarpum</i> | P3 | | | Perennial, herb 15 - 40cm high. Narrow-fruited. Fl. blue, Oct to Nov. Sandy, lateritic soils. | Possible | Yes | 21.5 km NE | Unlikely | Unlikely |
| <i>Conospermum densiflorum</i> subsp. <i>unicephalum</i> | | EN | EN | Erect, much-branched shrub, 0.3-0.6 m high, inflorescence a spike. Fl. cream/white & blue, Sep to Nov. Clay soils. Low-lying areas. | Yes | No | 33.3 km N | Unlikely | Confirmed |
| <i>Darwinia carnea</i> | | CR | EN | Spreading shrub, 0.2-0.45 m high. Fl. green & red, Oct to Dec. Lateritic loam & gravel. | Yes | Yes | 27.5 km NNW | Unlikely | Highly Unlikely |
| <i>Daviesia debilior</i> subsp. <i>sinuans</i> [^] | P3 | | | Straggling shrub, to 0.8 m high. Fl. yellow & red/purple, May to Jul. Gravelly lateritic clay. | Yes | No | 17.1 km NNE | Unlikely | Highly Unlikely |
| <i>Diplolaena andrewsii</i> | | EN | EN | Erect shrub, 0.5-1 m high. Fl. red, Jul to Oct. Loam, clay. Granite outcrops & hillsides. | Possible | No | 18.1 km SSW | Unlikely | Highly Unlikely |
| <i>Eryngium pinnatifidum</i> subsp. <i>Umbraphilum</i> (G.J. Keighery 13967) | P2 | | | Tuberous herb, to 0.05 m high, to 0.15 m wide. Fl. white/blue. Brown or grey sandy clay. Winter wet flats. | No | No | 11.6 km WSW | Unlikely | Unlikely |
| <i>Goodenia arthrotricha</i> | | EN | EN | Erect perennial, herb, to 0.4 m high. Fl. blue, Oct to Nov. Gravel. Granite rocks, slopes. | Possible | No | 18.0 km NW | Unlikely | Unlikely |
| <i>Grevillea candolleana</i> | P2 | | | Spreading shrub, 0.2-0.8 m high. Fl. white-cream, Aug to Sep. Laterite, lateritic loam. Hillsides. | Possible | Adjacent | 8.5 km S | Unlikely | Highly Unlikely |
| <i>Grevillea drummondii</i> | P4 | | | Spreading to erect shrub, 0.2-2(-2.5) m high. Fl. cream & yellow & red, Jun to Sep. Lateritic soils (sandy clay, gravel, loam, sand), sand over granite. Rocky hillsides, boulders, granite outcrops. | Yes | No | 13.4 km NE | Unlikely | Highly Unlikely |
| <i>Grevillea</i> sp. Toodyay West (F. Hort et al. 3296) | P2 | | | Erect branching shrub to 1m high. Fl. cream, Aug to Sept. Rocky loam, clay over granite on hillsides, gullies, breakaways, drainage lines. | No | No | 14.8 km ENE | Unlikely | Highly Unlikely |
| <i>Hibbertia glomerata</i> subsp. <i>ginginensis</i> | P2 | | | Erect shrub, to 0.5 m high. Fl. yellow, Jul to Sep. Sand, brown clay, laterite. Near roadsides. | No | No | 13.5 km SW | Unlikely | Highly Unlikely |
| <i>Hypocalymma sylvestre</i> | | EN | EN | Spreading shrub, 0.6 m high. Fl. yellow, Aug. Yellow-brown sandy loam. Woodland on lateritic hilltop. | Possible | Adjacent | 6.1 km W | Unlikely | Highly Unlikely |
| <i>Hypolaena robusta</i> [^] | P4 | | | Dioecious rhizomatous, perennial, herb, ca 0.5 m high. Fl. Sep to Oct. White sand. Sandplains. | No | No | 19.4 km W | Unlikely | Unlikely |
| <i>Lasiopetalum decoratum</i> | P2 | | | Erect shrub to 1.5m tall. Fl. pink, Oct to Dec. Brown loam/clay/sand with laterite on hillslopes, gully, hilltop breakaway | Possible | No | 17.6 km ENE | Unlikely | Highly Unlikely |
| <i>Platysace ramosissima</i> | P3 | | | Perennial, herb, to 0.3 m high. Fl. white-cream, Oct to Nov. Sandy soils. | Possible | Yes | 23.0 km NE | Unlikely | Unlikely |
| <i>Schoenus</i> sp. Toodyay (G.J. Keighery & N. Gibson 2918) | P1 | | | Small annual, herb. Brown loam over gravel. Flat upland areas. | Possible | No | 14.2 km SSE | Unlikely | Unlikely |
| <i>Stylidium cymiferum</i> | P3 | | | Rosetted perennial, herb, 0.12-0.35 m high. Fl. yellow, Oct to Nov. Brown loam over laterite. Uplands, Wandoo woodland. | Yes | No | 12.6 km NE | Unlikely | Unlikely |
| <i>Stylidium squamellosum</i> [^] | P2 | | | Caespitose perennial, herb, 0.12-0.35 m high. Fl. yellow, Oct to Nov. Brown to red-brown clay loam. Winter-wet habitats and depressions, open woodland, shrubland. | No | No | 19.3 km W | Unlikely | Unlikely |
| <i>Styphelia brevicuspis</i> | P2 | | | Erect and spreading shrub to 2m tall. Fl. white, Jan, May, June. Clay loam with gravel in gullies, slopes, drainage lines, breakaways. | Possible | No | 14.1 km ENE | Unlikely | Highly Unlikely |
| <i>Synaphea panhesya</i> | P1 | | | Erect shrub, 0.3-0.6 m high. Fl. yellow, Aug to Sep. Gravelly loam & sandy gravel. | Yes | No | 11.5 km NE | Unlikely | Highly Unlikely |
| <i>Tetratheca spartea</i> | P2 | | | Leafless multi-stemmed shrub to 30cm tall. Fl. Pink/magenta/mauve, Aug, Sept, Nov. Clay-loam with lateritic gravel in gullies, lateritic breakaways, slopes. | Possible | No | 17.1 km NE | Unlikely | Unlikely |
| <i>Thysanotus</i> sp. Badgingarra (E.A. Griffin 2511) | P2 | | | Perennial, herb (with tuberous roots), ca 0.35 m high. Fl. blue, Dec. Grey sand with lateritic gravel. | No | No | 9.0 km W | Unlikely | Unlikely |
| <i>Trithuria australis</i> | P4 | | | Small aquatic herb. Fl. red-purple, Oct to Nov. Grey/black silty clay. Edge of wetland, seasonal wet clay flats, swamps. | Possible | Yes | 21.1 km NE | Unlikely | Highly Unlikely |
| <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> [^] | P4 | | | Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan. Sand, sandy clay. Winter-wet depressions. | No | No | 19.8 km W | Unlikely | Highly Unlikely |
| <i>Acacia campylophylla</i> | P3 | | | Dense, rigid, spreading shrub, 0.1-0.6 m high. Fl. yellow, Jul to Aug. Lateritic gravelly soils. | Possible | No | 21.8 km NE | Highly Unlikely | Highly Unlikely |
| <i>Banksia nivea</i> subsp. <i>Morangup</i> (M. Pieroni 94/2) [^] | P2 | | | Non-lignotuberous shrub, 0.15-1.5 m high. Fl. cream-yellow-orange-pink/red-brown, Apr. Dry-wet laterite with loam-clay-gravel. | Possible | No | 21.7 km SSE | Highly Unlikely | Highly Unlikely |
| <i>Banksia serratuloides</i> subsp. <i>serratuloides</i> [^] | T | | | Low, bushy, lignotuberous shrub, 0.3-1 m high. Fl. yellow, Jul to Sep. Loam or clay loam over laterite, sandy gravel. | Possible | No | 38.2 km N | Highly Unlikely | Highly Unlikely |
| <i>Caladenia integra</i> [^] | P4 | | | Tuberous, perennial, herb, 0.2-0.5 m high. Fl. green & red, Sep to Oct. Clayey loam. Granite outcrops, rocky slopes. | No | No | 27.1 km SE | Highly Unlikely | Highly Unlikely |
| <i>Eucalyptus loxophleba</i> x <i>wandoo</i> | P4 | | | (Mallee) or tree, 4-20 m high, bark rough black-brown on trunk. Sandy clay or loam. | Possible | No | 21.4 km NE | Highly Unlikely | Highly Unlikely |
| <i>Melaleuca sciotostyla</i> | | EN | EN | Spreading shrub, 0.6-1.5 m high. Fl. Aug. Orange clayey sand with lateritic pebbles. Scree slopes. | No | No | 42.6 km N | Highly Unlikely | Highly Unlikely |
| <i>Stylidium sacculatum</i> | P3 | | | Creeping perennial, herb, 0.05-0.15 m high. Fl. white-pink, Oct to Nov. Clayey sand or sand. Lower slopes and flats. Open Wandoo or Marri woodland, Allocasuarina shrubland. | Possible | No | 21.5 km NE | Highly Unlikely | Highly Unlikely |
| <i>Thelymitra dedmaniarum</i> | | CR | EN | Tuberous, perennial, herb, to 0.8 m high. Fl. yellow, Nov to Dec or Jan. Granite. | Possible | No | 26.0 km SSW | Highly Unlikely | Highly Unlikely |
| <i>Tricoryne</i> sp. Wongan Hills (B.H. Smith 794) | P2 | | | Multi-stemmed, open, caespitose rhizomatous, perennial, herb, to 0.2 m high. Yellow to grey sand, gravelly clay quartz, laterite, limestone. Midslopes and uplands. | Possible | No | 21.5 km NE | Highly Unlikely | Highly Unlikely |
| <i>Verticordia paludosa</i> [^] | P4 | | | Erect shrub, 0.3-0.9 m high. Fl. pink-white, Jan to May. White/grey sand. Winter-wet flats. | No | No | 35.8 km NW | Highly Unlikely | Highly Unlikely |

Appendix G: Introduced Flora Database Search Results

| Family | Taxon | Source | | | | DP | WoNS | Ecological Impact | Invasiveness |
|--------------|---|-----------|-----|------|------|-----|------|-------------------|--------------|
| | | NatureMap | ALA | EPBC | WAOL | | | | |
| Alismataceae | <i>Sagittaria platyphylla</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| Apiaceae | <i>Coriandrum sativum</i> | • | • | | | No | No | Not assessed | Not assessed |
| Apocynaceae | <i>Calotropis procera</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Cryptostegia madagascariensis</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Gomphocarpus fruticosus</i> | | | | • | Yes | No | Unknown | Rapid |
| Araceae | <i>Pistia stratiotes</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Zantedeschia aethiopica</i> | | | | • | Yes | No | High | Moderate |
| Araliaceae | <i>Hydrocotyle ranunculoides</i> | | | | • | Yes | No | Not assessed | Not assessed |
| Asparagaceae | <i>Asparagus asparagoides</i> | | | • | • | Yes | Yes | High | Rapid |
| Asteraceae | <i>Chondrilla juncea</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Chrysanthemoides monilifera</i> | | | • | | No | No | Not assessed | Not assessed |
| | <i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> | | | • | | No | Yes | Not assessed | Not assessed |
| | <i>Hypochaeris glabra</i> | • | • | | | No | No | Medium | Rapid |
| | <i>Onopordum acaulon</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Silybum marianum</i> | | | | • | Yes | No | Unknown | Moderate |
| | <i>Ursinia anthemoides</i> | • | • | | | No | No | Unknown | Rapid |
| | <i>Ursinia anthemoides</i> subsp. <i>anthemoides</i> | • | | | | No | No | Unknown | Rapid |
| | <i>Xanthium spinosum</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Xanthium strumarium</i> | | | | • | Yes | No | Not assessed | Not assessed |
| Boraginaceae | <i>Echium plantagineum</i> | | | | • | Yes | No | Low | Moderate |
| Cactaceae | <i>Austrocylindropuntia cylindrica</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Austrocylindropuntia subulata</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Cylindropuntia fulgida</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Cylindropuntia imbricata</i> | | | | • | Yes | Yes | Not assessed | Not assessed |

| Family | Taxon | Source | | | | DP | WoNS | Ecological Impact | Invasiveness |
|---------------|---|-----------|-----|------|------|-----|------|-------------------|--------------|
| | | NatureMap | ALA | EPBC | WAOL | | | | |
| | <i>Cylindropuntia kleiniae</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Cylindropuntia pallida</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Cylindropuntia tunicata</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia elata</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia elatior</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia engelmannii</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia ficus-indica</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia microdasys</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia monacantha</i> | | | | • | Yes | Yes | Low | Slow |
| | <i>Opuntia polyacantha</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia puberula</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Opuntia stricta</i> | | | | • | Yes | Yes | Low | Slow |
| | <i>Opuntia tomentosa</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| Campanulaceae | <i>Monopsis debilis</i> | | • | | | No | No | Low | Rapid |
| Cyperaceae | <i>Isolepis levynsiana</i> | | • | | | No | No | Not assessed | Not assessed |
| Dicranaceae | <i>Campylopus introflexus</i> | • | | | | No | No | Not assessed | Not assessed |
| Euphorbiaceae | <i>Jatropha gossypifolia</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| Fabaceae | <i>Alhagi maurorum</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Genista</i> sp. X <i>Genista monspessulana</i> | | | • | | No | Yes | Not assessed | Not assessed |
| | <i>Parkinsonia aculeata</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Prosopis glandulosa</i> x <i>velutina</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Senna alata</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Senna obtusifolia</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Ulex europaeus</i> | | | | • | Yes | Yes | High | Moderate |
| | <i>Vicia benghalensis</i> | • | • | | | No | No | Unknown | Slow |

| Family | Taxon | Source | | | | DP | WoNS | Ecological Impact | Invasiveness |
|---------------|---|-----------|-----|------|------|-----|------|-------------------|--------------|
| | | NatureMap | ALA | EPBC | WAOL | | | | |
| Gentianaceae | <i>Cicendia filiformis</i> | | • | | | No | No | Low | Rapid |
| Iridaceae | <i>Gladiolus caryophyllaceus</i> | • | • | | | No | No | Not assessed | Not assessed |
| | <i>Moraea flaccida</i> | | | | • | Yes | No | High | Moderate |
| | <i>Moraea miniata</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Romulea rosea</i> | • | • | | | No | No | Not assessed | Not assessed |
| Juncaceae | <i>Juncus bufonius</i> | | • | | | No | No | Low | Rapid |
| | <i>Juncus capitatus</i> | | • | | | No | No | Low | Rapid |
| Orchidaceae | <i>Disa bracteata</i> | • | • | | | No | No | Unknown | Rapid |
| Orobanchaceae | <i>Bellardia trixago</i> | • | • | | | No | No | Not assessed | Not assessed |
| | <i>Parentucellia latifolia</i> | • | • | | | No | No | Unknown | Rapid |
| Pinaceae | <i>Pinus radiata</i> | | | • | | No | No | High | Rapid |
| Poaceae | <i>Aira caryophyllea</i> | • | • | | | No | No | Unknown | Rapid |
| | <i>Aira cupaniana</i> | • | • | | | No | No | Unknown | Rapid |
| | <i>Avellinia michelii</i> | • | • | | | No | No | Unknown | Unknown |
| | <i>Brachypodium distachyon</i> | • | • | | | No | No | Unknown | Unknown |
| | <i>Briza maxima</i> | • | • | | | No | No | Unknown | Rapid |
| | <i>Briza minor</i> | • | • | | | No | No | Unknown | Rapid |
| | <i>Pentameris airoides</i> | | • | | | No | No | Unknown | Unknown |
| | <i>Pentameris airoides</i> subsp. <i>airoides</i> | • | | | | No | No | Unknown | Unknown |
| | <i>Polypogon monspeliensis</i> | | • | | | No | No | Medium | Unknown |
| Primulaceae | <i>Lysimachia arvensis</i> | | • | | | No | No | Not assessed | Not assessed |
| Rhamnaceae | <i>Ziziphus mauritiana</i> | | | | • | Yes | No | Not assessed | Not assessed |
| Rosaceae | <i>Rubus anglocandicans</i> | | | | • | Yes | Yes | High | Moderate |
| | <i>Rubus fruticosus</i> aggregate | | | • | | Yes | Yes | High | Moderate |
| | <i>Rubus laudatus</i> | | | | • | No | No | Not assessed | Not assessed |

| Family | Taxon | Source | | | | DP | WoNS | Ecological Impact | Invasiveness |
|------------------|-------------------------------|-----------|-----|------|------|-----|------|-------------------|--------------|
| | | NatureMap | ALA | EPBC | WAOL | | | | |
| | <i>Rubus rugosus</i> | | | | • | No | No | Not assessed | Not assessed |
| | <i>Rubus ulmifolius</i> | | | | • | Yes | Yes | High | Moderate |
| Rubiaceae | <i>Galium aparine</i> | | | | • | Yes | No | Not assessed | Not assessed |
| | <i>Galium murale</i> | • | • | | | No | No | Low | Unknown |
| | <i>Galium spurium</i> | | | | • | Yes | No | Not assessed | Not assessed |
| Salviniaceae | <i>Salvinia molesta</i> | | | • | | No | Yes | Not assessed | Not assessed |
| Scrophulariaceae | <i>Phyllopodium cordatum</i> | • | • | | | No | No | Not assessed | Not assessed |
| Solanaceae | <i>Lycium ferocissimum</i> | | | • | | No | Yes | High | Moderate |
| | <i>Solanum elaeagnifolium</i> | | | | • | Yes | Yes | Not assessed | Not assessed |
| | <i>Solanum linnaeanum</i> | | | | • | Yes | No | Medium | Moderate |
| Tamaricaceae | <i>Tamarix aphylla</i> | | | • | • | Yes | Yes | Not assessed | Not assessed |
| Verbenaceae | <i>Lantana camara</i> | | | • | • | Yes | Yes | Not assessed | Not assessed |



Appendix H: Flora Composition

42 Zamiaceae

Macrozamia riedlei

115 Orchidaceae

Eriochilus dilatatus
Leporella fimbriata
Pyrorchis nigricans

124 Iridaceae

Orthrosanthus laxus var. *gramineus*
Orthrosanthus laxus var. *laxus*
Patersonia occidentalis
Patersonia sp. Indet

126 Xanthorrhoeaceae

Xanthorrhoea gracilis
Xanthorrhoea preissii

128 Asparagaceae

Laxmannia ?squarrosa
Laxmannia squarrosa
Lomandra ?effusa
Lomandra ?caespitosa
Lomandra caespitosa
Lomandra hermaphrodita
Lomandra sericea
Lomandra sp. Indet
Lomandra spartea

130 Hemerocallidaceae

Johnsonia pubescens

138 Haemodoraceae

Conostylis ?setigera
Conostylis aculeata
Conostylis setigera subsp. *setigera*
Haemodorum sp. Indet

156 Cyperaceae

Lepidosperma aff. *drummondii*
Lepidosperma pubisquameum
Lepidosperma sp. Indet
Lepidosperma tenue

159 Restionaceae

Desmocladius ?asper
Desmocladius asper
Lepidobolus preissianus

163 Poaceae

* *Aira caryophyllea*
Neurachne alopecuroidea

175 Proteaceae

Adenanthos cygnorum subsp. *cygnorum*
Banksia bipinnatifida subsp. *bipinnatifida*
Banksia dallanneyi subsp. *sylvestris*
Banksia fraseri var. *fraseri*
Banksia grandis
Banksia sessilis
Banksia sphaerocarpa var. ?*pumilio*
Banksia sphaerocarpa var. *pumilio*
Banksia squarrosa subsp. *squarrosa*
Conospermum densiflorum subsp. *unicephalum* (T)
 ?*Grevillea* sp. Indet
Grevillea bipinnatifida subsp. *bipinnatifida*
Grevillea pilulifera
Grevillea synapheae subsp. *synapheae*
Hakea incrassata
Hakea lissocarpa
Hakea prostrata
Hakea trifurcata
Hakea undulata
Hakea varia
Persoonia angustiflora
Persoonia elliptica
Petrophile striata
Stirlingia latifolia
Synaphea decorticans
Synaphea sp. Indet
Synaphea sp. Udumung (A.S. George 17058)

181 Dilleniaceae

Hibbertia ?semipilosa
Hibbertia commutata
Hibbertia hibbertioides var. *hibbertioides*
Hibbertia huegelii
Hibbertia hypericoides subsp. *hypericoides*
Hibbertia lasiopus
Hibbertia semipilosa

201 Fabaceae

?*Fabaceae* sp. Indet
Acacia celastrifolia
Acacia drummondii subsp. *drummondii*
Acacia drummondii subsp. *elegans*
Acacia lasiocarpa var. *sedifolia*
Acacia pulchella
Acacia saligna
Acacia sp. Indet
Bossiaea aquifolium subsp. *aquifolium*
Bossiaea eriocarpa
Bossiaea ornata
Daviesia angulata
Daviesia preissii
Daviesia sp. Indet
Gastrolobium calycinum
Gompholobium knightianum
Gompholobium marginatum

Jacksonia furcellata
Jacksonia sternbergiana
Kennedia prostrata

203 Polygalaceae

Comesperma calymega

208 Rhamnaceae

Trymalium odoratissimum subsp. *odoratissimum*

217 Casuarinaceae

Allocasuarina huegeliana
Allocasuarina humilis

247 Phyllanthaceae

Phyllanthus calycinus

281 Myrtaceae

Babingtonia camphorosmae
Beaufortia eriocephala (P3)
Calothamnus lateralis
Calothamnus quadrifidus subsp. *quadrifidus*
Calytrix ?angulata
Calytrix sp. Indet 1
Calytrix sp. Indet 2
Calytrix sp. Indet 3
Corymbia calophylla
Eucalyptus accedens
Eucalyptus drummondii
Eucalyptus marginata
Eucalyptus wandoo
Hypocalymma angustifolium
Hypocalymma sp. Indet
Kunzea praestans
Leptospermum erubescens
Melaleuca incana
Melaleuca trichophylla
Verticordia densiflora var. *cespitosa*
Verticordia sp. Indet

309 Malvaceae

Lasiopetalum caroliae
 Malvaceae sp. Indet

311 Thymelaeaceae

Pimelea argentea
Pimelea sp. indet

336 Olacaceae

Olax scalariformis

339 Loranthaceae

Amyema miquelii

Nuytsia floribunda

346 Droseraceae

Drosera ?sewelliae (P2)
Drosera erythrorhiza
Drosera sewelliae (P2)

403 Ericaceae

Leucopogon pulchellus
Leucopogon sp. Newdegate (M. Hislop 3585)
Styphelia epacridis
Styphelia macrocalyx
Styphelia oblongifolia
Styphelia pallida
Styphelia propinqua
Styphelia retrorsa
Styphelia tenuiflora

417 Solanaceae

* *Solanum nigrum*

432 Lamiaceae

Hemigenia wandooana

452 Stylidiaceae

Stylidium ?brunonianum
Stylidium diuroides
Stylidium eriopodum
Stylidium hispidum
Stylidium sp. Indet

458 Goodeniaceae

Lechenaultia ?biloba

460 Asteraceae

* *Ursinia anthemoides*

Appendix I: Coordinates for threatened and priority flora recorded in the Study Area

| Date | Species | Abundance | Latitude | Longitude |
|------------|--|-----------|--------------|-------------|
| 22/04/2021 | <i>Beaufortia eriocephala</i> | 1 | -31.492563 | 116.2118025 |
| 20/04/2021 | <i>Conospermum densiflorum</i> subsp. <i>unicephalatum</i> | 10 | -31.4951593 | 116.2345388 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.4564454 | 116.2505179 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 30 | -31.4565491 | 116.2326993 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 10 | -31.4637912 | 116.244132 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 2 | -31.4657556 | 116.2482689 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4658947 | 116.2501347 |
| 13/05/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.46748124 | 116.2387535 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.4704869 | 116.2237645 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4747317 | 116.2209516 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 0 | -31.4731772 | 116.2184898 |
| 13/05/2021 | <i>Drosera ?sewelliae</i> | 50 | -31.4752249 | 116.2157149 |
| 13/05/2021 | <i>Drosera ?sewelliae</i> | 25 | -31.4798179 | 116.2202231 |
| 20/04/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.484622 | 116.2340474 |
| 20/04/2021 | <i>Drosera ?sewelliae</i> | 5 | -31.495176 | 116.2345437 |
| 21/04/2021 | <i>Drosera ?sewelliae</i> | 50 | -31.507694 | 116.2249702 |
| 13/05/2021 | <i>Drosera ?sewelliae</i> | 30 | -31.486221 | 116.2294185 |
| 20/04/2021 | <i>Drosera ?sewelliae</i> | 50 | -31.4842306 | 116.2351272 |
| 21/04/2021 | <i>Drosera ?sewelliae</i> | 8 | -31.498202 | 116.2132615 |
| 21/04/2021 | <i>Drosera ?sewelliae</i> | 16 | -31.49032599 | 116.2197015 |
| 21/04/2021 | <i>Drosera ?sewelliae</i> | 15 | -31.46645932 | 116.2213295 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.49154489 | 116.2110576 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.49134938 | 116.2116585 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.49529643 | 116.2183992 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 9 | -31.4403218 | 116.2650815 |
| 13/05/2021 | <i>Drosera ?sewelliae</i> | 12 | -31.4629249 | 116.2333743 |
| 13/05/2021 | <i>Drosera ?sewelliae</i> | 200 | -31.4868082 | 116.2293833 |
| 20/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4818186 | 116.2322672 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4484087 | 116.2363142 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 40 | -31.4513891 | 116.240539 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 30 | -31.4522219 | 116.2422607 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 60 | -31.47362798 | 116.2184921 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 90 | -31.46865938 | 116.2458615 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.47384227 | 116.21902 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 40 | -31.4510657 | 116.2402124 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 1 | -31.450962 | 116.2400288 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 30 | -31.4478125 | 116.2351814 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4490652 | 116.2334492 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4513873 | 116.2407978 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 10 | -31.4521452 | 116.2422342 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 45 | -31.4521133 | 116.242339 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 70 | -31.47119266 | 116.2217321 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 65 | -31.47253503 | 116.225267 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.47255537 | 116.2252976 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 50 | -31.47267553 | 116.2253569 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 50 | -31.47295029 | 116.2253545 |
| 22/04/2021 | <i>Drosera ?sewelliae</i> | 40 | -31.45668665 | 116.2373198 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 15 | -31.4596598 | 116.2532145 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 3 | -31.4639855 | 116.2502204 |

| Date | Species | Abundance | Latitude | Longitude |
|-----------|------------------------------|-----------|-------------|-------------|
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 50 | -31.4611156 | 116.2400472 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 30 | -31.4610877 | 116.2398285 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4609386 | 116.2393381 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 6 | -31.4606509 | 116.2404001 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 20 | -31.4610173 | 116.2406688 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 10 | -31.4614942 | 116.243603 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 60 | -31.4606657 | 116.2394905 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 15 | -31.460595 | 116.2395061 |
| 7/05/2021 | <i>Drosera ?sewelliae</i> | 3 | -31.4604971 | 116.2403936 |
| 7/05/2021 | <i>Lasiopetalum caroliae</i> | 1 | -31.4610941 | 116.2550604 |
| 7/05/2021 | <i>Lasiopetalum caroliae</i> | 1 | -31.4620756 | 116.2522171 |



Appendix J: Sample Site Data

Julimar Project

SiteBAU-03

Date 7/05/2021

Described by SC & CW

Type R

Location MGA Zone 50
430298 mE; 6521373 mN
116.2664 E -31.440251 S

Veg Condition Excellent

Soil Sandy Loam

Rock Type Laterite

Fire Age 1-3 yrs,3-5 yrs

Habitat Undulating Low Hills

Vegetation Open *Eucalyptus marginata* woodland with scattered *Corymbia calophylla* over tall open shrubland of *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* over open low shrubland of *Hibbertia hypericoides* subsp. *hypericoides*, *Hibbertia huegelii*, and *Grevillea synapheae* subsp. *synapheae*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | HAR36-03 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | BAU03-01 |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCopp02 |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

SiteBAU-04

Date 7/05/2021
Described by SC & DR
Type R
Location MGA Zone 50
430041 mE; 6521189 mN
116.2637 E -31.441896 S
Veg Condition Excellent
Soil Sandy Clay Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Drainage Area/ Floodplain
Vegetation Mid *Eucalyptus wandoo* forest over tall *Banksia squarrosa* subsp. *squarrosa* shrubland over mid open *Leptospermum erubescens* and *Xanthorrhoea preissii* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Lepidobolus preissianus</i> | | | | BAU04-01 |
| <i>Leptospermum erubescens</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-01

Date 22/04/2021
Described by SC & HE
Type R
Location MGA Zone 50
427322 mE; 6520518 mN
116.2351 E -31.447776 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age >10 yrs
Habitat Undulating Low Hills
Vegetation Mid *Eucalyptus marginata* and *Corymbia calophylla* forest over tall open *Banksia squarrosa* subsp. *squarrosa* shrubland over mid open *Xanthorrhoea preissii* shrubland over low open *Hibbertia hypericoides* subsp. *hypericoides* and *Styphelia retrorsa* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-03

Date 22/04/2021

Described by SC & HE

Type R

Location MGA Zone 50
427104 mE; 6520262 mN
116.2327 E -31.450079 S

Veg Condition Excellent

Soil Sandy Clay Loam

Rock Type Laterite

Fire Age >10 yrs

Habitat Drainage Area/ Floodplain

Vegetation Mid scattered *Corymbia calophylla* trees over tall scattered *Hakea undulata* and *Adenanthos cygnorum* subsp. *cygnorum* shrubs over mid closed *Gastrolobium calycinum* and *Leptospermum erubescens* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Allocasuarina humilis</i> | | | | CWSCOPP06 |
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> | | | | HAR67-01 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia angulata</i> | | | | CWSCOPP04 |
| <i>Gastrolobium calycinum</i> | | | | HAR37-05 |
| <i>Hakea prostrata</i> | | | | |
| <i>Hakea undulata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Johnsonia pubescens</i> | | | | |
| <i>Leptospermum erubescens</i> | | | | |



Julimar Project

Site HAR-05

Date 7/05/2021
Described by EEB & CW
Type R
Location MGA Zone 50
428785 mE; 6519566 mN
116.2504 E -31.456463 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation *Eucalyptus marginata* and *Corymbia calophylla* open woodland over *Xanthorrhoea preissii*, *Macrozamia riedlei* and *Banksia squarrosa* subsp. *squarrosa* tall open shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Hibbertia ?semipilosa*, and *Phyllanthus calycinus* low open shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia grandis</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | CWSCOPP01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Gompholobium marginatum</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCOPP02 |
| <i>Hibbertia ?semipilosa</i> | | | | HAR70-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lomandra hermaphrodita</i> | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-06

Date 7/05/2021

Described by EEB & CW

Type R

Location MGA Zone 50
 429181 mE; 6519183 mN
 116.2545 E -31.459935 S

Veg Condition Excellent

Soil Sandy Clay Loam

Rock Type Laterite

Fire Age >10 yrs

Habitat Minor Drainage Line

Vegetation *Eucalyptus accedens* low open woodland over *Acacia celastrifolia* tall shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Xanthorrhoea gracilis* and *Hakea lissocarpha* low open shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|--------------|----------------|---------------|-----------------------|
| <i>Acacia celastrifolia</i> | | | | HAR06-01 |
| <i>Acacia drummondii</i> subsp. <i>elegans</i> | | | | EBCWOPP01 |
| <i>Eucalyptus accedens</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea gracilis</i> | | | | |



Julimar Project

Site HAR-07

Date 7/05/2021
Described by EEB & CW
Type R
Location MGA Zone 50
429225 mE; 6519051 mN
116.2550 E -31.461130 S
Veg Condition Excellent
Soil Clay Loam
Rock Type Laterite, Quartz
Fire Age 1-3 yrs, 3-5 yrs
Habitat Hillslope
Vegetation Open *Eucalyptus accedens* woodland over *Xanthorrhoea preissii*, *Macrozamia riedlei* scattered shrubs over low open shrubland of *Bossiaea eriocarpa*, *Hakea lissocarpha* and *Banksia bipinnatifida* subsp. *bipinnatifida*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Acacia drummondii</i> subsp. <i>elegans</i> | | | | EBCWOPP01 |
| <i>Acacia lasiocarpa</i> var. <i>sedifolia</i> | | | | HAR07-03 |
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | HAR07-02 |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Eucalyptus accedens</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Lasiopetalum caroliae</i> | | | | HAR07-04 |
| <i>Lomandra ?effusa</i> | | | | HAR07-05 |
| <i>Lomandra spartea</i> | | | | HAR07-01 |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-08

Date 7/05/2021
Described by EEB & CW
Type R
Location MGA Zone 50
428962 mE; 6518947 mN
116.2522 E -31.462058 S
Veg Condition Excellent
Soil Sandy Clay Loam
Rock Type Granite, Laterite
Fire Age 3-5 yrs
Habitat Hillslope
Vegetation *Eucalyptus wandoo* and *Eucalyptus accedens* mid to low open woodland over *Acacia lasiocarpa* var. *sedifolia* low open shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| ? <i>Grevillea</i> sp. Indet | | | | HAR08-01 |
| <i>Acacia lasiocarpa</i> var. <i>sedifolia</i> | | | | HAR07-03 |
| <i>Eucalyptus accedens</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Lasiopetalum caroliae</i> | | | | HAR07-04 |



Julimar Project

Site HAR-10

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
427567 mE; 6519563 mN
116.2376 E -31.456414 S

Veg Condition Very Good

Soil Sandy Loam

Rock Type Laterite

Fire Age 3-5 yrs, 5-10 yrs

Habitat Undulating Low Hills

Vegetation Mid to low *Eucalyptus marginata* and *Corymbia calophylla* woodland over *Adenanthos cygnorum* subsp. *cygnorum* and *Xanthorrhoea preissii* shrubland over low *Daviesia preissii* and *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia grandis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia preissii</i> | | | | HAR52-01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Petrophile striata</i> | | | | |
| <i>Stylidium diuroides</i> | | | | HAR59-01 |
| <i>Synaphea</i> sp. Indet | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-11

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50

427102 mE; 6519541 mN

116.2327 E -31.456582 S

Veg Condition Very Good

Soil Sandy Loam

Rock Type Laterite

Fire Age 3-5 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* and *Corymbia calophylla* low open woodland over *Banksia sessilis* and *Xanthorrhoea preissii* mid to tall open shrubland over *Hibbertia hypericoides* subsp. *hypericoides* and *Styphelia retrorsa* low shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera</i> ? <i>sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpa</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Lepidosperma pubisquameum</i> | | | | HAR11-02 |
| <i>Stylidium diuroides</i> | | | | HAR59-01 |
| <i>Styphelia epacridis</i> | | | | HAR11-01 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Synaphea</i> sp. Indet | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-12

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
426537 mE; 6519509 mN
116.2267 E -31.456835 S

Veg Condition Excellent

Soil Loamy Sand

Rock Type Laterite

Fire Age 5-10 yrs, >10 yrs

Habitat Undulating Low Hills

Vegetation Mid to low *Eucalyptus marginata* and *Corymbia calophylla* woodland over tall to mid *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | HAR62-01 |
| <i>Hakea prostrata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia semipilosa</i> | | | | |
| <i>Jacksonia sternbergiana</i> | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR61-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-13

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
426471 mE; 6518844 mN
116.2260 E -31.462832 S

Veg Condition Very Good

Soil Loam

Rock Type Laterite

Fire Age 1-3 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* and *Corymbia calophylla* low open woodland over *Xanthorrhoea preissii* mid to tall shrubs over *Hibbertia hypericoides* subsp. *hypericoides* and *Banksia dallanneyi* subsp. *sylvestris* low shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | |
| <i>Patersonia</i> sp. Indet | | | | |
| <i>Synaphea</i> sp. Indet | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-14

Date 13/05/2021
Described by CW & HE
Type R
Location MGA Zone 50
427155 mE; 6518850 mN
116.2332 E -31.462820 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation Open *Eucalyptus marginata* and *Corymbia calophylla* mid woodland over tall open shrubland of *Banksia sessilis* and *Xanthorrhoea preissii* over low open shrubland of *Styphelia retrorsa*, *Daviesia preissii* and *Banksia dallanneyi* subsp. *sylvestris*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia preissii</i> | | | | HAR14-01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCOPP02 |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lomandra sericea</i> | | | | HAR63-02 |
| <i>Stylidium</i> sp. Indet | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-16

Date 7/05/2021
Described by EEB & CW
Type R
Location MGA Zone 50
428183 mE; 6518745 mN
116.2440 E -31.463831 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation Open *Eucalyptus marginata* and *Corymbia calophylla* woodland over *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* tall open shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Styphelia tenuiflora* and *Banksia dallanneyi* subsp. *sylvestris* low shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | HAR07-02 |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Bossiaea ornata</i> | | | | |
| <i>Calytrix</i> ? <i>angulata</i> | | | | HAR16-01 |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera</i> ? <i>sewelliae</i> | | | | CWSCOPP01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Gompholobium knightianum</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCOPP02 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Laxmannia</i> ? <i>squarrosa</i> | | | | HAR16-02 |
| <i>Lomandra caespitosa</i> | | | | |
| <i>Lomandra hermaphrodita</i> | | | | |
| <i>Stylidium eriopodum</i> | | | | CWSCOPP08 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-17

Date 7/05/2021
Described by SC & DR
Type R
Location MGA Zone 50
428593 mE; 6518543 mN
116.2483 E -31.465678 S
Veg Condition Excellent
Soil Clayey Sand
Rock Type Laterite
Fire Age 5-10 yrs
Habitat Undulating Low Hills
Vegetation Mid *Eucalyptus marginata* and *Corymbia calophylla* forest over tall *Banksia sessilis* shrubland over mid *Daviesia angulata* and *Xanthorrhoea preissii* shrubland over low *Melaleuca trichophylla*, *Styphelia retrorsa* and *Banksia sphaerocarpa* var. *pumilio* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | | | | HAR36-04 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia angulata</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Leporella fimbriata</i> | | | | |
| <i>Leptospermum erubescens</i> | | | | |
| <i>Melaleuca trichophylla</i> | | | | HAR17-01 |
| <i>Pyrorchis nigricans</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-18

Date 7/05/2021
Described by SC & DR
Type R
Location MGA Zone 50
428762 mE; 6518520 mN
116.2501 E -31.465899 S
Veg Condition Excellent
Soil Clay Loam Sandy
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation Mid *Eucalyptus marginata* and *Corymbia calophylla* forest over tall open *Banksia squarrosa* subsp. *squarrosa* and *Banksia sessilis* shrubland over mid sparse *Xanthorrhoea preissii* over low open *Hibbertia hypericoides* subsp. *hypericoides*, *Hibbertia huegelii* and *Banksia dallanneyi* subsp. *sylvestris* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | |
| <i>Leptospermum erubescens</i> | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Petrophile striata</i> | | | | SCHEOPP01 |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Synaphea decorticans</i> | | | | HAR35-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-19

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
426022 mE; 6518447 mN
116.2212 E -31.466380 S
Veg Condition Very Good
Soil Loamy Sand
Rock Type Laterite
Fire Age >10 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Corymbia calophylla* and *Eucalyptus marginata* woodland over mid *Adenanthos cygnorum* subsp. *cygnorum* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia preissii</i> | | | | HAR52-01 |
| <i>Daviesia</i> sp. Indet | | | | HAR19-01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | HAR62-01 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia semipilosa</i> | | | | |
| <i>Hypocalymma</i> sp. Indet | | | | |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-20

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
426287 mE; 6518611 mN
116.2240 E -31.464921 S
Veg Condition Very Good
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation *Corymbia calophylla* and *Eucalyptus marginata* low open woodland over *Banksia sessilis* mid to tall shrubs over *Adenanthos cygnorum* subsp. *cygnorum* low shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Calytrix</i> sp. Indet 2 | | | | HAR20-03 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Nuytsia floribunda</i> | | | | |
| <i>Verticordia densiflora</i> var. <i>cespitosa</i> | | | | HAR20-02 |
| <i>Verticordia</i> sp. Indet | | | | HAR20-03 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-21

Date 13/05/2021
Described by CW & HE
Type R
Location MGA Zone 50
426956 mE; 6518352 mN
116.2311 E -31.467297 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation Open *Corymbia calophylla* and *Eucalyptus marginata* mid-tall woodland over open tall shrubland of *Xanthorrhoea preissii*, *Banksia squarrosa* subsp. *squarrosa* over open low shrubland of *Hibbertia hypericoides* subsp. *hypericoides*, *Styphelia retrorsa* and *Hakea lissocarpha*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCOPP02 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Stylidium</i> sp. Indet | | | | |
| <i>Styphelia macrocalyx</i> | | | | HAR71-02 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Synaphea decorticans</i> | | | | HAR35-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-22

Date 13/05/2021
Described by KG & MvW
Type R
Location MGA Zone 50
427693 mE; 6518363 mN
116.2388 E -31.467242 S
Veg Condition Excellent
Soil Clay Loam
Rock Type Laterite
Fire Age 3-5 yrs
Habitat Undulating Low Hills
Vegetation Low open *Eucalyptus marginata* and *Corymbia calophylla* woodland over tall open *Xanthorrhoea preissii* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* and *Hakea lissocarpa* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia preissii</i> | | | | HAR22-01 |
| <i>Drosera ?sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea pilulifera</i> | | | | HAR22-02 |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | MvWKGopp1 |
| <i>Hakea lissocarpa</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | HAR27-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Synaphea</i> sp. Indet | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-23

Date 13/05/2021
Described by KG & MvW
Type R
Location MGA Zone 50
428211 mE; 6517867 mN
116.2442 E -31.471750 S
Veg Condition Excellent
Soil Clay Loam
Rock Type Laterite
Fire Age 5-10 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Eucalyptus marginata*, *Corymbia calophylla* and *Eucalyptus wandoo* woodland over tall to mid *Hakea undulata* and *Banksia sessilis* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* and *Daviesia preissii* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | HAR23-01 |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Bossiaea ornata</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia preissii</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | HAR62-01 |
| <i>Hakea undulata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | HAR27-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Lepidosperma tenue</i> | | | | HAR22-02 |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |



Julimar Project

Site HAR-25

Date 13/05/2021

Described by CW & HE

Type R

Location MGA Zone 50
428214 mE; 6517182 mN
116.2442 E -31.477935 S

Veg Condition Excellent

Soil Loamy Sand

Rock Type Laterite

Fire Age 5-10 yrs

Habitat Drainage Area/ Floodplain

Vegetation Tall open *Corymbia calophylla* and *Eucalyptus accedens* woodland over open *Xanthorrhoea preissii* and *Trymalium odoratissimum* subsp. *odoratissimum* shrubland over a low open *Phyllanthus calycinus*, *Hakea lissocarpha* and *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Acacia pulchella</i> | | | | |
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus accedens</i> | | | | |
| <i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia</i> ? <i>semipilosa</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hypocalymma angustifolium</i> | | | | |
| <i>Leptospermum erubescens</i> | | | | |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-26

Date 13/05/2021

Described by CW & HE

Type R

Location MGA Zone 50
427944 mE; 6516946 mN
116.2414 E -31.480043 S

Veg Condition Excellent

Soil Sandy Clay Loam

Rock Type Granite, Laterite

Fire Age 5-10 yrs

Habitat Minor Drainage Line

Vegetation *Corymbia calophylla* mid closed woodland with scattered *Eucalyptus wandoo* over tall closed shrubland of *Trymalium odoratissimum* subsp. *odoratissimum* and *Xanthorrhoea preissii* over *Bossiaea eriocarpa* and *Trymalium odoratissimum* subsp. *odoratissimum* low shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Acacia pulchella</i> | | | | |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia</i> ? <i>semipilosa</i> | | | | |
| <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-27

Date 13/05/2021
Described by KG & MvW
Type R
Location MGA Zone 50
427494 mE; 6517818 mN
116.2367 E -31.472153 S
Veg Condition Excellent
Soil Clay Loam
Rock Type Laterite
Fire Age 3-5 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Eucalyptus marginata* and *Corymbia calophylla* open woodland over mid *Xanthorrhoea preissii* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | HAR27-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Synaphea</i> sp. Indet | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-28

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
426262 mE; 6517988 mN
116.2237 E -31.470534 S

Veg Condition Very Good

Soil Sandy Loam

Rock Type Laterite

Fire Age 3-5 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* low open woodland over *Banksia squarrosa* subsp. *squarrosa* tall sparse shrubland with *Adenanthos cygnorum* subsp. *cygnorum* and *Banksia sessilis* over *Banksia sphaerocarpa* var. *?pumilio* and *Daviesia preissii* low shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia sphaerocarpa</i> var. <i>?pumilio</i> | | | | HAR33-01 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Daviesia preissii</i> | | | | HAR52-01 |
| <i>Drosera ?sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Patersonia</i> sp. Indet | | | | |
| <i>Petrophile striata</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-29

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
426445 mE; 6517623 mN
116.2256 E -31.473846 S

Veg Condition Very Good

Soil Loam

Rock Type Laterite

Fire Age 3-5 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* and *Corymbia calophylla* low open woodland over *Xanthorrhoea preissii* tall sparse shrubland over *Styphelia retrorsa* low shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Acacia saligna</i> | | | | |
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | |
| <i>Hibbertia semipilosa</i> | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR61-01 |
| <i>Synaphea</i> sp. Indet | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-30

Date 22/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
426008 mE; 6517519 mN
116.2210 E -31.474754 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 3-5 yrs, 5-10 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Eucalyptus marginata* woodland over tall to mid *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera</i> ? <i>sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | HAR62-01 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-31

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
425757 mE; 6517701 mN
116.2184 E -31.473097 S

Veg Condition Good

Soil Loamy Sand

Rock Type Laterite

Fire Age <1 yr, 1-3 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* low open woodland over *Adenanthos cygnorum* subsp. *cygnorum* and *Banksia squarrosa* subsp. *squarrosa* mid to tall open shrubland over *Hibbertia hypericoides* subsp. *hypericoides* low

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Nuytsia floribunda</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-32

Date 13/05/2021
Described by KG & MvW
Type R
Location MGA Zone 50
425503 mE; 6517472 mN
116.2157 E -31.475146 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 3-5 yrs
Habitat Undulating Low Hills
Vegetation Low *Eucalyptus marginata* and *Corymbia calophylla* open woodland over tall to mid *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Lechenaultia ?biloba</i> | | | | HAR32-01 |
| <i>Patersonia occidentalis</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-33

Date 21/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
425614 mE; 6517128 mN
116.2168 E -31.478252 S

Veg Condition Very Good

Soil Sandy Loam

Rock Type Laterite

Fire Age 1-3 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* mid to low open woodland over mid *Xanthorrhoea preissii* sparse shrubs over resprouts.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|---|-------|---------|--------|----------------|
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | HAR36-03 |
| <i>Banksia sphaerocarpa</i> var. <i>?pumilio</i> | | | | HAR33-01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-34

Date 13/05/2021
Described by KG, CW, HE & MvW
Type R
Location MGA Zone 50
425929 mE; 6516958 mN
116.2201 E -31.479808 S
Veg Condition Very Good
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation Mid open *Corymbia calophylla* and *Eucalyptus marginata* woodland over tall shrubland of *Banksia sessilis*, *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* over low open shrubland of *Hibbertia hypericoides* subsp. *hypericoides*, *Hakea lissocarpha* and *Petrophile striata*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | CWSCopp01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Hypocalymma angustifolium</i> | | | | |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Petrophile striata</i> | | | | HAR90-01 |
| <i>Stylidium</i> sp. Indet | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Styphelia tenuiflora</i> | | | | BAU03-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-36

Date 20/04/2021
Described by SC & CW
Type R
Location MGA Zone 50
427248 mE; 6516438 mN
116.2340 E -31.484585 S
Veg Condition Excellent
Soil Loamy Sand
Rock Type Laterite
Fire Age 3-5 yrs
Habitat Undulating Low Hills
Vegetation Mid *Eucalyptus marginata* and *Corymbia calophylla* forest over tall scattered *Banksia squarrosa* subsp. *squarrosa* and *Banksia sessilis* shrubs over mid scattered *Xanthorrhoea preissii* shrubs over low scattered *Banksia sphaerocarpa* var. *pumilio* and *Hibbertia huegelii* shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|---|-------|---------|--------|----------------|
| ?Fabaceae sp. Indet | | | | HAR36-06 |
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | HAR36-03 |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | | | | HAR36-04 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpa</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lepidosperma pubisquamum</i> | | | | HAR36-02 |
| <i>Neurachne alopecuroidea</i> | | | | |
| <i>Stylidium diuroides</i> | | | | HAR36-01 |
| <i>Styphelia propinqua</i> | | | | HAR36-05 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-37

Date 20/04/2021
Described by SC & CW
Type R
Location MGA Zone 50
427720 mE; 6516597 mN
116.2390 E -31.483181 S
Veg Condition Excellent
Soil Clay Loam Sandy
Rock Type Laterite
Fire Age 3-5 yrs
Habitat Gully
Vegetation Mid *Eucalyptus wandoo* forest over tall scattered *Trymalium odoratissimum* subsp. *odoratissimum* shrubs over mid scattered *Xanthorrhoea preissii* and *Gastrolobium calycinum* shrubs over low scattered shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Gastrolobium calycinum</i> | | | | HAR37-05 |
| <i>Grevillea pilulifera</i> | | | | HAR37-01 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia ?semipilosa</i> | | | | HAR70-01 |
| <i>Malvaceae</i> sp. Indet | | | | HAR37-03 |
| <i>Orthrosanthus laxus</i> var. <i>gramineus</i> | | | | HAR37-04 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> | | | | HAR37-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-38

Date 20/04/2021

Described by SC & CW

Type R

Location MGA Zone 50
427498 mE; 6515651 mN
116.2366 E -31.491699 S

Veg Condition Excellent

Soil Sandy Loam

Rock Type Laterite

Fire Age 3-5 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* and *Corymbia calophylla* mid forest over tall shrubland of *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* over low open shrubland of *Hibbertia hypericoides* subsp. *hypericoides*, *Hakea lissocarpha* and *Hibbertia lasiopus*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Bossiaea ornata</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-39

Date 20/04/2021
Described by SC & CW
Type R
Location MGA Zone 50
427309 mE; 6515257 mN
116.2345 E -31.495241 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age >10 yrs
Habitat Stony Plain
Vegetation Closed tall shrubland of *Banksia squarrosa* subsp. *squarrosa*, *Allocasuarina huegeliana*, and *Leptospermum erubescens* over low shrubland of *Banksia sphaerocarpa* var. *pumilio*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Allocasuarina huegeliana</i> | | | | HAR39-01 |
| <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | | | | HAR36-04 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Calytrix</i> sp. Indet 1 | | | | HAR39-03 |
| <i>Conospermum densiflorum</i> subsp. <i>unicephalatum</i> | | | | HAR39-04 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera</i> ? <i>sewelliae</i> | | | | |
| <i>Leptospermum erubescens</i> | | | | CWSCopp06 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-40

Date 13/05/2021

Described by KG & MvW

Type R

Location MGA Zone 50
426683 mE; 6515736 mN
116.2280 E -31.490883 S

Veg Condition Good

Soil Clay Loam

Rock Type Laterite

Fire Age 1-3 yrs, 3-5 yrs

Habitat Undulating Low Hills

Vegetation Low *Eucalyptus marginata* open woodland over mid *Xanthorrhoea preissii* shrubland over low *Hibbertia huegelii* and *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-42

Date 21/04/2021
Described by EEB
Type R
Location MGA Zone 50
425894 mE; 6515795 mN
116.2197 E -31.490299 S
Veg Condition Very Good
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs, 3-5 yrs
Habitat Undulating Low Hills
Vegetation Low open *Eucalyptus marginata* and *Corymbia calophylla* (resprouting) woodland over tall open *Xanthorrhoea preissii* shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | HAR36-03 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-45

Date 22/04/2021
Described by SC & HE
Type R
Location MGA Zone 50
425159 mE; 6516160 mN
116.2120 E -31.486961 S
Veg Condition Excellent
Soil Loamy Sand
Rock Type Laterite
Fire Age >10 yrs
Habitat Footslope
Vegetation Tall closed *Banksia squarrosa* subsp. *squarrosa* shrubland over low *Calothamnus quadrifidus* subsp. *quadrifidus*, *Calytrix* sp. Indet 2 and *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | | | | HAR36-04 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> | | | | HAR67-01 |
| <i>Calytrix</i> sp. Indet 2 | | | | HAR54-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |



Julimar Project

Site HAR-47

Date 22/04/2021
Described by KG
Type R
Location MGA Zone 50
425142 mE; 6515539 mN
116.2118 E -31.492563 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 3-5 yrs, 5-10 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Eucalyptus marginata* woodland with scattered *Corymbia calophylla* trees over mid *Adenanthos cygnorum* subsp. *cygnorum* shrubland over low *Beaufortia eriocephala* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | HAR36-03 |
| <i>Banksia sphaerocarpa</i> var. <i>?pumilio</i> | | | | HAR33-01 |
| <i>Beaufortia eriocephala</i> | | | | HAR47-01 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | |
| <i>Petrophile striata</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR61-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-48

Date 13/05/2021
Described by CW & HE
Type R
Location MGA Zone 50
424760 mE; 6515246 mN
116.2077 E -31.495180 S
Veg Condition Excellent
Soil Sand
Rock Type Laterite
Fire Age 5-10 yrs
Habitat Undulating Low Hills
Vegetation Low to mid *Eucalyptus wandoo* and *Corymbia calophylla* open woodland over mid *Xanthorrhoea preissii*, *Hakea varia* and *Leptospermum erubescens* shrubland over low open *Babingtonia camphorosmae* and *Styphelia retrorsa* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Calothamnus lateralis</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Hakea prostrata</i> | | | | |
| <i>Hakea varia</i> | | | | Har48-01 |
| <i>Hypocalymma angustifolium</i> | | | | |
| <i>Lepidosperma tenue</i> | | | | HAR71-03 |
| <i>Leptospermum erubescens</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-49

Date 22/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
425549 mE; 6515174 mN
116.2160 E -31.495878 S

Veg Condition Excellent

Soil Loamy Sand

Rock Type Laterite

Fire Age 3-5 yrs, 5-10 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* and *Corymbia calophylla* mid to low open woodland over *Xanthorrhoea preissii* and *Acacia celastrifolia* mid to tall shrubs over *Leucopogon pulchellus* low shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Acacia celastrifolia</i> | | | | HAR49-01 |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia grandis</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | |
| <i>Hibbertia semipilosa</i> | | | | |
| <i>Leucopogon pulchellus</i> | | | | HAR49-02 |
| <i>Petrophile striata</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-51

Date 21/04/2021

Described by EEB & KG

Type R

Location MGA Zone 50
426988 mE; 6514659 mN
116.2311 E -31.500615 S

Veg Condition Excellent

Soil Sandy Loam

Rock Type Laterite

Fire Age >10 yrs

Habitat Undulating Low Hills

Vegetation *Eucalyptus marginata* mid to low open woodland over *Banksia squarrosa* subsp. *squarrosa* mid to tall sparse shrubland over *Xanthorrhoea preissii* mid shrubs over *Hibbertia hypericoides* subsp. *hypericoides* and *Styphelia retrorsa* low open shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Kunzea praestans</i> | | | | HAR51-01 |
| <i>Pimelea</i> sp. Indet | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-52

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
426021 mE; 6514760 mN
116.2209 E -31.499647 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 3-5 yrs
Habitat Undulating Low Hills
Vegetation *Eucalyptus marginata* and *Corymbia calophylla* mid to low open woodland over *Xanthorrhoea preissii*, *Banksia squarrosa* subsp. *squarrosa* and *Banksia sessilis* mid tall shrubs over *Daviesia preissii* low shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis aculeata</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Daviesia preissii</i> | | | | HAR52-01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Petrophile striata</i> | | | | |
| <i>Stylidium</i> sp. Indet | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-53

Date 21/04/2021
Described by CW & HE
Type R
Location MGA Zone 50
425261 mE; 6514873 mN
116.2130 E -31.498572 S
Veg Condition Excellent
Soil Sandy Clay Loam
Rock Type Laterite
Fire Age >10 yrs
Habitat Sandy/ Stony Plain
Vegetation Open tall *Eucalyptus marginata* woodland over tall closed *Banksia squarrosa* subsp. *squarrosa* and *Banksia sessilis* shrubland over dense *Hibbertia hypericoides* subsp. *hypericoides* and *Leucopogon pulchellus* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia grandis</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> | | | | HAR36-04 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Calytrix</i> sp. Indet 3 | | | | |
| <i>Conostylis</i> ? <i>setigera</i> | | | | HAR63-01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea pilulifera</i> | | | | HAR37-01 |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCOPP02 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Leucopogon pulchellus</i> | | | | HAR-53-01 |
| <i>Lomandra sericea</i> | | | | HAR-63-02 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea gracilis</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-54

Date 21/04/2021

Described by CW & HE

Type R

Location MGA Zone 50
424775 mE; 6514891 mN
116.2078 E -31.498378 S

Veg Condition Excellent

Soil Clayey Sand

Rock Type Laterite

Fire Age >10 yrs

Habitat Sand Plain

Vegetation Sparse *Corymbia calophylla* and *Eucalyptus marginata* trees over closed tall shrubland of *Banksia sessilis*, *Banksia squarrosa* subsp. *squarrosa* and *Adenanthos cygnorum* subsp. *cygnorum*, over low shrubland of *Leucopogon pulchellus*, *Babingtonia camphorosmae* and *Styphelia retrorsa*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| <i>Amyema miquelii</i> | | | | CWHEOPP03 |
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Calytrix</i> sp. Indet 2 | | | | HAR54-01 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia hibernioides</i> var. <i>hibbertioides</i> | | | | CWHWopp08 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Leucopogon pulchellus</i> | | | | HAR-53-01 |
| <i>Lomandra</i> ? <i>caespitosa</i> | | | | HAR-55-01 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| * <i>Ursinia anthemoides</i> | | | | |



Julimar Project

Site HAR-55

Date 21/04/2021

Described by CW & HE

Type R

Location MGA Zone 50
424869 mE; 6514614 mN
116.2088 E -31.500887 S

Veg Condition Excellent

Soil Sand

Rock Type Laterite

Fire Age >10 yrs

Habitat Sandy/ Stony Plain

Vegetation Tall open *Corymbia calophylla* and *Eucalyptus marginata* woodland over a tall scattered *Banksia sessilis* and *Xanthorrhoea preissii* shrubland over a *Bossiaea eriocarpa* and *Hibbertia hypericoides* subsp. *hypericoides* and *Phyllanthus calycinus* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> | | | | |
| * <i>Aira caryophylla</i> | | | | |
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Comesperma calymega</i> | | | | HAR-55-02 |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea pilulifera</i> | | | | HAR37-01 |
| <i>Haemodorum</i> sp. Indet | | | | |
| <i>Hibbertia hibbertioides</i> var. <i>hibbertioides</i> | | | | CWHWopp08 |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Lomandra ?caespitosa</i> | | | | HAR-55-01 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-56

Date 21/04/2021

Described by CW & HE

Type R

Location MGA Zone 50
424468 mE; 6514454 mN
116.2046 E -31.502307 S

Veg Condition Excellent

Soil Clayey Sand

Rock Type Laterite

Fire Age >10 yrs

Habitat Sandy/ Stony Plain

Vegetation Tall open *Eucalyptus marginata* and *Corymbia calophylla* woodland over tall scattered *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* over low shrubland of *Hibbertia hypericoides* subsp. *hypericoides*, *Styphelia retrorsa* and *Synaphea decorticans*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Amyema miquelii</i> | | | | CWHEopp03 |
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia</i> ? <i>semipilosa</i> | | | | HAR70-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lepidosperma tenue</i> | | | | HAR56-01 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Synaphea decorticans</i> | | | | HAR35-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-57

Date 21/04/2021
Described by CW & HE
Type R
Location MGA Zone 50
425348 mE; 6514304 mN
116.2138 E -31.503711 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type None
Fire Age 5-10 yrs
Habitat Undulating Low Hills
Vegetation Tall open woodland of *Eucalyptus accedens*, *Eucalyptus wandoo* and *Eucalyptus marginata* over tall scattered shrubland of *Xanthorrhoea preissii*, *Banksia squarrosa* subsp. *squarrosa* and *Banksia sessilis* over low open shrubland of *Hibbertia hypericoides* subsp. *hypericoides*, *Banksia dallanneyi* subsp. *sylvestris* and *Hakea lissocarpha*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis ?setigera</i> | | | | HAR63-01 |
| <i>Eucalyptus accedens</i> | | | | CWHWopp05 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lomandra hermaphrodita</i> | | | | |
| <i>Lomandra sericea</i> | | | | HAR63-02 |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Orthrosanthus laxus</i> var. <i>laxus</i> | | | | HAR70-02 |
| <i>Styphelia oblongifolia</i> | | | | HAR57-02 |
| <i>Styphelia pallida</i> | | | | HAR57-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project Site HAR-59

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
426917 mE; 6514108 mN
116.2303 E -31.505583 S
Veg Condition Excellent
Soil Loamy Sand
Rock Type Laterite
Fire Age >10 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Eucalyptus marginata* and *Corymbia calophylla* woodland over tall to mid *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* and *Styphelia retrorsa* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hakea lissocarpa</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Stylidium diuroides</i> | | | | HAR59-01 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-60

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
427112 mE; 6513797 mN
116.2324 E -31.508406 S
Veg Condition Very Good
Soil Sandy Loam
Rock Type Laterite
Fire Age >10 yrs
Habitat Undulating Low Hills
Vegetation *Eucalyptus wandoo* and *Eucalyptus marginata* mid to low open woodland over *Xanthorrhoea preissii* and *Banksia squarrosa* subsp. *squarrosa* mid shrubs over *Hibbertia hypericoides* subsp. *hypericoides* low shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia sessilis</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia</i> ? <i>semipilosa</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR62-02 |
| <i>Lepidosperma pubisquameum</i> | | | | |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-61

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
426401 mE; 6513865 mN
116.2249 E -31.507747 S
Veg Condition Excellent
Soil Loamy Sand
Rock Type Laterite
Fire Age 5-10 yrs, >10 yrs
Habitat Undulating Low Hills
Vegetation Mid to low *Eucalyptus marginata* and *Eucalyptus wandoo* woodland over tall to mid *Xanthorrhoea preissii* and *Banksia squarrosa* subsp. *squarrosa* shrubland over low *Hibbertia hypericoides* subsp. *hypericoides* and *Styphelia retrorsa* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis</i> ? <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Desmocladius</i> ? <i>asper</i> | | | | |
| <i>Drosera</i> ? <i>sewelliae</i> | | | | HAR61-02 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Stylidium</i> ? <i>brunonianum</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR61-01 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-62

Date 21/04/2021
Described by EEB & KG
Type R
Location MGA Zone 50
425928 mE; 6513801 mN
116.2199 E -31.508287 S
Veg Condition Very Good
Soil Loamy Sand
Rock Type Laterite
Fire Age 5-10 yrs, >10 yrs
Habitat Undulating Low Hills
Vegetation *Eucalyptus marginata* mid to low open woodland over *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* mid to tall open shrubland over *Hibbertia hypericoides* subsp. *hypericoides* and *Styphelia retrorsa* low sparse shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | HAR62-01 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | 62-02 |
| <i>Stylidium ?brunonianum</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-63

Date 21/04/2021
Described by CW & HE
Type R
Location MGA Zone 50
425056 mE; 6514047 mN
116.2107 E -31.506018 S
Veg Condition Excellent
Soil Sandy Clay Loam
Rock Type Laterite
Fire Age >10 yrs
Habitat Sandy/ Stony Plain
Vegetation Tall open *Eucalyptus wandoo* woodland over mid scattered *Xanthorrhoea preissii* shrubland over a low sparse *Hakea lissocarpha*, *Banksia bipinnatifida* subsp. *bipinnatifida* and *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Conostylis ?setigera</i> | | | | HAR-63-01 |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia ?semipilosa</i> | | | | HAR70-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lomandra sericea</i> | | | | HAR-63-02 |
| <i>Orthrosanthus laxus</i> var. <i>laxus</i> | | | | HAR70-02 |
| <i>Styphelia propinqua</i> | | | | HAR36-05 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-64

Date 21/04/2021

Described by CW & HE

Type R

Location MGA Zone 50
425036 mE; 6513846 mN
116.2105 E -31.507824 S

Veg Condition Excellent

Soil Sandy Clay Loam

Rock Type Laterite

Fire Age 5-10 yrs, >10 yrs

Habitat Sandy/ Stony Plain

Vegetation Tall open woodland of *Eucalyptus marginata* and *Corymbia calophylla* over a tall *Banksia squarrosa* subsp. *squarrosa* and *Xanthorrhoea preissii* shrubland over a low *Hibbertia hypericoides* subsp. *hypericoides*, *Styphelia retrorsa* and *Banksia dallanneyi* subsp. *sylvestris* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | CWSCOPP02 |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Stylidium hispidum</i> | | | | HAR-64-01 |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Synaphea decorticans</i> | | | | HAR35-01 |
| * <i>Ursinia anthemoides</i> | | | | |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-65

Date 21/04/2021

Described by SC & CW

Type R

Location MGA Zone 50
424780 mE; 6514013 mN
116.2078 E -31.506303 S

Veg Condition Excellent

Soil Sand

Rock Type None

Fire Age >10 yrs

Habitat Sand Plain

Vegetation Scattered tall *Corymbia calophylla* over tall open shrubland of *Hakea prostrata*, *Jacksonia sternbergiana* and *Banksia sessilis* over low open shrubland of *Hypocalymma angustifolium*, *Hibbertia hypericoides* subsp. *hypericoides* and *Phyllanthus calycinus*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Amyema miquelii</i> | | | | CWHEOPP03 |
| <i>Banksia sessilis</i> | | | | |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Hakea prostrata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hypocalymma angustifolium</i> | | | | |
| <i>Jacksonia sternbergiana</i> | | | | |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Macrozamia riedlei</i> | | | | |
| <i>Orthrosanthus laxus</i> var. <i>laxus</i> | | | | HAR70-02 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| * <i>Ursinia anthemoides</i> | | | | |



Julimar Project

Site HAR-66

Date 21/04/2021

Described by CW & HE

Type R

Location MGA Zone 50
424265 mE; 6513788 mN
116.2024 E -31.508298 S

Veg Condition Excellent

Soil Clay Loam Sandy

Rock Type Laterite

Fire Age >10 yrs

Habitat Sandy/ Stony Plain

Vegetation Open *Eucalyptus marginata*, *Corymbia calophylla* and *Eucalyptus wandoo* woodland, over mid open *Xanthorrhoea preissii* shrubland over low *Hakea lissocarpha*, *Hibbertia hypericoides* subsp. *hypericoides* and *Hibbertia ?semipilosa* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Bossiaea eriocarpa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Gompholobium marginatum</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia ?semipilosa</i> | | | | HAR70-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hypocalymma angustifolium</i> | | | | |
| <i>Lomandra</i> sp. Indet | | | | |
| <i>Orthrosanthus laxus</i> var. <i>laxus</i> | | | | HAR70-02 |
| <i>Phyllanthus calycinus</i> | | | | |
| <i>Styphelia retrorsa</i> | | | | HAR39-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-67

Date 22/04/2021
Described by SC & HE
Type R
Location MGA Zone 50
425393 mE; 6515901 mN
116.2144 E -31.489307 S
Veg Condition Excellent
Soil Sandy Clay Loam
Rock Type Laterite
Fire Age >10 yrs
Habitat Undulating Low Hills
Vegetation Tall scattered *Xanthorrhoea preissii* shrubs over low *Banksia fraseri* var. *fraseri*, *Calothamnus quadrifidus* subsp. *quadrifidus* and *Hibbertia hypericoides* subsp. *hypericoides* shrubland.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia fraseri</i> var. <i>fraseri</i> | | | | HAR67-02 |
| <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> | | | | HAR67-01 |
| <i>Calytrix</i> sp. Indet 3 | | | | |
| <i>Hakea incrassata</i> | | | | HAR67-03 |
| <i>Hakea undulata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Lepidosperma</i> sp. Indet | | | | |
| <i>Melaleuca incana</i> | | | | HAR67-04 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-70

Date 20/04/2021

Described by SC & CW

Type R

Location MGA Zone 50
427500 mE; 6516594 mN
116.2366 E -31.483194 S

Veg Condition Excellent

Soil Loamy Sand

Rock Type Laterite

Fire Age 3-5 yrs

Habitat Undulating Low Hills

Vegetation Mid *Eucalyptus wandoo* and occasional *Eucalyptus marginata* and *Corymbia calophylla* forest over tall scattered *Banksia squarrosa* subsp. *squarrosa* and *Trymalium odoratissimum* subsp. *odoratissimum* shrubs over mid scattered *Xanthorrhoea preissii* shrubs over low sparse *Hibbertia hypericoides* subsp. *hypericoides*, *Hakea lissocarpha* and *Hibbertia lasiopus* shrubs.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia bipinnatifida</i> subsp. <i>bipinnatifida</i> | | | | |
| <i>Banksia dallaneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Eucalyptus wandoo</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia</i> ? <i>semipilosa</i> | | | | HAR70-01 |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | |
| <i>Orthrosanthus laxus</i> var. <i>laxus</i> | | | | HAR70-02 |
| <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> | | | | CWSCOPP04 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-71

Date 20/04/2021
Described by SC & CW
Type R
Location MGA Zone 50
428191 mE; 6516242 mN
116.2439 E -31.486414 S
Veg Condition Excellent
Soil Sand
Rock Type None
Fire Age 5-10 yrs
Habitat Sandy/ Stony Plain
Vegetation *Jacksonia sternbergiana* and *Banksia sessilis* tall open shrubland over mid-low shrubland of *Daviesia angulata* and *Hibbertia hypericoides* subsp. *hypericoides*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Babingtonia camphorosmae</i> | | | | HAR71-01 |
| <i>Banksia sessilis</i> | | | | |
| <i>Daviesia angulata</i> | | | | CWSCopp04 |
| <i>Desmocladius asper</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Jacksonia sternbergiana</i> | | | | |
| <i>Lepidosperma tenue</i> | | | | HAR71-03 |
| <i>Styphelia macrocalyx</i> | | | | HAR71-02 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-72

Date 20/04/2021

Described by SC & CW

Type R

Location MGA Zone 50
427752 mE; 6516242 mN
116.2393 E -31.486388 S

Veg Condition Excellent

Soil Sand

Rock Type None

Fire Age 5-10 yrs, >10 yrs

Habitat Sandy/ Stony Plain

Vegetation Low open *Eucalyptus marginata* and *Corymbia calophylla* woodland over open tall shrubland of *Allocasuarina humilis*, *Xanthorrhoea preissii* and *Banksia squarrosa* subsp. *squarrosa* over low open shrubland of *Patersonia occidentalis*, *Hibbertia hypericoides* subsp. *hypericoides* and *Banksia dallanneyi* subsp. *sylvestris*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Allocasuarina humilis</i> | | | | |
| <i>Babingtonia camphorosmae</i> | | | | |
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | HAR36-03 |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Laxmannia squarrosa</i> | | | | CWSCopp07 |
| <i>Lepidosperma</i> aff. <i>drummondii</i> | | | | CWSCopp09 |
| <i>Patersonia occidentalis</i> | | | | |
| <i>Stylidium eriopodum</i> | | | | CWSCopp08 |
| <i>Xanthorrhoea preissii</i> | | | | |



Julimar Project

Site HAR-90

Date 13/05/2021
Described by CW & HE
Type R
Location MGA Zone 50
426812 mE; 6516255 mN
116.2294 E -31.486204 S
Veg Condition Excellent
Soil Sandy Loam
Rock Type Laterite
Fire Age 1-3 yrs
Habitat Undulating Low Hills
Vegetation Open mid *Eucalyptus marginata* and *Corymbia calophylla* woodland over tall open shrubland of *Xanthorrhoea preissii* and *Banksia squarrosa* subsp. *squarrosa* over low sparse *Hibbertia hypericoides* subsp. *hypericoides*, *Banksia dallanneyi* subsp. *sylvestris* and *Hibbertia lasiopus*.

SPECIES LIST

| Name | Cover | C Class | Height | Specimen Notes |
|--|-------|---------|--------|----------------|
| <i>Banksia dallanneyi</i> subsp. <i>sylvestris</i> | | | | |
| <i>Banksia squarrosa</i> subsp. <i>squarrosa</i> | | | | |
| <i>Conostylis setigera</i> subsp. <i>setigera</i> | | | | |
| <i>Corymbia calophylla</i> | | | | |
| <i>Drosera ?sewelliae</i> | | | | CWSCOPP01 |
| <i>Eucalyptus marginata</i> | | | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | | | | |
| <i>Hakea lissocarpha</i> | | | | |
| <i>Hibbertia commutata</i> | | | | |
| <i>Hibbertia huegelii</i> | | | | |
| <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> | | | | |
| <i>Hibbertia lasiopus</i> | | | | HAR36-07 |
| <i>Petrophile striata</i> | | | | HAR90-01 |
| <i>Styphelia propinqua</i> | | | | HAR36-05 |
| <i>Xanthorrhoea preissii</i> | | | | |



| | | |
|--|------------|-----------|
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera ?sewelliae</i> | | |
| <i>Drosera erythrorhiza</i> | SCDRopp05 | |
| <i>Drosera sewelliae</i> | CWSCopp11 | |
| <i>Drosera sewelliae</i> | | |
| <i>Eriochilus dilatatus</i> | | |
| <i>Eucalyptus accedens</i> | CWHWopp05 | |
| <i>Eucalyptus drummondii</i> | CWSCopp10 | |
| <i>Eucalyptus wandoo</i> | | |
| <i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i> | | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | CWSCopp02 | |
| <i>Grevillea synapheae</i> subsp. <i>synapheae</i> | Mvwkgopp1 | |
| <i>Hakea prostrata</i> | | |
| <i>Hakea prostrata</i> | | |
| <i>Hakea trifurcata</i> | | |
| <i>Hakea trifurcata</i> | | |
| <i>Hemigenia wandooana</i> | HWCWopp10 | |
| <i>Hibbertia hibbertioides</i> var. <i>hibbertioides</i> | CWHW-opp08 | |
| <i>Hibbertia hibbertioides</i> var. <i>hibbertioides</i> | | |
| <i>Jacksonia furcellata</i> | | |
| <i>Jacksonia sternbergiana</i> | | |
| <i>Kennedia prostrata</i> | | |
| <i>Laxmannia squarrosa</i> | CWSCopp07 | |
| <i>Lepidosperma</i> aff. <i>drummondii</i> | SCHEopp02 | |
| <i>Lepidosperma</i> aff. <i>drummondii</i> | CWSCopp09 | |
| <i>Leporella fimbriata</i> | | |
| <i>Leptospermum erubescens</i> | CWSCopp06 | |
| <i>Leucopogon</i> sp. Newdegate (M. Hislop 3585) | SCDRopp04 | |
| <i>Melaleuca trichophylla</i> | | |
| <i>Nuytsia floribunda</i> | | |
| <i>Nuytsia floribunda</i> | | |
| <i>Olax scalariformis</i> | | |
| <i>Persoonia angustiflora</i> | SCHEopp03 | |
| <i>Persoonia elliptica</i> | | |
| <i>Persoonia elliptica</i> | | |
| <i>Persoonia elliptica</i> | | |
| <i>Petrophile striata</i> | SCHEopp01 | |
| <i>Phyllanthus calycinus</i> | | |
| <i>Pimelea argentea</i> | SCDRopp01 | farm weed |
| <i>Pimelea</i> sp. Indet | CWHWopp02 | |
| * <i>Solanum nigrum</i> | | |
| <i>Stirlingia latifolia</i> | | |
| <i>Stylidium eriopodum</i> | CWSCopp08 | |
| <i>Stylidium hispidum</i> | CWHWopp01 | |
| <i>Synaphea decorticans</i> | HAR35-01 | |
| <i>Synaphea</i> sp. Udumung (A.S. George 17058) | HWopp01 | |
| <i>Synaphea</i> sp. Udumung (A.S. George 17058) | Hwopp01 | |
| <i>Synaphea</i> sp. Udumung (A.S. George 17058) | | |
| <i>Synaphea</i> sp. Udumung (A.S. George 17058) | | |
| <i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i> | CWSCopp03 | |
| <i>Xanthorrhoea gracilis</i> | | |

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APPENDIX 2: BASIC AND TARGETED VERTEBRATE FAUNA SURVEY (WESTERN WILDLIFE 2021)

Julimar Nickel-Copper PGE Project: Hartog and Baudin Exploration Targets

Basic Vertebrate Fauna Survey and Targeted Mammal Survey 2021



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June 2021

Executive Summary

Introduction

Chalice Gold Mines Limited (CGML) propose to conduct exploration drilling in the Hartog and Baudin's Exploration Targets at their Julimar Nickel-Copper PGE Project (Julimar Project). As these areas are located in Julimar State Forest, CGML commissioned Western Wildlife to carry out a basic vertebrate fauna survey and targeted conservation significant mammal survey of a study area that encompassed the two exploration target areas.

Methods

The fauna survey was undertaken in accordance with *Technical guidance: terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) and relevant State and Federal Guidelines on surveying conservation significant fauna.

The field survey was carried out on the 14th April - 17th May 2021, and included:

- Fauna habitat identification.
- Camera trapping for conservation significant mammals at 20 sites.
- Keeping opportunistic records of all vertebrate fauna observed.

Species of conservation significance were classified as: **Threatened** if listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Biodiversity Conservation Act 2016* (BC Act); **Migratory** if listed as Migratory under the EPBC Act and/or BC Act, excluding those species also listed as threatened; **Specially Protected** if listed as Other Specially Protected Species or Conservation Dependent Fauna under the BC Act; **Priority** if listed as Priority by DBCA and **Locally Significant** if considered by the author to potentially be of local significance.

Results and Discussion

Three fauna habitats were identified: Jarrah – Marri woodland, Wandoo woodland and Creek. The habitats in the study area are common in the Northern Jarrah Forest IBRA subregion. The key importance of the habitats present is twofold. Firstly, the study areas are part of Julimar State Forest, a large area of remnant native vegetation that has value in supporting a relatively intact ecosystem. Large habitat areas are less vulnerable to the impacts of habitat fragmentation and increase the likelihood of faunal populations persisting in the long-term. Secondly, the habitats provide 'habitat critical to the survival' of at least four EPBC Act-listed Threatened species.

The predicted faunal assemblage includes up to 16 frogs, 54 reptiles, 99 birds and 31 mammals (25 native and six introduced). The observed faunal assemblage included one frog, three reptiles, 39 birds and 12 mammals (eight native and four introduced), and this is unlikely to be complete. The faunal assemblage is likely to be relatively intact and typical of woodlands in the region. A total of 15 vertebrate fauna species of conservation significance have the potential to occur in the study area:

Threatened species

Six threatened species potentially occur in the Study Area, of which two were recorded:

- Forest Red-tailed Black-cockatoo (*Calyptorhynchus latirostris banksii*) – EPBC Act (Vulnerable), BC Act (Vulnerable) - **Recorded**
- Carnaby's Black-cockatoo (*Calyptorhynchus latirostris*) – EPBC Act (Endangered), BC Act (Endangered) - **Recorded**
- Baudin's Black-cockatoo (*Calyptorhynchus baudinii*) – EPBC Act (Vulnerable), BC Act (Vulnerable)
- Chuditch (*Dasyurus geoffroii*) – EPBC Act (Vulnerable), BC Act (Vulnerable) – **Recorded**
- Woylie – EPBC Act (Endangered), BC Act (Critically Endangered) – **Recorded**
- Black-flanked Rocky-wallaby (*Petrogale lateralis lateralis*) – EPBC Act (Endangered), BC Act (Endangered)

All three black-cockatoo species are likely to be foraging visitors to the study area, with foraging by Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo recorded. Baudin's Cockatoo is on the northern limit of its range in the area and is likely to be an occasional visitor only. The woodlands represent high value foraging habitat as they contain favoured cockatoo food-plants such as Marri. The foraging habitat is likely to be important for supporting breeding birds. Both Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo are known to breed in the subregion, and potentially breed in the study area.

The Chuditch and Woylie were recorded in the study area and are likely to be breeding residents. The Black-flanked Rock-wallaby may disperse through the study area, although the likelihood is low as the habitats of the study area are unsuitable for this species.

Migratory species

One Migratory species potentially occurs in the study area:

- Fork-tailed Swift (*Apus pacificus*) – EPBC Act (Migratory), BC Act (Migratory)

The Fork-tailed Swift is a Migratory species that is thought to be almost entirely aerial when visiting Australia, so the study area is not likely to provide important habitat for this species.

Specially Protected species

Two Specially Protected species potentially occur in the study area:

- Peregrine Falcon (*Falco peregrinus*) – BC Act (Other Specially Protected)
- Brush-tailed Phascogale (*Phascogale tapoatafa*) – BC Act (Conservation Dependent)

The Peregrine Falcon is likely to occur as a foraging visitor, but the study area is unlikely to be important for this species as its population is large and secure, and its favoured breeding habitat is absent. The Brush-tailed Phascogale has been recorded at Julimar in the past and is likely to occur in all habitats.

Priority species

Five Priority species potentially occur in the study area, of which one was recorded:

- Dell's Ctenotus (*Ctenotus delli*) – Priority 4
- Barking Owl, southern (*Ninox connivens connivens*) – Priority 3
- Quenda (*Isoodon fusciventer*) – Priority 4
- Western Brush Wallaby (*Notamacropus irma*) – Priority 4 – **Recorded**
- Tammar Wallaby (*Notamacropus eugenii derbianus*) – Priority 4 – **Recorded**

The Western Brush Wallaby and Tammar Wallaby were recorded in the study area and are likely to be breeding residents using all habitats. Although not recorded on this survey, the Quenda is regularly recorded at Julimar and is likely to be a breeding resident favouring the creek habitat and woodland areas with dense understory. Dell's Ctenotus is likely to occur in the Jarrah – Marri woodland, as it is known to occur nearby. The Barking Owl is uncommonly recorded, but the habitats of the study area are suitable for this species.

Locally significant species

One locally significant species is likely to occur: the Carpet Python (*Morelia spilota imbricata*).

Invertebrates

This report is primarily concerned with vertebrate fauna, however, four invertebrates of conservation significance are known to occur in the vicinity of the study area. Of these, Carter's Freshwater Mussel (*Westralunio carteri*) and the Mortlock River Shield-backed Trapdoor Spider (*Idiosoma schoknechtorum*) are unlikely to occur. Two other spiders potentially occur in the Jarrah – Marri woodland with native understory: the Julimar Shield-backed Trapdoor Spider (*Idiosoma mccllementsorum*) and Inornate Trapdoor Spider (*Euoplos inornatus*).

Conclusion

The habitats of the study areas are likely to support a relatively intact faunal assemblage of up to 16 frogs, 54 reptiles, 99 birds and 31 mammals (25 native and six introduced). Up to 15 conservation significant vertebrate fauna of which six were recorded on this survey. Up to four conservation significant invertebrate fauna potentially occur. The key value of the fauna habitats are as a part of a large area of remnant native vegetation that supports a relatively intact ecosystem and their value as habitat to conservation significant fauna. The habitats of the study area provide habitat critical to the survival of at least four EPBC Act-listed Threatened species: the Woylie, Chuditch, Carnaby's Cockatoo and Forest Red-tailed Black-cockatoo. Critical habitat is essential to the long-term survival and recovery of a species.

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1. Introduction

Chalice Gold Mines Limited (CGML) propose to conduct exploration drilling in the Hartog and Baudin's Exploration Targets at their Julimar Nickel-Copper PGE Project (Julimar Project). As these areas are located in Julimar State Forest, CGML commissioned Western Wildlife to carry out a basic vertebrate fauna survey and targeted conservation significant mammal survey of a study area that encompassed the two exploration target areas.

The aims of the fauna survey were to:

- Identify the fauna habitats present in the study area.
- List the vertebrate fauna that were recorded in the study area and/or have the potential to occur in the study area.
- Identify species of conservation significance, or habitats of particular importance for fauna, that may occur in the study area.
- Conduct targeted camera trapping for the presence of conservation significant mammals.

This report details the findings of the fauna survey conducted in April - May 2021.

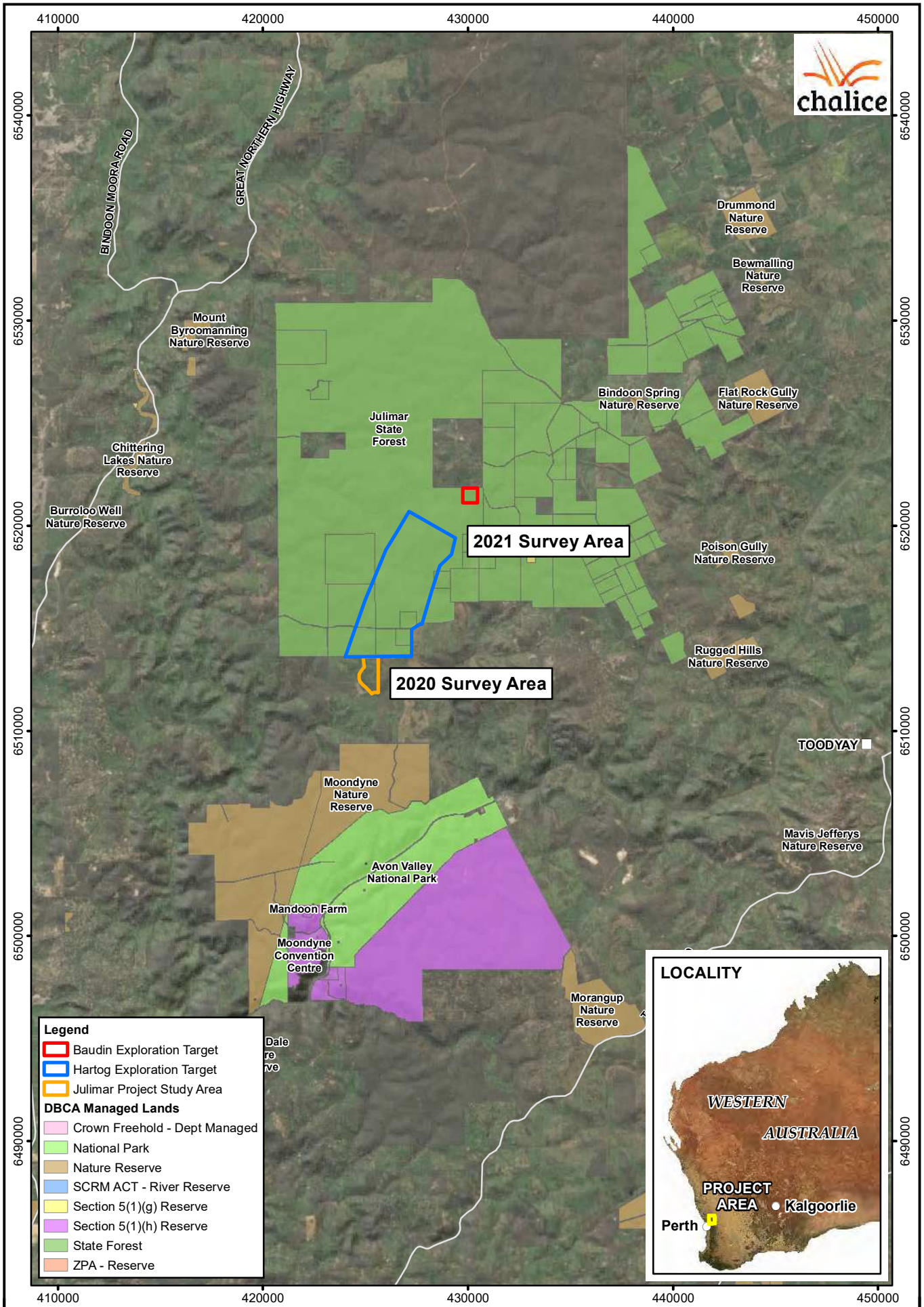
1.1 The Study Area

The study area consists of two parts: the Hartog (1,971.1ha) and Baudin (50.3ha) Exploration Targets. It is situated off Julimar Rd, Julimar, in the Shire of Toodyay. The entire study area is under native vegetation (Figure 1).

1.2 Regional Context

The study area is situated in Julimar State Forest (Figure 1). Julimar State Forest is a large area of Jarrah – Marri woodland on uplands, Wandoo woodlands in broad valleys and Powderbark Wandoo on lateritic breakaways (Johnson *et al.* 2006). Julimar is a translocation site for several conservation significant species, including the Chuditch (*Dasyurus geoffroii*), Woylie (*Bettongia penicillata ogilbyi*) and Tammar Wallaby (*Notamacropus eugenii derbianus*) (Johnson *et al.* 2006).

The study area is about 5km north of Moondyne Nature Reserve, which is contiguous with Avon Valley National Park. Avon Valley National Park is also a translocation site for threatened fauna.



- Legend**
- Baudin Exploration Target
 - Hartog Exploration Target
 - Julimar Project Study Area
- DBCA Managed Lands**
- Crown Freehold - Dept Managed
 - National Park
 - Nature Reserve
 - SCRM ACT - River Reserve
 - Section 5(1)(g) Reserve
 - Section 5(1)(h) Reserve
 - State Forest
 - ZPA - Reserve



1.2.1. Interim Biogeographic Regionalisation for Australia (IBRA) Region

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the land surface of Australia into 89 Bioregions and 419 subregions, each defined by a set of environmental influences that impact the occurrence of flora and fauna and their interaction with the physical environment (DoEE 2018).

The study area is the Northern Jarrah Forest subregion of the Jarrah Forest Bioregion according to IBRA (DoEE 2018). Occurring east of the Darling Scarp, this subregion supports Jarrah – Marri forests on lateritic soils, Wandoo – Marri woodlands on clayey soils and Powderbark Wandoo on breakaways. There are Banksia woodlands on sands in localized patches, and granites support heaths (Williams and Mitchell 2001).

Refugia identified in the subregion include release sites of the Noisy Scrub-bird (*Atrichornis clamosus*), populations of critical weight range mammals, freshwater wetlands, granite outcrops and Wandoo woodlands (such as Dryandra Woodland) that support the Numbat (*Myrmecobius fasciatus*), Woylie (*Bettongia penicillata ogilbyi*) and Tammar Wallaby (Williams and Mitchell 2001).

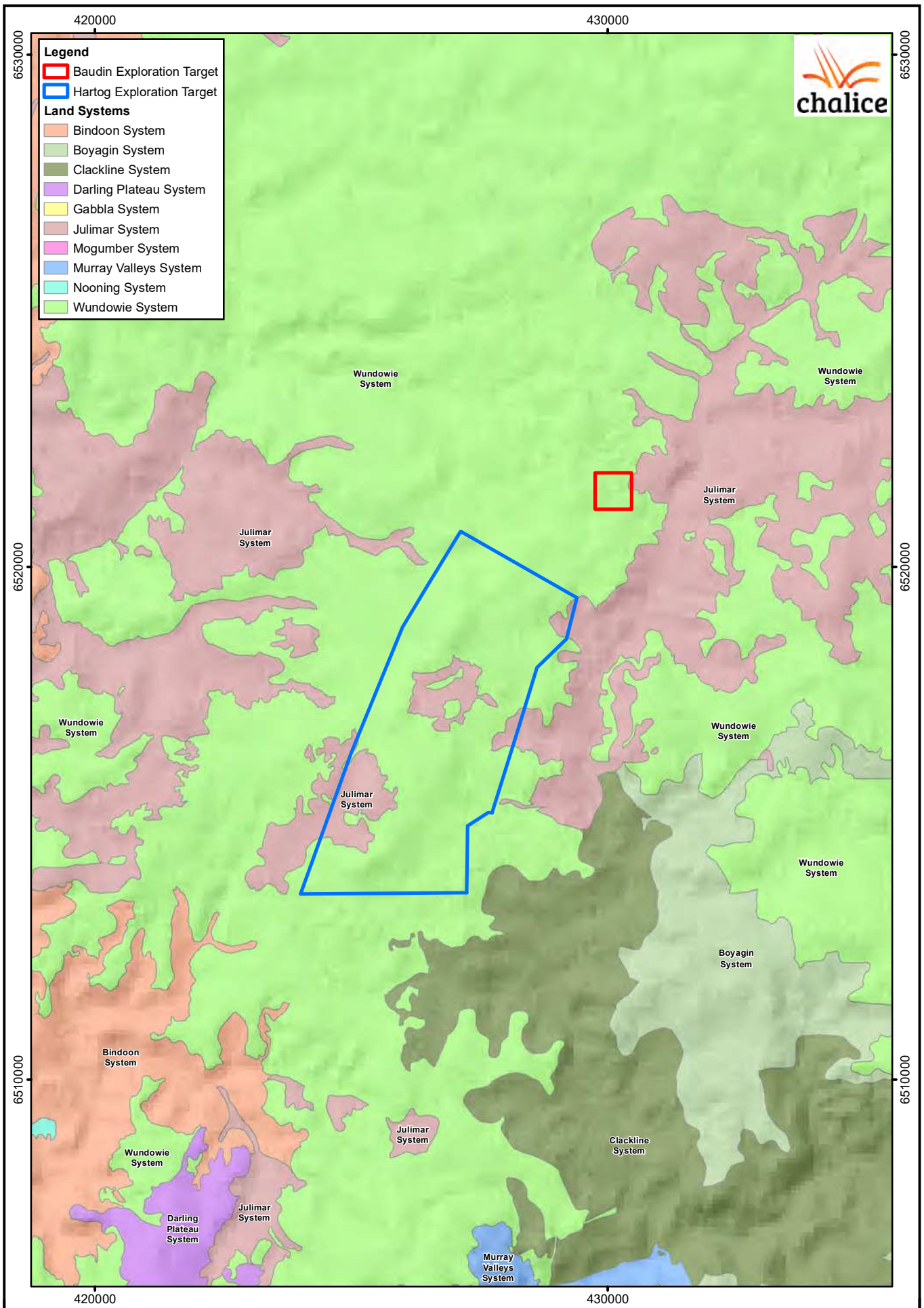
1.2.2 Land Systems

Land systems are broad descriptions of landform, geology and soils. The study area intersects two land systems (Figure 2). The land systems are characterised as follows:

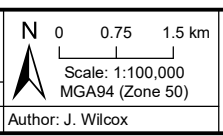
- **Julimar:** Moderately dissected areas with gravelly slopes and ridges and minor rock outcrop on the eastern side of the Darling Plateau over weathered granite and granitic gneiss. Loamy gravel, shallow duplexes and pale deep sand common. Wandoo woodlands.
- **Wundowie:** Intact undulating lateritic terrain with minor rock outcrops in the north eastern Darling Range. "Buckshot" gravels, duricrust and some deep sands vegetated by Jarrah forest.

1.2.3 Climate and Weather

The monthly climate statistics for Pearce RAAF (Bureau of Meteorology Site 009053) are shown in Figure 3 (data after BOM 2021). Pearce RAAF is about 27km southwest of the study area. The climate is Mediterranean with cold, wet winters and hot, dry summers. The mean annual rainfall (1937 – 2021) is 673.5mm. The weather during the field survey was cool, mostly sunny with some light rain (Table 1).



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 CAD Ref: a2779Fa02_02 | A4
 Date: June 2021 | Rev: A | Author: J. Wilcox



**Julimar Project (Hartog and Baudin)
 Land Systems**

Figure: **2**

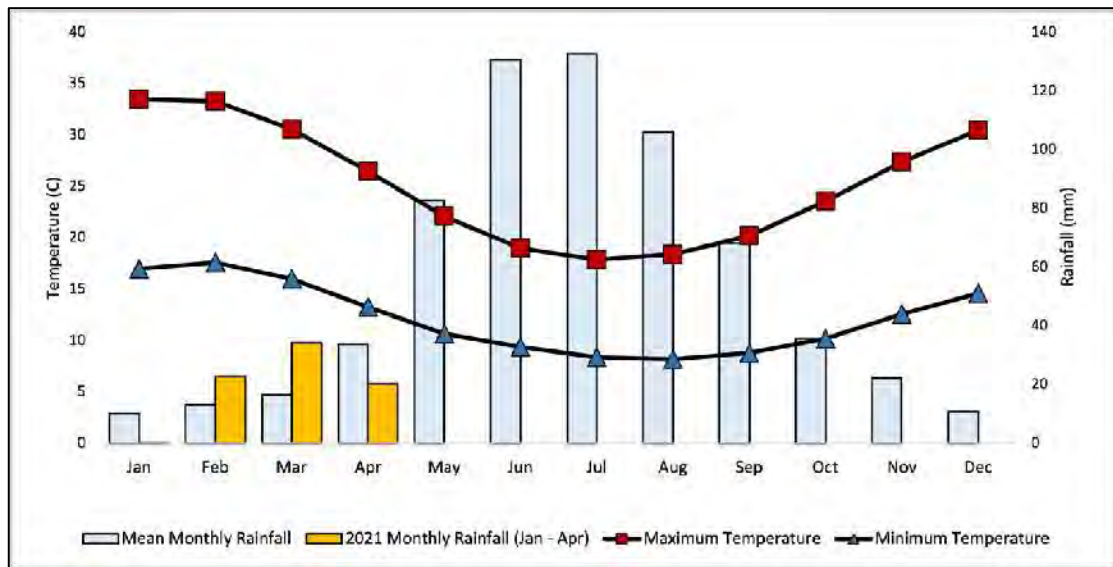


Figure 3. Climate Statistics, Pearce RAAF.

Table 1. Weather During the Field Survey (Pearce RAAF).

Field survey days shaded light green

| Date | Minimum | Maximum | Rainfall | Date | Minimum | Maximum | Rainfall |
|---------|---------|---------|----------|---------|---------|---------|----------|
| 14/4/21 | 10.8 | 26.3 | - | 01/5/21 | 13.0 | 24.9 | - |
| 15/4/21 | 11.2 | 25.6 | - | 02/5/21 | 14.5 | 28.8 | - |
| 16/4/21 | 8.4 | 26.5 | - | 03/5/21 | 14.4 | 32.0 | - |
| 17/4/21 | 14.2 | 29.4 | - | 04/5/21 | 14.5 | 26.1 | - |
| 18/4/21 | 10.9 | 23.9 | - | 05/5/21 | 15.6 | 24.6 | 2.4 |
| 19/4/21 | 16.6 | 23.8 | 6.0 | 06/5/21 | 11.6 | 17.3 | 8.6 |
| 20/4/21 | 9.6 | 25.0 | 0.8 | 07/5/21 | 10.3 | 19.2 | 2.8 |
| 21/4/21 | 13.6 | 26.2 | 0.4 | 08/5/21 | 11.8 | 19.6 | 4.2 |
| 22/4/21 | 13.0 | 25.5 | 0.2 | 09/5/21 | 4.5 | 20.2 | - |
| 23/4/21 | 13.1 | 26.3 | - | 10/5/21 | 7.1 | 26.2 | - |
| 24/4/21 | 12.4 | 23.6 | - | 11/5/21 | 3.9 | 23.3 | - |
| 25/4/21 | 16.6 | 24.5 | 1.2 | 12/5/21 | 9.0 | 29.7 | - |
| 26/4/21 | 9.8 | 27.7 | 1.0 | 13/5/21 | 15.2 | 29.8 | - |
| 27/4/21 | 8.8 | 26.3 | - | 14/5/21 | 8.6 | 25.0 | - |
| 28/4/21 | 12.1 | 22.1 | 0.2 | 15/5/21 | 5.3 | 22.4 | - |
| 29/4/21 | 8.1 | 22.2 | - | 16/5/21 | 10.0 | 23.5 | - |
| 30/4/21 | 11.3 | 21.8 | - | 17/5/21 | 10.1 | 20.3 | - |

2. Methods

2.1 Overview

This fauna survey included a search of available literature and databases (a 'desktop' study), and a field survey. The field survey comprised the following two components: a basic vertebrate fauna survey and a targeted conservation significant mammal survey. The field survey served to put the desk-top study into context, as well as allowing for the identification of fauna habitats and likely fauna assemblages of the site. The targeted surveys were designed to provide additional data on Threatened and Priority mammal species known to occur in Julimar State Forest.

2.2 Guidance Documents and Licencing

The fauna survey was conducted with reference to the following documents:

- Technical guidance: terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020)
- Referral Guidelines for Three Threatened Black-Cockatoo Species (DSEWPac 2012)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPac 2011)

The survey was undertaken under Fauna Taking (Biological Assessment) Licence BA27000274 and an Authorisation to Take or Disturb Threatened Species TFA 2020-0080.

2.3 Personnel

Ms Jenny Wilcox (*BSc.Biol./Env.Sci., Hons.Biol.*) from Western Wildlife carried out the field survey and prepared the report. Jenny Wilcox has 21 years' experience in carrying out fauna surveys in Western Australia, including in the Northern Jarrah Forest IBRA subregion.

2.4 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report follow the Western Australian Museum checklists, updated in April 2020.

2.5 Habitat Mapping

Fauna habitat mapping was undertaken using observations made by fauna personnel in the field and interpretation of aerial photography. CAD Resources produced the maps from information provided by Western Wildlife. Key habitat elements were identified for each fauna habitat. Habitat elements include (but are not restricted to) caves, rocky crevices, tree hollows, fallen logs, accumulations of leaf litter, sources of water, and/or sandy soils suitable for burrowing.

2.6 Literature Review

Lists of fauna expected to occur in the study area were produced using information from several sources. These included publications that provide information on general patterns of distribution of frogs (Tyler *et al.* 2000), reptiles (Wilson and Swan 2017, Storr *et al.* 1983, 1990, 1999 and 2002), birds (Barrett *et al.* 2003; Johnstone and Storr 1998; Johnstone and Storr 2004) and mammals (Churchill 2007, Menkhorst and Knight 2004; Van Dyck and Strahan 2008).

The databases in Table 2 were searched for fauna records in and around the study area. Some species may occur on database results that are not likely to be present in the study area, usually due either to lack of suitable habitat or that the study area is outside the known range of the species as presented in the literature (i.e., erroneous records). These species are not included in lists of expected fauna.

A previous fauna survey for the Julimar Project was undertaken in 2020, on a 130.9ha area of farmland and remnant native vegetation adjacent to the southern boundary of the current study area (Figure 1). The survey included a basic fauna survey, a cockatoo habitat survey and camera trapping at 20 sites (Western Wildlife 2020). The fauna recorded on this survey are indicated in the listed of potential fauna in Appendices 2 – 5. No other fauna surveys undertaken within 20km of the study area could be found in the public domain.

2.7 Field Studies

2.7.1 Basic Fauna Survey

The field study component of a basic fauna survey aims to inventory, so far as possible, the habitats and vertebrate fauna present on the site. As no trapping is undertaken, observations of fauna are restricted to larger diurnal species such as birds, and evidence of other species such as tracks, scats and diggings. The site was visited on the 19th April, 14th May and 17th May 2021. All vertebrate fauna encountered were recorded and notes were made on the fauna habitats present on the site.

Table 2. Databases Used in the Preparation of this Report.

| Database | Type of records held on database | Area searched |
|--|--|---|
| Western Australian Museum Specimen Databases (DBCA 2007-) | Records of specimens held in the WA Museum. Includes historical data. | 20km surrounding 31.473°S, 116.235°E. |
| Fauna Survey Returns Database (DBCA 2007-) | Records of fauna captured, observed or inferred from secondary evidence during fauna surveys. | 20km surrounding 31.473°S, 116.235°E. |
| Birds Australia Atlas Database (DBCA 2007-) | Records of bird observations in Australia, 1998-2009. | 20km surrounding 31.473°S, 116.235°E. |
| Birdata (DBCA 2007-) | Records of bird observations in Australia, 2010-2018. | 20km surrounding 31.473°S, 116.235°E. |
| Quenda Community Survey Database (DBCA 2007-) | Survey of community sightings of Quenda. | 20km surrounding 31.473°S, 116.235°E. |
| Faunafile (DBCA 2007-) | Records from DBCA's Western Shield Fauna Monitoring Database. | 20km surrounding 31.473°S, 116.235°E. |
| DBCA's Threatened and Priority Fauna Database (DBCA 2020) | Records of Threatened and Priority species in Western Australia, also drawing from the databases above. | 20km surrounding 50J 425277 E, 6512798 N. |
| Black-cockatoo breeding sites (buffered to 2km) (Birdlife Australia 2019) | Sites where Black-Cockatoos (generally Carnaby's) are confirmed to be breeding. Breeding is inferred based on surveys which have recorded either birds entering/leaving the nest or the inside of the nest has been viewed with eggs or chicks. These records are of breeding attempts, but not necessarily of successful fledging. The first surveys were in 2003, with some nests surveyed a single time and others revisited once a year. Most records are in the peak breeding season of Carnaby's (September to January). | 40km surrounding 50J 425277 E, 6512798 N. |
| Carnaby's Cockatoo confirmed breeding areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions. (Glossop <i>et al.</i> 2011) | Confirmed breeding areas of the Carnaby's Black Cockatoo (CBC) within the Swan Coastal Plain and the Jarrah Forest IBRA regions. Confirmed sites are identified where chicks or eggs of CBC have been observed. | 40km surrounding 50J 425277 E, 6512798 N. |
| Black-cockatoo roosting sites (buffered to 1km) (Birdlife Australia 2020) | Data from The Great Cocky Count which takes place annually in early to mid-April. This event records birds as they fly in to night roosts on a single day and has taken place since 2010. Three species are recorded: Carnaby's and Baudin's (white-tailed) and Forest Red-tailed Black-Cockatoos. In the Perth-Peel Coastal Plain all white-tailed are assumed to be Carnaby's. In other areas the roosts could include either species or both, so a generic 'white-tailed' term is used. | 40km surrounding 50J 425277 E, 6512798 N. |
| Carnaby's Cockatoo confirmed roosting areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions. (Glossop <i>et al.</i> 2011) | Describes the currently known and confirmed night roost areas for Carnaby's Black Cockatoo in the South - West of Western Australia. | 40km surrounding 50J 425277 E, 6512798 N. |
| EPBC Protected Matters Search Tool | Records on matters protected under the EPBC Act, including threatened species. | 5km surrounding 31.473°S, 116.235°E. |

2.7.2 Habitat Assessment

As part of the basic fauna survey, the study area was walked and habitats assessed for the potential to support conservation significant fauna. Habitat assessments were completed at 36 sites across the study area. The area traversed and the habitat assessment locations are shown in Figure 4. At each habitat assessment site, the following were recorded:

- GPS co-ordinate
- Habitat name
- Vegetation description
- Landform
- Evidence of fire
- Disturbance (e.g., weeds, clearing)
- Soil colour and type
- Rock type and presence of outcrops
- Important features that support fauna, such as:
 - Termite mounds
 - Logs and woody debris
 - Leaf litter accumulations
 - Tree hollows
 - Tree crevices or peeling bark
- Wetlands
- All fauna or evidence of fauna observed
- Representative photographs.

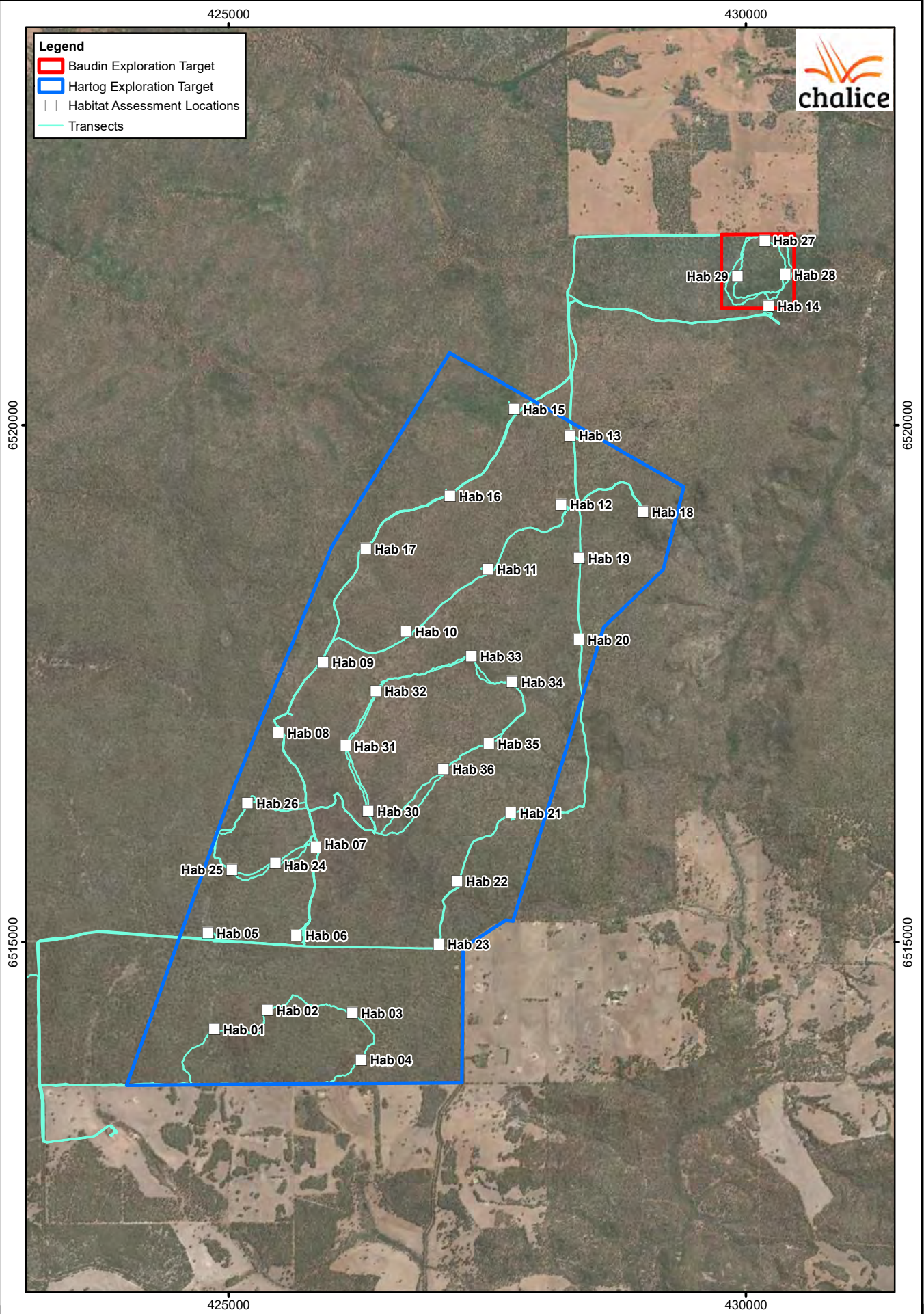
Although potential cockatoo habitat trees were not individually recorded, the habitats of the study area were examined for their potential to support one or more of the following species:

- Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*)
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*)
- Baudin's Cockatoo (*Calyptorhynchus baudinii*)

The study area was examined for the presence of vegetation types or plant species known to constitute cockatoo foraging habitat and any evidence of foraging such as chewed fruits or flowers.

Legend

- Baudin Exploration Target
- Hartog Exploration Target
- Habitat Assessment Locations
- Transects



Imagery: ESRI, Vivid (April 2019)

Drawn: CAD Resources
 www.cadresources.com.au
 Tel: (08) 9246 3242
 CAD Ref: a2779Fa02_03 | A4
 Date: June 2021 | Rev: A | Author: J. Wilcox

N 0 400 800 m
 Scale: 1:50,000
 MGA94 (Zone 50)



**Julimar Project (Hartog and Baudin)
 Transects and
 Habitat Assessments**

Figure: **4**

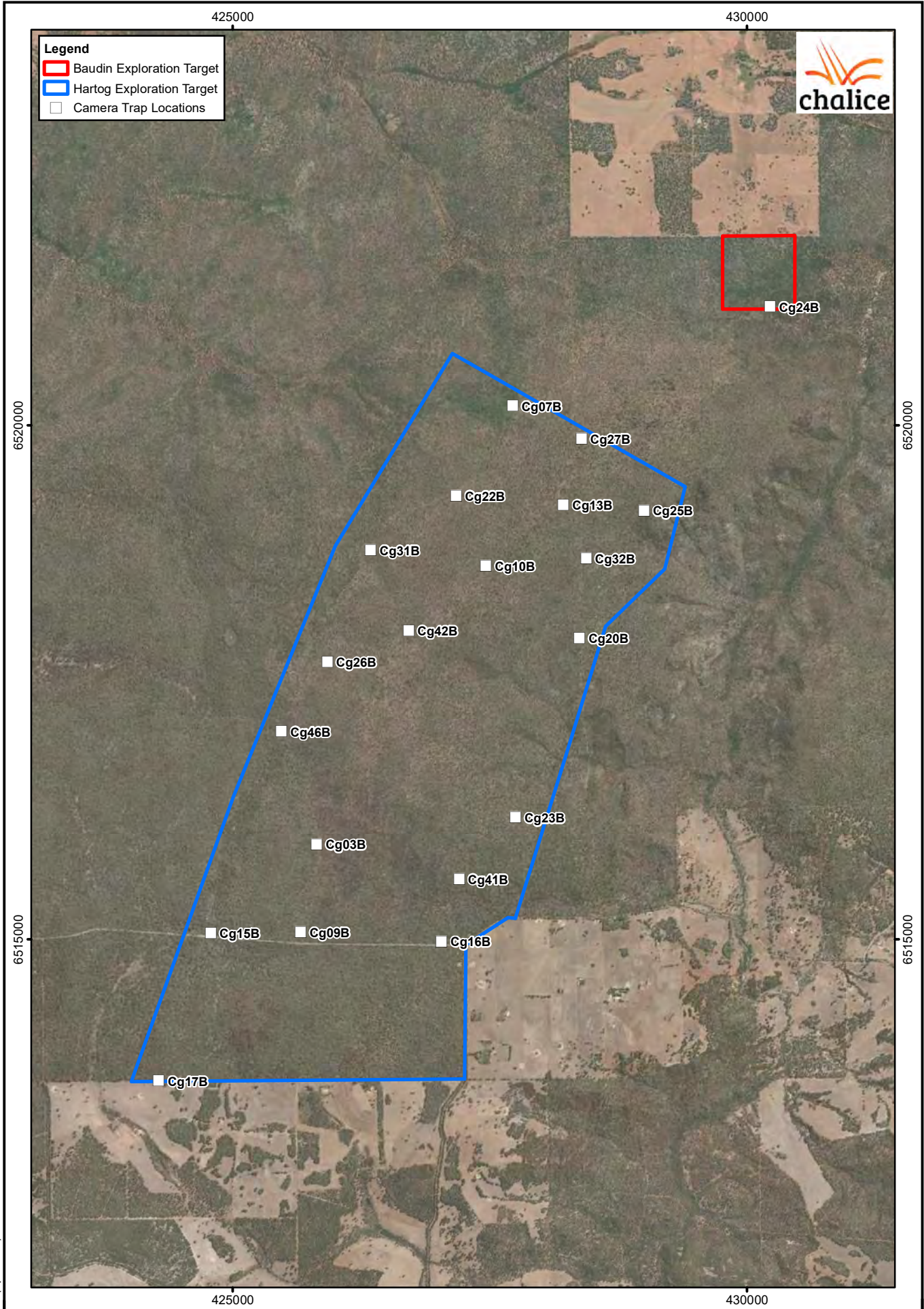
2.7.3 Targeted Conservation Significant Mammal Survey

A total of 20 camera traps were deployed across the study area with the purpose of detecting the presence of conservation significant mammals including the Chuditch (*Dasyurus geoffroii*), Woylie (*Bettongia penicillata ogilbyi*), Tammar Wallaby (*Notamacropus eugenii derbianus*), Western Brush Wallaby (*Notamacropus irma*), Brush-tailed Phascogale (*Phascogale tapoatafa*) and Quenda (*Isoodon fusciventer*) (Table 3, Figure 5).

Each camera trap was securely fastened to a tree, baited with a non-reward lure (a burley-oil-soaked sponge in a perforated PVC tube) placed in the line of sight of the camera and the lure secured to the ground with a tent peg. The cameras were left in situ for 24 nights between the 19th April and 14th May 2021, giving a total of 480 camera trap nights. The cameras were downloaded, and all fauna species recorded on each camera were identified to species level where possible.

Table 3. Camera Trap Locations and Habitat.

| Camera code | Habitat | Zone | Easting | Northing |
|-------------|----------------------------------|------|---------|----------|
| Cg03B | Jarrah – Marri woodland | 50 | 425817 | 6515924 |
| Cg09B | Jarrah – Marri woodland | 50 | 425661 | 6515068 |
| Cg10B | Jarrah – Marri woodland | 50 | 427463 | 6518633 |
| Cg13B | Jarrah – Marri woodland | 50 | 428217 | 6519226 |
| Cg15B | Wandoo woodland | 50 | 424786 | 6515060 |
| Cg16B | Jarrah – Marri woodland | 50 | 427033 | 6514981 |
| Cg17B | Jarrah – Marri woodland | 50 | 424282 | 6513624 |
| Cg20B | Jarrah – Marri woodland | 50 | 428374 | 6517930 |
| Cg22B | Jarrah – Marri woodland | 50 | 427173 | 6519312 |
| Cg23B | Jarrah – Marri woodland | 50 | 427752 | 6516184 |
| Cg24B | Wandoo – Marri woodland | 50 | 430228 | 6521152 |
| Cg25B | Wandoo – Jarrah – Marri woodland | 50 | 429003 | 6519168 |
| Cg26B | Jarrah – Marri woodland | 50 | 425922 | 6517696 |
| Cg27B | Jarrah – Marri woodland | 50 | 428392 | 6519868 |
| Cg31B | Jarrah – Marri woodland | 50 | 426342 | 6518785 |
| Cg32B | Jarrah – Marri woodland | 50 | 428439 | 6518705 |
| Cg41B | Jarrah – Marri woodland | 50 | 427203 | 6515585 |
| Cg42B | Jarrah – Marri woodland | 50 | 426713 | 6518003 |
| Cg46B | Jarrah – Marri woodland | 50 | 425474 | 6517022 |
| Cg07B | Jarrah – Marri woodland | 50 | 427725 | 6520187 |



Legend

- Baudin Exploration Target
- Hartog Exploration Target
- Camera Trap Locations



Imagery: ESRI, Vivid (April 2019)

Drawn: CAD Resources
 www.cadresources.com.au
 Tel: (08) 9246 3242
 CAD Ref: a2779Fa02_05 | A4
 Date: June 2021 | Rev: A | Author: J. Wilcox

N 0 400 800 m
 Scale: 1:50,000
 MGA94 (Zone 50)



Julimar Project (Hartog and Baudin)
Camera Trap Locations

Figure:
5

2.8 Assessment of Conservation Significance

2.8.1 Legislative Protection for Fauna

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's primary piece of environmental legislation. Listed under Part 3 of the EPBC Act are 'Matters of National Environmental Significance' (MNES); these include threatened species, threatened ecological communities and migratory species. Threatened fauna species are assessed against categories based on International Union for Conservation of Nature (IUCN) criteria.

The migratory species listed under the EPBC Act are those recognised under international agreements. These agreements are the China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), or species listed under the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) for which Australia is a range state.

Matters of National Environmental Significance (MNES) include the following categories:

- **Extinct in the wild (EW):** Taxa known to survive only in captivity.
- **Critically Endangered (Cr):** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (En):** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (Vu):** Taxa facing a very high risk of extinction in the wild in the medium-term future.
- **Migratory (Mi):** Taxa listed under international agreements to which Australia is a party.

Reports on the conservation status of most vertebrate fauna species have been produced by the federal Department of Agriculture, Water and the Environment (DAWE) in the form of Action Plans. An Action Plan is a review of the conservation status of a taxonomic group against IUCN categories. Action Plans have been prepared for amphibians (Tyler 1998), lizards and snakes (Chapple *et al.* 2019), birds (Garnett *et al.* 2011) and mammals (Woinarski *et al.* 2014). These publications also use categories similar to those used by the EPBC Act. The information presented in some of the earlier Action Plans may be out of date due to changes since publication.

The *Biodiversity Conservation Act 2016* (BC Act) is State legislation that aims to conserve and protect biodiversity and biodiversity components in Western Australia, including threatened fauna. It is administered by the Department of Biodiversity, Conservation and Attractions (DBCA). In addition to threatened fauna, the BC Act has scope to protect threatened ecological communities and important habitats.

Fauna species are listed under the BC Act as threatened species using IUCN categories, or as specially protected species, as described below.

Threatened Species:

- **Extinct in the wild (EW):** Taxa known to survive only in captivity.
- **Critically Endangered (Cr):** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (En):** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (Vu):** Taxa facing a very high risk of extinction in the wild in the medium-term future.

Specially Protected Species:

- **Migratory (Mi):** A subset of the migratory fauna that are known to visit Western Australia that are protected under the international agreements or treaties, excluding species that are listed as Threatened species.
- **Conservation dependent fauna (CD):** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened
- **Other specially protected species (OS):** fauna in need of special protection to ensure their conservation.

The BC Act supersedes the *Western Australian Wildlife Conservation Act 1950* (WC Act).

Priority species are not listed under State or Commonwealth Acts. In Western Australia, DBCA maintains a list of Priority Fauna made up of species that are possibly Threatened but do not meet adequacy of survey requirements or are otherwise data deficient. There are four levels of Priority as defined by DBCA, as listed below.

- **Priority 1:** Poorly known species (on threatened lands)
- **Priority 2:** Poorly known species in few locations (some on conservation lands)
- **Priority 3:** Poorly known species in several locations (some on conservation lands)
- **Priority 4:** Rare, near threatened and other species in need of monitoring

2.8.2 Levels of Conservation Significance in this Report

Five levels of conservation significance are used within this report to indicate the level of significance of fauna species, according to the following criteria:

- **Threatened (T):** Taxa listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable under the EPBC Act and/or BC Act. These species are grouped as they are all species considered to be at risk of extinction, are often rare and are likely to be subject to on-going threatening processes.
- **Migratory (Mi):** Taxa listed as Migratory under the EPBC Act and/or BC Act, excluding those species also listed as threatened. These species are grouped as they are not necessarily rare, but may be dependent on specific habitats for a portion of their life-cycle. For these species, loss of important foraging, breeding or stop-over sites may have a disproportionately large impact on populations.
- **Specially Protected (Sp):** Taxa listed as Other Specially Protected Species or Conservation Dependent Fauna under the BC Act. These species are not necessarily rare, but may be dependent on on-going conservation to ensure their protection.
- **Priority (P):** Taxa listed as Priority by DBCA. These species are grouped as they are either conservation dependent or data deficient and in need of further survey.
- **Locally Significant (LS):** Locally significant taxa are not listed under State or Commonwealth Acts or in publications on threatened fauna or as Priority species by DBCA, but are considered by the author to potentially be of local significance because they are at the limit of their distribution in the area, they have a very restricted range or they occur in breeding colonies (e.g. some waterbirds). This level of significance has no legislative recognition and is based on interpretation of information on the species patterns of distribution. For example, the Government of Western Australia (2000) used this sort of interpretation to identify significant bird species in the Perth metropolitan area as part of Bush Forever. Recognition of such species is consistent with the aim of preserving regional biodiversity.

2.9 Likelihood of Occurrence

Fauna of conservation significance were assessed and ranked for their likelihood of occurrence in the study area, according to the following criteria:

- **Very Low:** The study area is outside the current known distribution of the species as presented in the literature; no suitable habitat was identified as being present during the field survey; for some species, individuals may occur occasionally as vagrants, especially if suitable habitat is located nearby, but the study area itself would not support the species; includes species generally accepted as being locally extinct.
- **Low:** The study area is within or just outside the current known distribution of the species, as presented in the literature; any habitat present is either limited in extent or of marginal quality at best; no recent or nearby records of the species on databases; the species is generally known to be less common in the vicinity of the study area (e.g., for inland sites, where the species usually occurs on the coast).
- **Moderate:** The study area is within the current known distribution of the species, as presented in the literature; habitat of reasonable quality was identified as being present during the field survey; some recent and/or nearby records of the species of databases.
- **High:** The study area is well within the current known distribution of the species, as presented in the literature; habitat of good quality was identified as being present during the field survey; many recent and nearby records of the species on databases.
- **Known to Occur:** The species was positively identified in the study area during this field survey or recorded as occurring in the study area on previous recent field surveys. Note that for a species 'known to occur', the habitat may still be marginal and therefore the population may be small, or the species may visit the site irregularly.

3. Survey Limitations

All fauna surveys have limitations. Examples of possible limitations are given in the Technical Guidelines (EPA 2020) and have been addressed in Table 4.

Not all fauna species present on the site are likely to be sampled during a survey. Fauna may not be recorded because they are rare, they are difficult to trap or observe, or because they are only present on the site for part of the year. In the case of the study area, there were no limitations other than those in common with all surveys of this type. The key limitation of this survey was with the identification of tree hollows, in that it is not possible to ascertain hollow depth from a ground-level survey.

Table 4. Fauna Survey Limitations.

| Potential Limitation | Extent of limitation for the fauna survey | |
|--|---|---|
| Availability of data and information | Not limiting | The fauna of the southwest are relatively well-known, and there are many records on databases for the 20km surrounding the study area. |
| Competency/experience of the survey team, including experience in the bioregion surveyed | Not limiting | The survey was undertaken by Jenny Wilcox, who has more than 21 years' experience with fauna surveys in Western Australia. She has previously undertaken targeted surveys for Chuditch (e.g., at Forrestiana) and black-cockatoo habitat (e.g., at Collie, Mt Helena and Muchea). She has completed other surveys in the Northern Jarrah Forest subregion (e.g., in Chittering, Morangup, Beechina, Brigadoon, Red Hill, Mt Helena and Pickering Brook). |
| Scope of survey (e.g., faunal groups excluded from the survey) | Minor limitation | The level of survey undertaken restricted fauna records mainly to opportunistic observations of diurnal species, and observations in a single season. Although a limitation to describing the known faunal assemblage of the study area, this is ameliorated by the literature review and is not considered part of a basic survey. Key conservation significant mammals were targeted with camera traps. |
| Timing, weather and season | Minor limitation | The survey was undertaken outside of the main September – January breeding season for Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo, so current nesting could not be reliably determined. This is in common with many surveys of this type and hence the approach of identifying all potential habitat trees. Heavy rain was experienced during the camera trapping period. Although this has the potential to wash away the bait, it did not appear to be limiting in this case as many of the target species were recorded. |
| Disturbance that may have affected the results | Not limiting | Some of the study area had been recently burnt, however, this was unlikely to impact the survey and unburnt habitat was also present. |
| The proportion of fauna identified, recorded or collected | Minor limitation | As a basic fauna survey, the fauna identified were mostly restricted to diurnal birds and mammals, and frogs that call in winter. Additional records were obtained from the camera trapping results. |
| The adequacy of the survey intensity and proportion of survey achieved (e.g., extent to which the area was surveyed) | Not limiting | The survey was completed with a moderate intensity. Within the survey period a representative proportion of the study area was surveyed (see Figure 4). The number of camera traps deployed was large for the size of the study area and were effective at detecting several of the target species. |
| Access problems | Not limiting | Within the survey period all areas were accessible on foot and/or by vehicle (see Figure 4). |
| Problems with data and analysis, including sampling biases | Not limiting | No complex analyses were undertaken, and no problems were noted. |

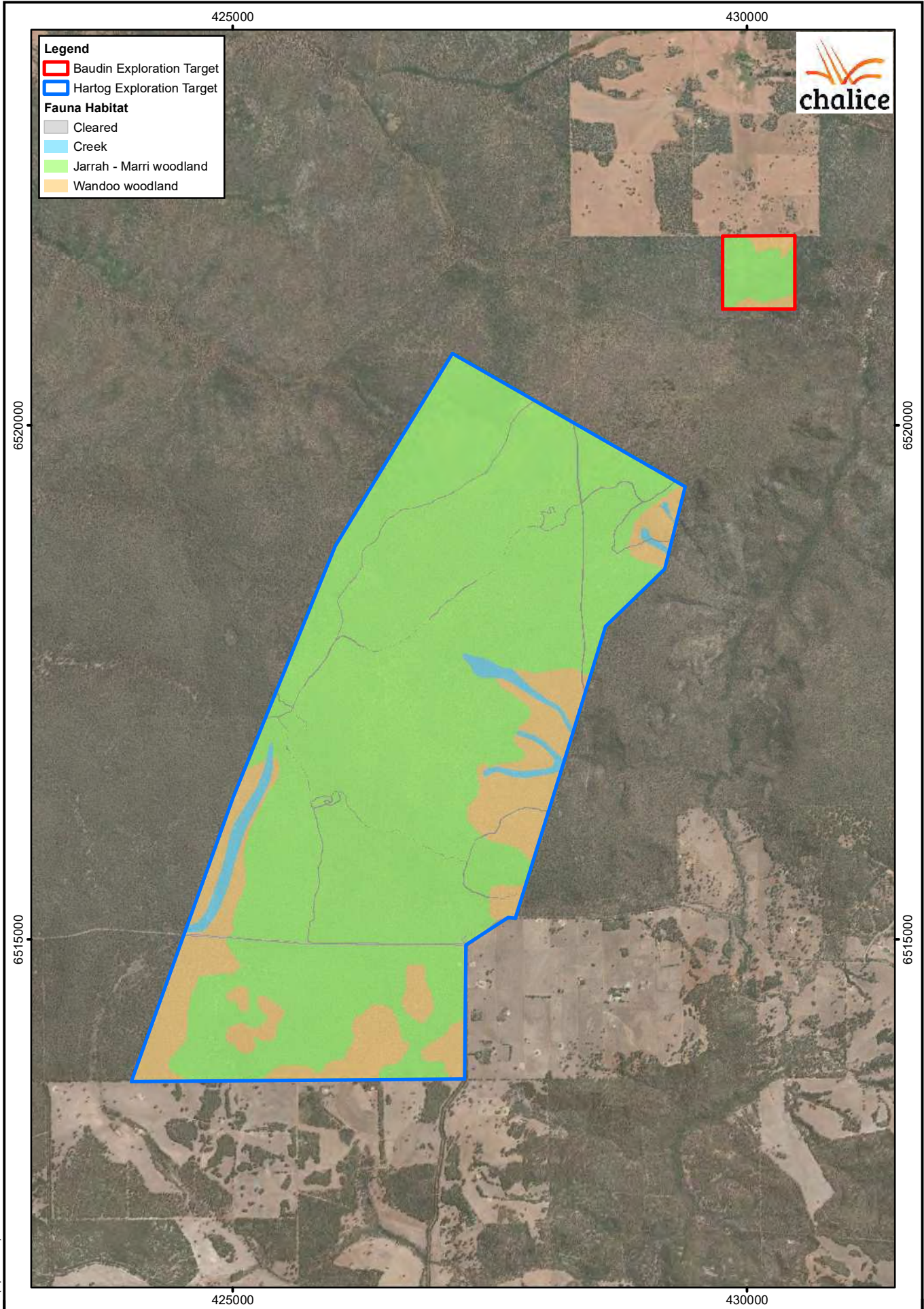
4. Fauna Habitats of the Study Area

Three broad fauna habitats were identified in the study area during the site visit: Jarrah – Marri Woodland, Wandoo Woodland and Creek (Table 5, Figure 6, Appendix 1). Each habitat is described below and presented in Figure 6. The habitats are common in Julimar State Forest. Less common habitat types, such as wetlands and granite outcrops, were absent.

Table 5. Fauna Habitats.

| Habitat | Key Habitat Elements | Area (ha) – Hartog | Area (ha) – Baudin | Total Area (ha) |
|-------------------------|---|--------------------|--------------------|-----------------|
| Jarrah – Marri woodland | <ul style="list-style-type: none"> • Trees with hollows and crevices provide shelter and breeding habitat for fauna. • Fallen logs provide shelter habitat. • Scattered surface rocks and small outcrops provide shelter for reptiles. • Patches of <i>Banksia sessilis</i> and/or <i>Banksia squarrosa</i> provide shelter and foraging habitat for nectar-feeding species. • Native understory provides habitat for terrestrial fauna. | 1,603.6 | 38.5 | 1,642.1 |
| Wandoo woodland | <ul style="list-style-type: none"> • Trees with hollows and crevices provide shelter and breeding habitat for fauna. • Fallen logs provide shelter habitat. • Scattered surface rocks and small outcrops provide shelter for reptiles. • Native understory provides habitat for terrestrial fauna. | 311.5 | 11.8 | 323.3 |
| Creek | <ul style="list-style-type: none"> • Shelter and breeding habitat for native frogs. • Emergent trees with hollows and crevices provide shelter and breeding habitat for fauna. • Dense stands of shrubs provide habitat for nesting birds. | 43.2 | - | 43.2 |
| Cleared (tracks, roads) | <ul style="list-style-type: none"> • Limited value to fauna. | 12.8 | - | 12.8 |
| Total Area: | | 1,971.1 | 50.3 | 2,021.4 |

Overall, there is little disturbance to the habitats, except that from historical logging and current access tracks. There is some illegal rubbish dumping near tracks, which may also be sources of weeds or pathogens. Parts of the study area were recently burnt in 2019.



Imagery: ESRI, Vivid (April 2019)

Drawn: CAD Resources
 www.cadresources.com.au
 Tel: (08) 9246 3242
 CAD Ref: a2779Fa02_06 | A4
 Date: June 2021 | Rev: A | Author: J. Wilcox

N 0 400 800 m
 Scale: 1:50,000
 MGA94 (Zone 50)



Julimar Project (Hartog and Baudin)
Fauna Habitats

Figure:
6

4.1 Jarrah – Marri Woodland

The Jarrah – Marri woodland occurs on the higher ground on lateritic sandy gravels with occasional surface rock outcropping (Plates 1 – 4). The canopy is mostly Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*), with occasional Wandoo (*Eucalyptus wandoo*). There are occasional patches of Bull Banksia (*Banksia grandis*) in the midstory. The understory vegetation is mostly of low mixed shrubs dominated by *Hibbertia hypericoides*, with Grasstrees (*Xanthorrhoea* sp.) and Zamia (*Macrozamia riedlei*). There are also extensive thickets of Parrotbush (*Banksia sessilis*) and/or Pingle (*Banksia squarrosa*).

Some of the larger trees contain hollows that are likely to be suitable for nesting and roosting fauna, and patches of Parrotbush, where present, are nesting habitat for birds. Fallen logs and woody debris provide shelter for ground-dwelling fauna.

Threatened fauna that are likely to be supported by this habitat include Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Forest-Red-tailed Black-cockatoo (*Calyptorhynchus banksia naso*) and the Chuditch (*Dasyurus geoffroii*). Priority fauna that may occur are the Quenda (*Isoodon fusciventer*) and Brush-tailed Phascogale (*Phascogale tapoatafa*). These are further discussed in section 5.2.



Plate 1. Jarrah - Marri woodland.



Plate 2. Jarrah - Marri woodland, recently burnt.



Plate 3. Jarrah - Marri woodland with a shrubby understory including Woollybush.



Plate 4. Jarrah – Marri woodland with *Banksia squarrosa* thicket.

4.2 Wandoo Woodland

The Wandoo woodland occurs mainly on the lower slopes and valleys on pale clay-loams (Plates 5 – 6). The canopy is mostly Wandoo (*Eucalyptus wandoo*) with scattered Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*). On laterite rises there are woodlands of Powderbark Wandoo (*Eucalyptus accedens*) (Plate 7). The understory vegetation is often sparse but consists mixed low native shrubs with grasstrees (*Xanthorrhoea* sp.). Some of the larger trees contain hollows that may be suitable for nesting and roosting fauna. Fallen logs and woody debris provide shelter for ground-dwelling fauna.

Threatened fauna that are likely to be supported by this habitat include Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Forest-Red-tailed Black-cockatoo (*Calyptorhynchus banksia naso*) and the Chuditch (*Dasyurus geoffroii*). Priority fauna that may occur are the Quenda (*Isoodon fusciventer*). These are further discussed in section 5.2.



Plate 5. Wandoo woodland.



Plate 6. Wandoo woodland with large hollow-bearing trees.



Plate 7. Powderbark Wandoo woodland on laterite rise.

4.3 Creek

The creek habitat consists of small seasonal or ephemeral channels (Plates 8 - 9). Some are open with little understory, and some have a shrubby understory. Some of the larger trees contain hollows that may be suitable for nesting and roosting fauna, and the patches of dense understory, where present, provide shelter for ground-dwelling fauna or nesting birds. The creek channels and adjacent seasonally wet areas provide damp habitats for native frog species.

Priority fauna likely to be supported by this habitat is the Quenda (*Isoodon fusciventer*). Threatened fauna, include Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Forest-Red-tailed Black-cockatoo (*Calyptorhynchus banksia naso*) and the Chuditch (*Dasyurus geoffroii*) may also occur. These are further discussed in section 5.2.



Plate 8. Creek with shrubby vegetation and a Jarrah – Marri – Wandoo canopy.



Plate 9. Minor creek with small channel and a Wandoo canopy.

5. Vertebrate Fauna of the Study Area

5.1 Vertebrate Fauna Assemblage

The results of the literature review and field survey were combined to create a list of all the vertebrate fauna potentially occurring in the study area (Appendices 2 - 5). Indicated in the fauna lists are all the species observed during the fauna survey, those recorded previously on the Julimar Project and those recorded in the region as part of the literature review (see Table 2 for search areas). The results of the EPBC Act Protected Matters search are given in Appendix 6. All fauna recorded on this survey are listed in Appendix 7.

The potentially occurring vertebrate faunal assemblage is summarised in Table 6. The overall vertebrate faunal assemblage is likely to be relatively intact, as the study area is set within a relatively large area of native vegetation and the habitats are in good condition.

Table 6. Summary of Vertebrate Fauna Potentially Occurring in the Study Area.

| Taxon | Total Species | Introduced Species | Conservation Significant Species | | | | |
|----------------|---------------|--------------------|----------------------------------|-----------|---------------------|---------------|---------------------|
| | | | Threatened | Migratory | Specially Protected | DBCA Priority | Locally Significant |
| Amphibians | 16 | 0 | - | - | - | - | - |
| Reptiles | 54 | 0 | - | - | - | 1 | 1 |
| Birds | 99 | 2 | 3 | 1 | 1 | 1 | - |
| Mammals | 33 | 6 | 3 | - | 1 | 3 | - |
| Totals: | 202 | 8 | 6 | 1 | 2 | 5 | 1 |

5.1.1 Amphibians

Up to 16 species of frog occur in the study area, of which one was recorded opportunistically during this survey and a further two species were recorded in the Julimar Project to the south of the current study area (Appendix 2). The creek habitat provides shelter and breeding habitat for frogs. Some frog species, such as the Slender Tree Frog (*Litoria adelaidensis*) and Motorbike Frog (*Litoria moorei*) require permanent water or permanently damp situations and are likely to be restricted to the creek habitat, if present. Burrowing species, such as the Moaning Frog (*Heleioporus eyrei*) and Banjo Frog (*Limnodynastes dorsalis*), breed around seasonal water but can range widely in terrestrial habitats during the non-breeding season. These species are also likely to be found in the Jarrah – Marri and Wandoo woodlands.

5.1.2 Reptiles

Up to 54 species of reptile potentially occur in the study area (Appendix 3). Only three species, were recorded during the field survey, but this is consistent with a basic fauna survey in the cooler months. Important habitat elements for reptiles include fallen timber, tree crevices and hollows, loose bark on trees, leaf litter, surface rocks and the loose sandy surface (for fossorial species).

The study area is likely to support an intact reptile assemblage. The reptile assemblage of each habitat is likely to be similar, with many species occurring across all habitats and only a few species restricted to a particular habitat. For example, the South-west Cool Skink (*Acritoscincus trilineatus*) is likely to favour the creek habitat but is also likely to range into adjacent areas of woodlands. The Reticulated Velvet Gecko (*Hesperoedura reticulata*) prefers the smooth-barked trees in the Wandoo woodland habitat but may also range into Jarrah-Marri woodland.

5.1.3 Birds

There are 99 species of bird that have the potential to occur in the study area, of which 39 were recorded during the field survey (Appendix 4). The bird assemblage is likely to be relatively intact, and most species are likely to occur in all habitats. A few species may favour one habitat, such as the Crested Shrike-tit (*Falcunculus frontatus*) and Rufous Treecreeper (*Climacteris rufus*), both of which prefer Wandoo woodlands.

Many birds are highly mobile and will move into and out of the study area on a daily or seasonal basis. For example, when flowering, the eucalypt canopy is likely to attract honeyeaters. Trees with hollows may support nesting parrots, pardalotes, kingfishers or owls. Small insectivores such as the Splendid Fairywren (*Malurus splendens*) are more sedentary and are likely to favour habitats with dense native understory, such as patches of Woollybush or *Banksia squarrosa* thickets in the Jarrah-Marri woodland. For wide-ranging species, such as many birds of prey, the study area would represent only a portion of a much larger home-range.

Although many waterbirds are known from the region, only those that nest in tree hollows (four species of duck) have been included in Appendix 4. The creek habitat may attract a few other common waterbird species from time to time but is unlikely to be important habitat for foraging or breeding waterbirds.

5.1.4 Mammals

There are 31 species of mammal that have the potential to occur in the study area, of which 25 are native and six introduced (Appendix 5). Twelve mammals (eight native and four introduced) were recorded during the field survey using camera traps. A dunnart (*Sminthopsis* sp.) was also observed on camera, but unable to be identified to species level as three species potentially occur.

The mammal assemblage of the study area is likely to be relatively intact, as the habitats are in good condition and situated in a large area of remnant forest. As Julimar State Forest has been a release site for translocated populations of conservation significant mammals, several species are present that are locally extinct in other parts of their natural range, including the Woylie (*Bettongia penicillata ogilbyi*), Chuditch (*Dasyurus geoffroii*) and Tammar Wallaby (*Notamacropus eugenii derbianus*). These species are further discussed in section 5.2.

A large proportion of the mammal species on the list in Appendix 5 are insectivorous bats. Bats may roost in crevices, loose bark or hollows in trees, foraging under the woodland canopy at night. The Common Brushtail Possum (*Trichosurus vulpecula*) was recorded on two of the 20 camera traps in the study area (Plate 10) and would also use tree hollows for shelter. The Echidna (*Tachyglossus aculeatus*) was common, observed on 15 of the 20 camera traps and likely to occur in all habitats.



Plate 10. Brush-tailed Possum and Echidna Recorded on Camera Traps in the Study Area.

Feral mammals recorded were the Cat (*Felis catus*), Fox (*Vulpes vulpes*), Rabbit (*Oryctolagus cuniculus*) and Pig (*Sus scrofa*). Of the 20 camera traps deployed, the Cat was recorded on two and the Fox was recorded on five. The remaining species were not recorded on cameras but were observed from their secondary signs such as diggings and scats.

5.2 Vertebrate Fauna of Conservation Significance

There are 15 vertebrate fauna of conservation significance that potentially occur in the study area: six Threatened, one Migratory, two Specially Protected, five Priority and one Locally Significant species. Each species is summarised in Table 7 and discussed in the sections below.

Conservation significant fauna recorded within 20km of the Survey Area on DBCA's Threatened and Priority Fauna Database are shown in Figure 7. Note that some of the points shown have been generalized by DBCA to protect the exact location of protected species. Records of conservation significant fauna made on this survey are shown in Figure 8. Figure 9 shows confirmed breeding and roosting sites for cockatoos (mainly Carnaby's) in the region surrounding the study area. Note that these sites are shown as buffered by 2 – 12km.

One recorded on DBCA's Threatened and Priority Fauna Database, the Woma (*Aspidites ramsayi*; Priority 1), was omitted from the list in Appendix 3 and the discussion below. This record is listed as uncertain, the habitats in the study area are unsuitable for this species and it is generally thought to be locally extinct.

A number of bird species occur on databases (Figure 7, Appendix 6) but would not occur in the study area as either their habitats are absent or they are locally extinct. These include migratory shorebirds such as the Australia Painted Snipe (*Rostratula australis*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Pectoral Sandpiper (*Calidris melanotos*), Eastern Curlew (*Numenius madagascariensis*), Common Sandpiper (*Tringa hypoleucos*), Common Greenshank (*Tringa nebularia*) and Grey Wagtail (*Motacilla cinerea*). The Blue-billed Duck (*Oxyura australis*) requires deep waters which are absent from the study area and the Osprey (*Pandion haliaetus*) occurs primarily in coastal areas. Muir's Corella (*Cacatua pastinator pastinator*) may be an erroneous record, as this subspecies is only known from the southwest in the vicinity of Boyup Brook, Bridgetown and Rocky Gully. The Malleefowl is generally thought to be locally extinct in the area and there are no records of this species in the area on DBCA's Threatened and Priority Fauna Database (Figure 7). These species have been excluded from the list of potentially occurring birds in Appendix 4 and are not discussed further.

There is one mammal listed on DBCA's Threatened and Priority Fauna Database for the area that has been excluded from the list in Appendix 5 and the discussion below. The Bilby (*Macrotis lagotis*; Threatened) is known only from historical records and is locally extinct.

Table 7. Summary of Conservation Significant Vertebrate Fauna.

Key to status: Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, Mi = Migratory, OS = Other Specially Protected, CD = Conservation Dependent, P1 – P4 = Priority 1 – 4, LS = Locally Significant.

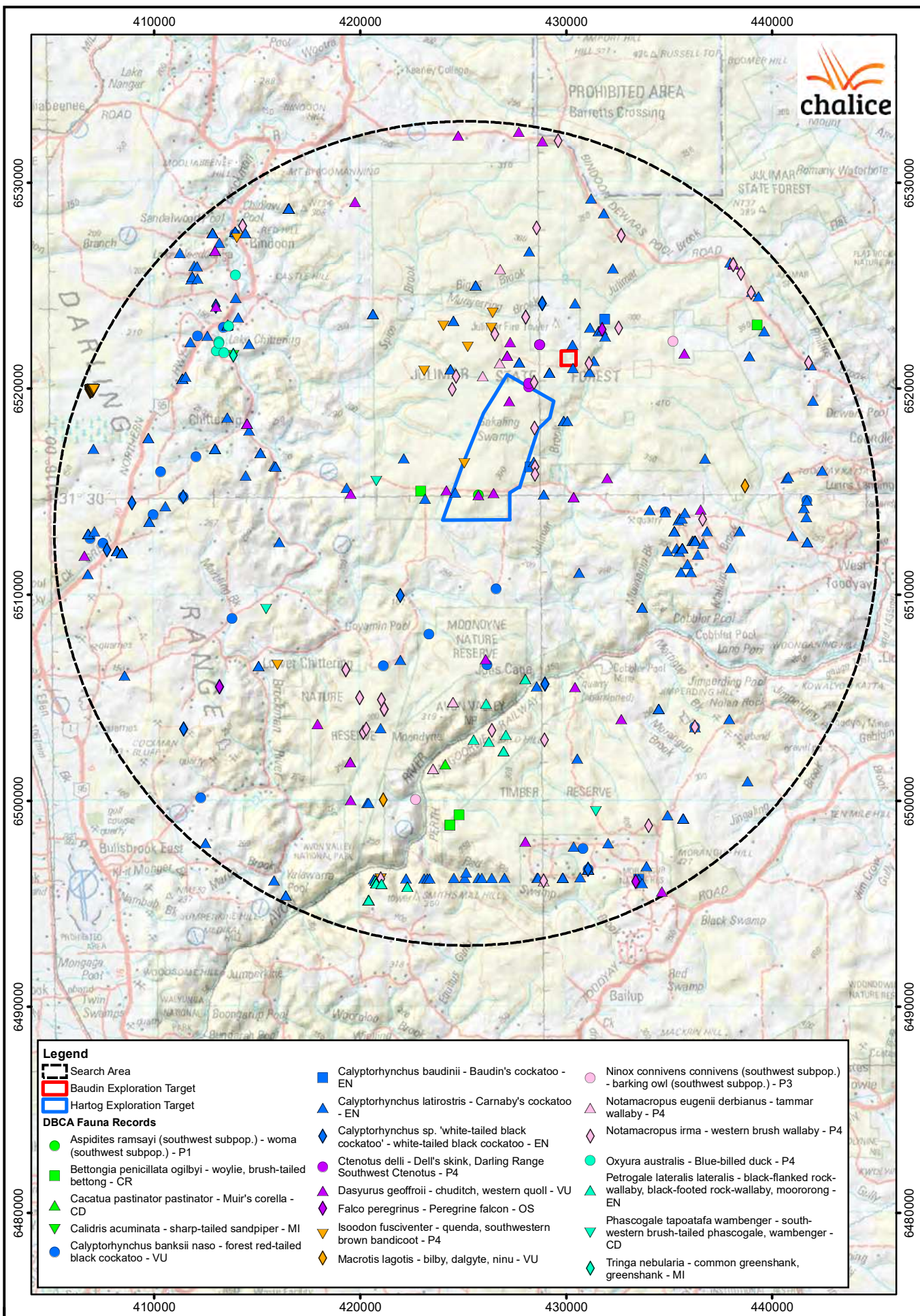
| Species | Conservation Status | | | | Records within 20km (DBCA 2020, see also Figure 7) | Likelihood of Occurrence | Potential habitat use in the Study Area |
|--|---------------------|--------|---------------|---------------------|--|--------------------------|--|
| | EPBC Act | BC Act | DBCA Priority | Locally significant | | | |
| Threatened Species | | | | | | | |
| <i>Calyptorhynchus banksii naso</i> Forest Red-tailed Black Cockatoo | Vu | Vu | - | - | Recorded on this survey, Apr-May 2021. Foraging signs and birds heard. 20 nearby records (DBCA 2020). Records from Chittering (2006, 2007, 2015, 2017), Moondyne Nature Reserve (2017), Morangup (2015, 2017), Bindoon (2015) and Julimar (2013). | Known to occur | A resident or seasonal visitor, foraging in Jarrah – Marri woodland and possibly breeding in tree hollows in Jarrah, Marri or Wandoo. |
| <i>Calyptorhynchus latirostris</i> Carnaby's Black-Cockatoo | En | En | - | - | Recorded on this survey, Apr-May 2021. Foraging signs recorded. 298 nearby records (DBCA 2020). Records from Bindoon, Chittering, Morangup, Julimar, Dewars Pool, West Toodyay, Coondle and Avon Valley National Park. | Known to occur | A seasonal visitor, foraging in Jarrah – Marri woodland, <i>Banksia</i> thickets and possibly breeding in tree hollows in Jarrah, Marri or Wandoo. |
| <i>Calyptorhynchus baudinii</i> Baudin's Black-Cockatoo | Vu | Vu | - | - | 3 records (DBCA 2020). 2 records in Julimar (2004, 2007), 1 in Morangup (1999). | Low | An uncommon winter visitor, foraging in Jarrah – Marri woodland. |
| <i>Dasyurus geoffroii</i> Chuditch | Vu | Vu | - | - | Recorded on this survey, Apr-May 2021. Recorded on several camera traps. 36 nearby records (DBCA 2020). Translocation records from Julimar (1992, 1993), other records from Julimar (2000, 2014), Moondyne (1984, 1989, 1990), Bindoon (1993, 2000, 2003, 2015), Morangup (2018), Avon Valley National Park (2011, 2012), Chittering (1973, 1985, 2016) and Dewars Pool (2000). | Known to occur | Likely to be a breeding resident occurring in all habitats, denning in hollow logs, rock piles and possibly tree hollows. |
| <i>Bettongia penicillata ogilbyi</i> Woylie | En | Cr | - | - | Recorded on this survey, Apr-May 2021. Recorded on camera traps. 5 records (DBCA 2020). Translocation records from Avon Valley National Park (2002, 2003), other records from Julimar (2019) and Dewars Pool (2015). | Known to occur | Likely to be a breeding resident occurring in all habitats. |
| <i>Petrogale lateralis lateralis</i> Black-flanked Rock-wallaby | En | En | - | - | 42 records (DBCA 2020). Records of translocations to Avon Valley National Park (2001, 2002, 2010) and Paruna Sanctuary (2001, 2002, 2003), other records from Avon Valley National Park (2010 – 2017) and Moonyne (2014). | Very low | May disperse through the study area but unlikely to use any habitat in the study area. |

Table 7. (cont.)

| Species | Conservation Status | | | | Records within 20km (DBCA 2020, see also Figure 7) | Likelihood of Occurrence | Potential habitat use in the Study Area |
|---|---------------------|--------|---------------|---------------------|--|--------------------------|--|
| | EPBC Act | BC Act | DBCA Priority | Locally significant | | | |
| Migratory Species | | | | | | | |
| <i>Apus pacificus</i> Fork-tailed Swift | Mi | Mi | - | - | No records within 20km. | Moderate | May overfly study area but unlikely to use any habitat in the study area. |
| Specially Protected Fauna | | | | | | | |
| <i>Falco peregrinus</i> Peregrine Falcon | - | OS | - | - | 3 records (DBCA 2020). Records from Lower Chittering (1980), Julimar (2000) and Morangup (2006). | Moderate | Possible foraging visitor over pasture, that may breed in tall trees in woodlands. The study area would be part of a much larger home-range for a single pair. |
| <i>Phascogale tapoatafa</i> Brush-tailed Phascogale | - | CD | - | - | 3 records (DBCA 2020). Records from Lower Chittering (2005), Mortimer (1994) and Avon Valley National Park (2013). | High | Likely to be a breeding resident occurring in all habitats. |
| DBCA Priority Fauna | | | | | | | |
| <i>Ninox connivens connivens</i> Barking Owl | - | - | P3 | - | 2 records (DBCA 2020). Records from Avon Valley National Park (1994) and Julimar (1999). | Moderate | Possible breeding resident, breeding in large tree hollows. The study area would be part of a much larger home-range for a single pair. |
| <i>Ctenotus delli</i> Dell's Ctenotus | - | - | P4 | - | 5 records (DBCA 2020). Records from Julimar (1983, 1994, 1999). | High | Likely to be a breeding of Jarrah-Marri woodland. |

Table 7. (cont.)

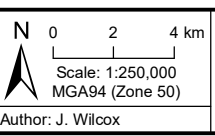
| Species | Conservation Status | | | | Records within 20km (DBCA 2020, see also Figure 7) | Likelihood of Occurrence | Potential habitat use in the Study Area |
|--|---------------------|--------|---------------|---------------------|---|--------------------------|---|
| | EPBC Act | BC Act | DBCA Priority | Locally significant | | | |
| <i>Isoodon fusciventer</i> Quenda | - | - | P4 | - | 123 records (DBCA 2020). Records from Bindoon (2013), Lower Chittering (2005, 2012), Paruna Sanctuary (2000), Julimar (2006, 2011), Avon Valley National Park (2013) and Mortimer (1994). | High | Likely to be a breeding resident occurring in all habitats but favouring creek and woodlands with a dense understory. |
| <i>Notamacropus eugenii derbianus</i> Tammar Wallaby | - | - | P4 | - | Recorded on this survey, Apr-May 2021. Recorded on camera traps. 34 records (DBCA 2020). Translocation records from Avon Valley National Park (2001, 2002, 2003) and Julimar (1998). Other records from Avon Valley National Park/Paruna Sanctuary (2010 – 2016), Morangup (2004) and Julimar (2004). | Known to occur | Likely to be a breeding resident occurring in all habitats. |
| <i>Notamacropus irma</i> Western Brush Wallaby | - | - | P4 | - | Recorded on this survey, Apr-May 2021. Recorded on camera traps. 53 records (DBCA 2020). Records from Lower Chittering (2012), Dewars Pool (2000), Morangup (2004, 2012), Julimar (2000, 2004, 2006), Avon Valley National Park (2010, 2012, 2017), Bindoon Springs Nature Reserve (2000) and Moodyne (2010, 2012) | Known to occur | Likely to be a breeding resident occurring in all habitats. |
| Locally Significant Fauna | | | | | | | |
| <i>Morelia spilota imbricata</i> Carpet Python | - | - | - | LS | Recorded on the WA Museum Specimen Database (Appendix 3). | High | May occur in woodland habitats, sheltering in tree hollows, rock piles and hollow logs. |



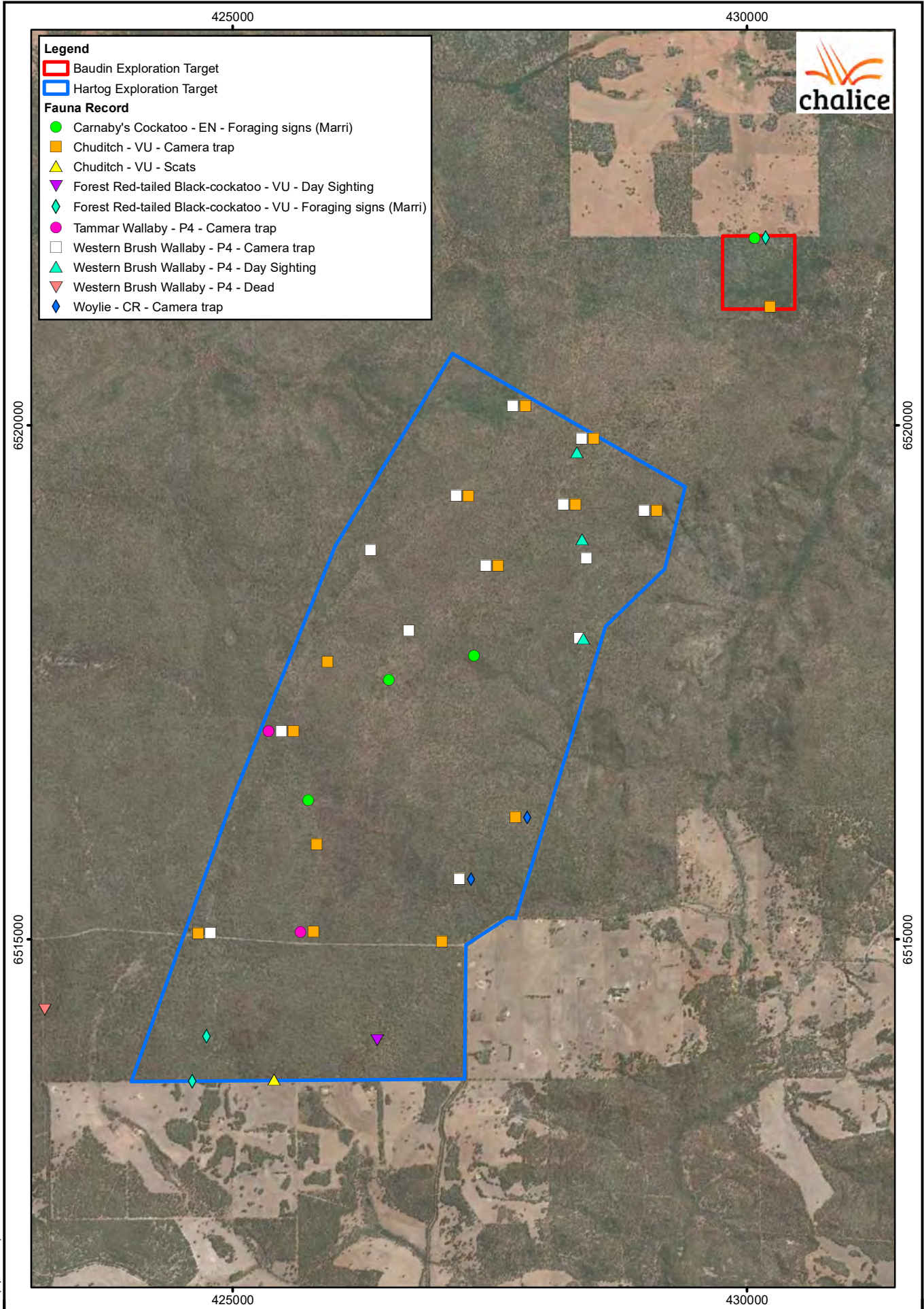
Legend

- Search Area
 - Baudin Exploration Target
 - Hartog Exploration Target
- DBCA Fauna Records**
- *Aspidites ramsayi* (southwest subpop.) - woma (southwest subpop.) - P1
 - *Bettongia penicillata ogilbyi* - woylie, brush-tailed bettong - CR
 - ▲ *Cacatua pastinator pastinator* - Muir's corella - CD
 - ▼ *Calidris acuminata* - sharp-tailed sandpiper - MI
 - *Calyptorhynchus banksii naso* - forest red-tailed black cockatoo - VU
 - *Calyptorhynchus baudinii* - Baudin's cockatoo - EN
 - ▲ *Calyptorhynchus latirostris* - Carnaby's cockatoo - EN
 - ◆ *Calyptorhynchus* sp. 'white-tailed black cockatoo' - white-tailed black cockatoo - EN
 - *Ctenotus delli* - Dell's skink, Darling Range Southwest Ctenotus - P4
 - ▲ *Dasyurus geoffroi* - chuditch, western quoll - VU
 - ◆ *Falco peregrinus* - Peregrine falcon - OS
 - ▼ *Isoodon fusciventer* - quenda, southwestern brown bandicoot - P4
 - ◆ *Macrotis lagotis* - bilby, dalgyte, ninu - VU
 - *Ninox connivens connivens* (southwest subpop.) - barking owl (southwest subpop.) - P3
 - ▲ *Notamacropus eugenii derbianus* - tammar wallaby - P4
 - ◆ *Notamacropus irma* - western brush wallaby - P4
 - *Oxyura australis* - Blue-billed duck - P4
 - ▲ *Petrogale lateralis lateralis* - black-flanked rock-wallaby, black-footed rock-wallaby, moororong - EN
 - ▼ *Phascogale tapoatafa wambenger* - south-western brush-tailed phascogale, wambenger - CD
 - ◆ *Tringa nebularia* - common greenshank, greenshank - MI

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 Date: June 2021 Rev: A Author: J. Wilcox



**Julimar Project (Hartog and Baudin)
 DBCA Records of
 Vertebrate Fauna**



Imagery: ESRI, Vivid (April 2019)

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 Date: June 2021 | Rev: A

Scale: 1:50,000
 MGA94 (Zone 50)
 Author: J. Wilcox



**Julimar Project (Hartog and Baudin)
 Conservation Significant
 Fauna Recorded**

Figure: **8**

5.2.1 Threatened Fauna

Threatened species are those that are considered in danger of extinction as their populations have declined and/or are still declining, and their total population size is small and/or fragmented or geographically restricted. Sites that support these species are likely to be important for their long-term conservation, particularly if the site supports a resident breeding population. An area of habitat that is essential to the conservation of a listed species can be considered 'habitat critical to the survival' of the species. Critical habitat is usually defined in recovery plans and is different for each species.

Six Threatened species potentially occur in the study area, of which four were recorded on this survey.

Woylie - *Bettongia penicillata ogilbyi*

The Woylie is listed as Endangered under the EPBC Act and Critically Endangered under the BC Act.

The Woylie was formerly widespread across much of Australia south of the tropics, but by 1970 was restricted to four subpopulations in Western Australia (TSSC 2018). Initial translocation efforts resulted in a population increase, but it suffered a catastrophic population decline between 2000 and 2010, dropping by about 90% (Woinarski *et al.* 2014). There are translocated populations at Julimar Forest, as well as nearby at Avon Valley National Park (about 8km south of the study area), although the latter is thought to have failed (Woinarski *et al.* 2014, TSSC 2018).

Key threats impacting this species are predation by feral cats and foxes, habitat loss and inappropriate fire regimes (TSSC 2018, Woinarski *et al.* 2014). Cats and foxes predate on young Woylies and appropriate fire regimes are required to maintain the dense protective cover of understory vegetation.

The Woylie used to inhabit a wide variety of habitats, but the remnant subpopulations occur in woodlands and heaths. During the day, this species rests in a concealed nest built over a small depression on the ground (TSSC 2018). Habitat critical to the survival of the species is considered to include tall eucalypt forests or woodlands, dense myrtaceous shrubland and proteaceous or mallee heath that either currently support Woylies or have the potential to support Woylies (Yeatman and Groom 2012).

There are five records of this species within 20km on DBCA's Threatened and Priority Fauna Database (Figure 7), ranging from 2002 to 2019. The 2019 record is from the corner of Julimar and Keating Rd, about 1.7km west of the study area. The Woylie was recorded on two of the 20 camera traps in the study area (Figure 8, Plate 11). This species potentially occurs throughout the study area.



Plate 11. Woylie Recorded on Camera Traps in the Study Area.

Chuditch – *Dasyurus geoffroi*

The Chuditch is listed as Vulnerable under the BC Act and EPBC Act.

The Chuditch used to occur across much of Australia but is now restricted to the southwest of Western Australia. It is vulnerable to predation by foxes and increases in areas where fox control is undertaken (Burbidge 2004). Although they used to occupy a variety of habitats, the majority of Chuditch now occur in the Jarrah forest with some wheatbelt populations in drier woodlands, heath and mallee shrublands (Van Dyck and Strahan 2008; Orrell and Morris 1994).

There are many records within 20km on DBCA's Threatened and Priority Database, including records from Julimar State Forest and Avon Valley National Park (Figure 7). Chuditch were reintroduced to Julimar State Forest in the 1990s and is now considered by DBCA to be one of the healthiest Chuditch populations in Western Australia. The Chuditch was recorded in the study area, on 17 of the 20 camera traps deployed (Figure 8, Plate 12). The Chuditch is likely to use all habitats in the study area, using hollow logs, rock crevices and possibly tree hollows as daytime shelter.



Plate 12. Chuditch Recorded on Camera Traps in the Study Area.

Black-flanked Rock-wallaby – *Petrogale lateralis lateralis*

The Black-flanked Rock-wallaby is listed as Endangered under the BC Act and EPBC Act.

The Black-flanked Rock-wallaby is endemic to Western Australia and currently confined to small patches of suitable habitat across the central and southern part of the State (TSSC 2016). It is known from translocated populations in Avon Valley National Park and Paruna Sanctuary, about 9km and 18km south of the study area respectively. Records from these populations are shown on Figure 7. This species inhabits rocky habitats including caves, scree and boulder piles, foraging in close proximity to shelter sites. As the study area lacks these rocky habitats, the Black-flanked Rock-wallaby is unlikely to occur, however, there is a small possibility that wallabies could disperse through the study area.

Carnaby's Cockatoo – *Calyptorhynchus latirostris*

Carnaby's Cockatoo is listed as Endangered under the BC Act and EPBC Act.

Carnaby's Cockatoo is endemic to the southwest of Western Australia, occurring mostly in the wheatbelt but also on the Swan Coastal Plain and wetter southwest (Johnstone and Storr 1998). The population size is estimated to be 40,000 birds (or possibly between 10,000 – 60,000) (Garnett *et al.* 2011). There are many records of this species within 20km on DBCA'S Threatened and Priority Fauna Database (Figure 7). The study area is within the Bindoon - Julimar Key Biodiversity Area (KBA), an area that supports at least 1% of the breeding population of Carnaby's Cockatoo, as well as providing foraging habitat (Birdlife International 2021a). There are many confirmed breeding sites in the region (Figure 9).

Typically, Carnaby's Cockatoo breeds in the wheatbelt region of Western Australia, nesting in large hollows in smooth-barked eucalypts such as the Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*). However, it has started breeding in areas further west and south than its traditional breeding range, including areas in the Darling Range and on the Swan Coastal Plain (Johnstone *et al.* 2005, Johnstone *et al.* 2011). Eggs are laid from early July to mid-October (Johnstone and Storr 1998).

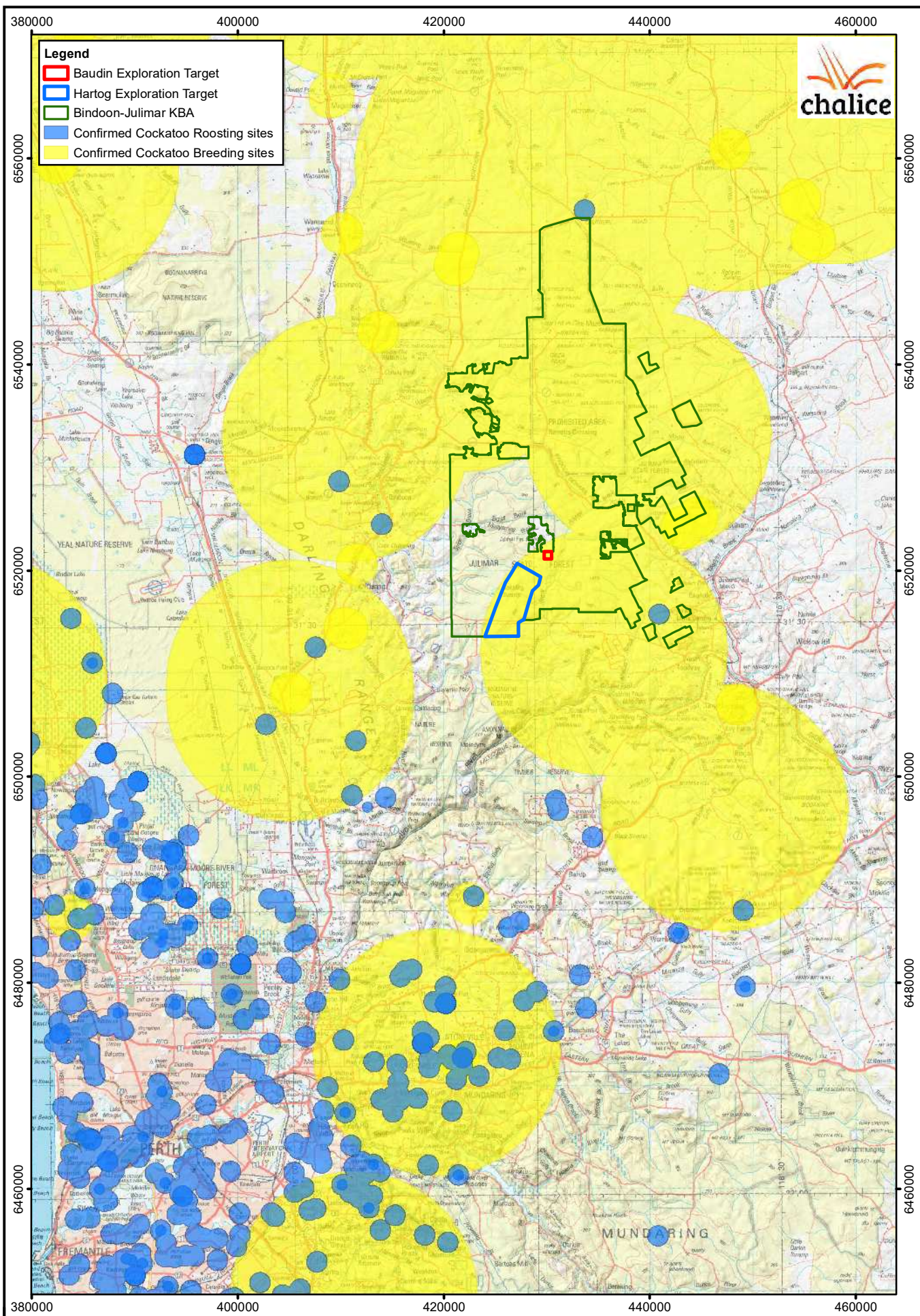
Some of the Carnaby's Cockatoo population is resident (particularly in wetter areas) and some of the population moves west and south towards the coast after breeding (Johnstone and Storr 1998). Between February and September, large flocks of birds aggregate in feeding flocks on the northern Swan Coastal Plain (Johnstone *et al.* 2011). These birds are foraging mainly in heaths, *Banksia* woodlands and pine plantations, and can be in large numbers of up to 7,000 birds (Johnstone *et al.* 2011). On the southern Swan Coastal Plain flocks are smaller (200 – 1,200 birds) and these birds forage on vegetation over a wide area (Johnstone *et al.* 2011). Vegetation on the Swan Coastal Plain and adjacent escarpment is an important resource, with 8,000 – 10,000 birds estimated to use the area during the non-breeding season (Burnham *et al.* 2010).

Carnaby's Black-Cockatoo forage on the seeds of a range of plant species, but are particularly attracted to proteaceous heaths, *Banksia* and *Eucalyptus* woodlands and pine plantations (Johnstone and Storr 1998). On the Swan Coastal Plain, important food plants include *Banksia attenuata*, *B. menziesii*, *B. grandis*, *B. ilicifolia*, *B. sessilis*, *B. prionotes*, Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) (Shah 2006). In breeding areas, it is important to have sufficient foraging resources in close proximity to nest hollows (DSEWPaC 2012). Carnaby's Black-Cockatoo generally roosts in tall native or introduced eucalypts or pines in riparian habitats or near permanent water (DEE 2017, Burnham *et al.* 2010).

Evidence of Carnaby's Cockatoo foraging on Marri was recorded in the study area (Figure 8, Plate 13). All woodlands are foraging habitat for this species, particularly areas with dense thickets of Parrotbush (*Banksia sessilis*) or Pingle (*Banksia squarrosa*) in the understory (Figure 6, Table 5). It is possible that this species currently breeds in the study area, and it is known to breed nearby (Figure 9). No evidence of roosting was recorded.



Plate 13. Marri nuts observed in the study area, chewed by Carnaby's Cockatoo.



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 Author: J. Wilcox



**Julimar Nickel-Copper PGE Project
 Confirmed Cockatoo Roosting
 and Breeding Sites**

Figure:
9

Baudin's Cockatoo – *Calyptorhynchus baudinii*

Baudin's Cockatoo is listed as Endangered under the BC Act and EPBC Act.

Baudin's Cockatoo is endemic to the southwest of Western Australia and is more common in the deep south-west (Johnstone and Storr 1998). The population size is estimated to be 10,000 - 15,000 birds (Garnett *et al.* 2011). Baudin's Cockatoo has declined primarily due to persecution by orchardists and loss of habitat due to wildfires and vegetation clearance in their range (Johnstone and Storr 1998). Baudin's Cockatoos breed in forests of Karri, Marri and Jarrah in the deep southwest, where the annual rainfall is on average more than 750mm. Breeding occurs in late winter to spring (August to November), using a large hollow in a eucalypt, generally in Karri, Marri or Wandoo (Johnstone and Storr 1998). The hollows used are usually 30 - 40cm in diameter and more than 30cm deep. Breeding occurs as far north as Lowden, with an isolated breeding record from Serpentine (Johnstone and Kirkby 2008).

Outside of the breeding season Baudin's Cockatoo can gather into large foraging flocks. In the non-breeding season this species ranges more widely, foraging primarily in habitats that contain Marri, and their distribution is probably defined by where Marri trees occur. Baudin's Cockatoos feed mainly on the seeds of eucalypts, with most of their diet consisting of Marri seeds. They also feed on seeds from other plants (e.g., Jarrah, *Banksia*, *Hakea* or commercial orchard crops such as apples and pears) and take some invertebrate material by stripping bark from trees (Johnstone and Storr 1998, Johnstone *et al.*, 2005). Roosting habitat is generally in the tallest trees in riparian habitats, near permanent water or in sheltered gullies (Johnstone and Kirkby 2008).

Baudin's Cockatoo may forage in the study area, particularly on Marri, but will not breed in the vicinity of the study area. The study area is on the northern limit of the distribution of this species, and there are few nearby records of this species on DBCA's Threatened and Priority Fauna Database (Figure 7).

Forest Red-tailed Black-Cockatoo – *Calyptorhynchus banksii naso*

The Forest Red-tailed Black-Cockatoo is listed as Vulnerable under the BC Act and EPBC Act.

The Forest Red-tailed Black-Cockatoo is endemic to the southwest of Western Australia. It is patchily distributed through its range (Johnstone and Storr 1998), with the population size estimated to be 15,000 birds (Johnstone and Kirkby 1999). It occurs in Jarrah, Marri and Karri forests between about Gingin to the north, Albany to the south, and east to Mt Helena, North Bannister and Rocky Gully (Johnstone and Storr 1998). This species also ranges irregularly onto the Swan Coastal Plain to feed on the seeds of the introduced Cape Lilac (*Melia azedarach*).

Groups of up to 50 birds roost in trees overnight, dispersing into smaller flocks when ranging out to forage during the day. Roosts may be on roadsides, paddocks or forested areas (Johnstone and Kirkby 1999). Forest Red-tailed Black Cockatoos feed primarily on the seeds of Marri and Jarrah, but also feed on the seeds of Blackbutt (*Eucalyptus patens*), Forest Sheoak (*Allocasuarina fraseriana*), Snottygobble (*Persoonia longifolia*) and Cape Lilac (Johnstone and Storr 1998).

This species does not undertake regular seasonal movements, instead exhibiting irregular population fluctuations, perhaps as a response to food availability. The Forest Red-tailed Black Cockatoo nests in hollows in Karri (*Eucalyptus diversicolor*), Marri, Jarrah, Bullich (*Eucalyptus megacarpa*) and Wandoo (*Eucalyptus wandoo*) (Johnstone and Storr 1998, DSEWPaC 2012). However, they have generally been found to prefer nesting in large (mean DBH of 90cm) Marri trees (Johnstone *et al.* 2013). Eggs are laid in October and November (Johnstone and Storr 1998).

Evidence of this species foraging in the study area was recorded during the field survey, and this species was also heard calling nearby (Figure 8). The Jarrah – Marri woodland and Creek habitats are foraging habitat for this species, and it is possible that this species currently breeds in the study area. No evidence of roosting was recorded, but the woodland areas may provide roosting habitat.

5.2.2 Migratory Fauna

Migratory species are not always present at a site, but a particular site may have significance as a seasonal or ephemeral foraging, breeding or shelter area. Impacts to these sites may then impact the population both within the site and further afield. For Migratory shorebirds, a site is deemed internationally important if it regularly supports more than 1% of the flyway population of a species, or a total abundance of at least 20,000 shorebirds, and nationally important if it regularly supports more than 0.1% of the flyway population of a species, at least 2,000 shorebirds or at least 15 shorebird species (Hansen *et al.* 2016, Commonwealth of Australia 2017).

There is one Migratory species that potentially occurs in the study area.

Fork-tailed Swift – *Apus pacificus*

The Fork-tailed Swift is listed as Migratory under the BC Act and EPBC Act.

The Fork-tailed Swift is a non-breeding visitor to Australia between September and April (Boehm 1962). While it can be common further north, in southwest Australia this species is generally scarce (Johnstone and Storr 1998). The bird is primarily observed foraging for insects in proximity to cyclonic weather (Boehm 1962). Although a migratory species, the Fork-tailed Swift has a large range, a large population that appears to be stable (Birdlife International 2021b). There are no records of this species within 20km on DBCA's Threatened and Priority Fauna Database (Figure 7), however, the species may occur. The Fork-tailed Swift is a largely aerial species and is unlikely to be affected by changes to the study area.

5.2.3 Specially Protected Fauna

The populations of Specially Protected species are large enough that they are not considered to be Threatened. However, they require on-going conservation intervention (i.e., Conservation Dependent) or be specially protected in order to prevent them from becoming Threatened. There are two specially protected fauna that potentially occur in the study area.

Brush-tailed Phascogale – *Phascogale tapoatafa*

The Brush-tailed Phascogale is listed as Conservation Dependent under the BC Act.

The Brush-tailed Phascogale is a nocturnal carnivore that occurs in open forests and woodlands with a sparse understory (Van Dyck and Strahan 2008). It has declined due to habitat loss and fragmentation. Females have been found to have non-overlapping home ranges of about 20 – 40 ha, and males have or 100 ha home ranges that may overlap with other males or females (Van Dyck and Strahan 2008). Nest sites include tree hollows and stumps, and within a year an individual phascogale may use up to 40 different sites. There are three nearby records of this species on DBCA's Threatened and Priority Fauna Database (Figure 7). The Brush-tailed Phascogale is likely to occur in the study area, using all habitats.

Peregrine Falcon – *Falco peregrinus*

The Peregrine Falcon is listed as Other Specially Protected Fauna under the BC Act.

The Peregrine Falcon is a widespread bird of prey that globally has a very large range and a very large population that appears to be secure (BirdLife International 2021b). In Western Australia the population is secure, though this species may experience reductions at a local level due to human disturbance at nesting sites (Debus 1998). The Peregrine Falcon nests mainly on ledges on cliffs or rocky outcrops, and it may also use tall trees (Johnstone and Storr 1998). This species often takes advantage of man-made structures such as abandoned open pits or quarries.

The Peregrine Falcon has been recorded within 20km at Morangup, Lower Chittering and Julimar on DBCA's Threatened and Priority Fauna Database (Figure 7). If present, the Peregrine Falcon may forage on adjacent pastures and open areas within the forest, however, the study area is unlikely to be important for this species unless a pair were found to be nesting.

5.2.4 Priority Fauna

Priority 1, 2 or 3 species are considered to be in need of further survey, as insufficient data exist to adequately determine their status. Many Priority 1, 2 and 3 species are known from only a few records in a limited number of locations, thus determining their status in the study area may be problematic. Priority 4 species are considered to require regular monitoring, as although they are adequately known, they are either rare, near threatened or recently removed from the threatened list.

There are five Priority fauna species that potentially occur in the study area, of which two were recorded on this survey.

Barking Owl – *Ninox connivens connivens*

The southwest subpopulation of the Barking Owl is listed as Priority 3 by DBCA.

The southwest subpopulation of the Barking Owl inhabits the southwest corner of Western Australia. The range of this subspecies also extends across the southeast of Australia. It occurs in dry sclerophyll woodlands, particularly in association with watercourses and forest edge (Garnett *et al.* 2010). It nests in large eucalypt hollows in mature trees. The Barking Owl has been recorded within 20km in Avon Valley National Park and Julimar State Forest on DBCA's Threatened and Priority Fauna Database (Figure 7). The habitats of the study area are likely to be suitable for this species, but the status of the species in the local area is unknown as there are few records overall.

Dell's Ctenotus – *Ctenotus delli*

Dell's Ctenotus is listed as Priority 4 by DBCA.

There are five records of Dell's Ctenotus within 20km of the study area on DBCA's Threatened and Priority Fauna Database (Figure 5), all from Julimar between 1983 and 1999. This lizard occurs patchily and uncommonly in the Darling Range, where it inhabits Jarrah and Marri woodlands on a range of soil types (Bush *et al.* 2010, Chapple *et al.* 2019). This species is likely to occur in the Jarrah-Marri woodland habitat in the study area.

Quenda – *Isoodon fusciventer*

The Quenda (or Southern Brown Bandicoot) is listed as Priority 4 by DBCA.

The Quenda has been recorded from multiple sites in Julimar Forest on DBCA's Threatened and Priority Fauna Database (Figure 7). The Quenda is likely to occur in all habitats, however, as it favours areas with a dense understory, the creek habitat and areas of Jarrah – Marri woodland with a shrubby understory are most likely to support this species. Surprisingly, this species was not recorded on the camera traps deployed on this survey. However, it was recorded on a camera trap in the adjacent area in 2020 (Western Wildlife 2020).

Western Brush Wallaby – *Notamacropus irma*

The Western Brush Wallaby is listed as Priority 4 by DBCA.

The Western Brush Wallaby occurs in areas of forest or woodland where there is a dense, shrubby understory. The Western Brush Wallaby has been recorded nearby on DBCA's Threatened and Priority Fauna Database (Figure 7). The home-range size of one individual has been estimated at about 9.9ha for males and 5.3ha for females (Bamford and Bamford 1999), therefore many individuals may be supported in the study area. This species was recorded on 13 of the 20 camera traps deployed (Figure 8, Plate 14), indicating it is relatively common in the area. It was also sighted during the day, and a road-killed individual recorded nearby on Keating Road (Appendix 7). The Western Brush Wallaby is likely to occur in all habitats, resting in dense vegetation during the day and foraging on grasses at night.



Plate 14. Western Brush Wallabies Recorded on Camera Traps in the Study Area.

Tammar Wallaby – *Notamacropus eugenii derbianus*

The Tammar Wallaby is listed as Priority 4 by DBCA.

The Tammar Wallaby was once widespread in south-western Australia, but now occurs only on islands and in several reserves and National Parks (Woinarski *et al.* 2014). Translocated populations occur in Julimar State Forest and nearby at Paruna Sanctuary, and there are records from these populations on DBCA's Threatened and Priority Fauna Database (Figure 7). This species inhabits dense vegetation during the day, foraging in open grassy areas at night (Woinarski *et al.* 2014). The Tammar Wallaby was recorded on two of the 20 camera traps deployed (Figure 8, Plate 15), and potentially occurs in all habitats.



Plate 15. Tammar Wallabies Recorded on Camera Traps in the Study Area.

5.2.5 Locally Significant Fauna

The Carpet Python occurs in a variety of habitats, though it appears to require large tracts of bushland in order to persist (Bush *et al.* 2007). This species has been recorded within 20km of the study area on the WA Museum Specimen Database (Appendix 3) and is known to occur in Julimar State Forest (Johnson *et al.* 2006). The large tracts of native vegetation in forests and reserves are likely to be important for maintaining this species in the region.

5.3 Invertebrates of Conservation Significance

This report is primarily concerned with vertebrate fauna. In general, the invertebrate fauna is far less well known than the vertebrate fauna, while being far more numerous. No field survey for invertebrate fauna was undertaken, however, four invertebrates of conservation significance were listed on DBCA's Threatened and Priority Database within 20km of the study area (Figure 10).

5.3.1 Threatened Invertebrates

A single threatened invertebrate was recorded on DBCA's Threatened and Priority Database within 20km of the study area (Figure 10).

Carter's Freshwater Mussel – *Westralunio carteri*

Carter's Freshwater Mussel is listed as Vulnerable under the BC Act and EPBC Act.

Carter's Freshwater Mussel has been recorded nearby on DBCA's Threatened and Priority Fauna Database (Figure 10), in Marbling Brook, Chittering Valley Road and in West Toodyay. This long-lived species has a declining population, principally due to a decline in its river habitats. This species occurs in perennial freshwater systems, favouring areas with woody debris, and overhanging riparian vegetation (Ponder *et al.* 2016). It is unlikely that Carter's Freshwater Mussel occurs in the creek habitat of the study area as the creeks would not hold water for a sufficient length of time to support this species.

5.3.2 Priority Invertebrates

Three Priority invertebrates were listed on DBCA's Threatened and Priority Database within 20km of the study area (Figure 10).

Inornate Trapdoor Spider – *Euplos inornatus*

The Inornate Trapdoor Spider is listed as Priority 3 by DBCA.

The Inornate Trapdoor Spider occurs on the eastern edge of Swan Coastal Plain, with most records from the Darling Scarp. There is a single record within 20km of the study area on DBCA's Threatened and Priority Fauna Database, on Chittering Rd near Bullsbrook (Figure 10). This species potentially occurs in Jarrah – Marri woodland in the study area.

Julimar Shield-backed Trapdoor Spider – *Idiosoma mcclementsorum*

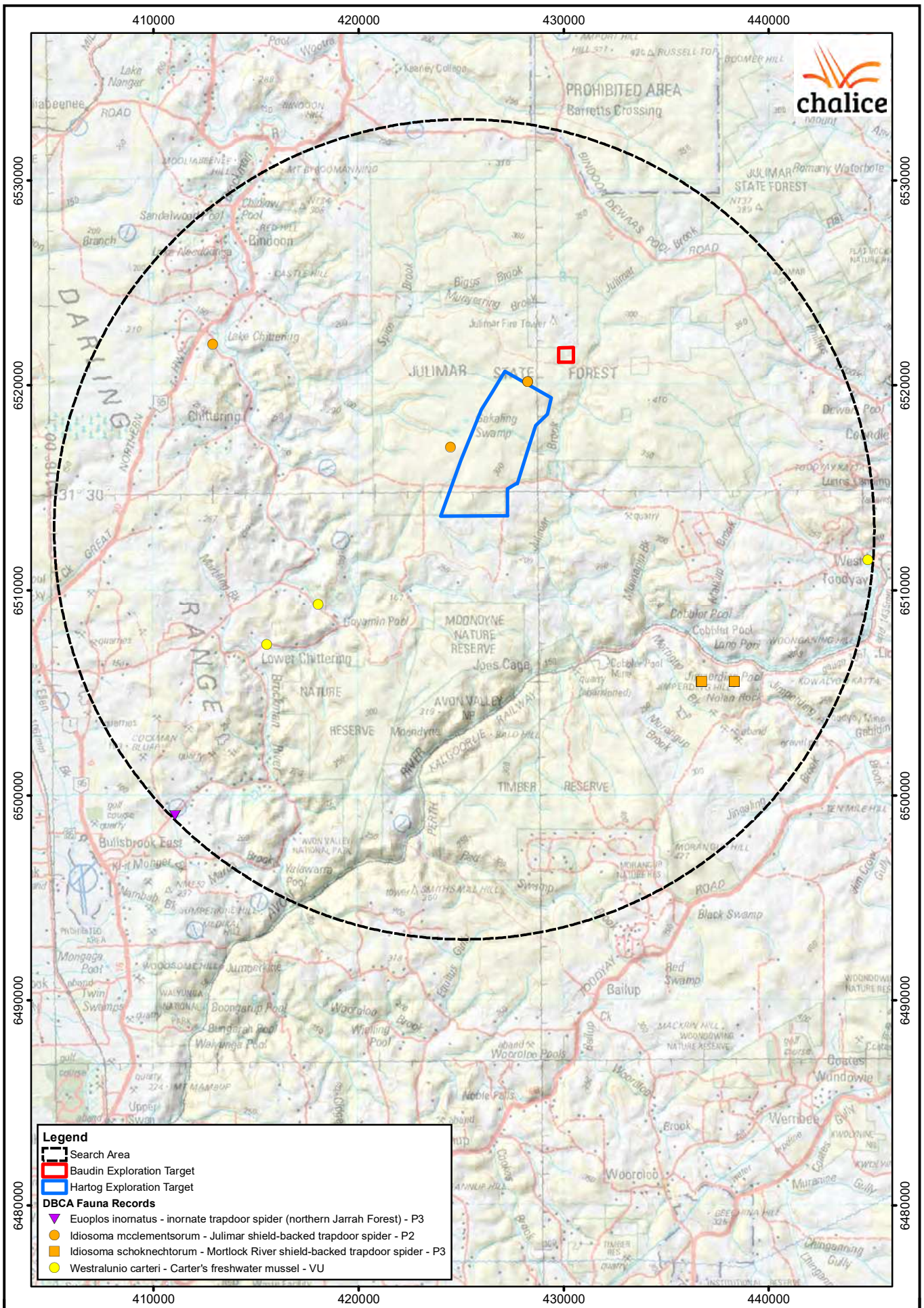
The Julimar Shield-backed Trapdoor Spider is listed as Priority 2 by DBCA.

The Julimar Shield-backed Trapdoor Spider has a highly restricted distribution in the northern Jarrah forest. It is known to occur between Chittering Lakes, Julimar, Toodyay and Gillingara (Rix *et al.* 2018). They build a burrow in sandy soils over laterite, and the trapdoor is adorned with a moustache-like arrangement of twig-lines (Rix *et al.* 2018). This species is known to occur nearby, with records from Julimar State Forest on DBCA's Threatened and Priority Fauna Database (Figure 10). This species potentially occurs in Jarrah – Marri woodland in the study area.

Mortlock River Shield-backed Trapdoor Spider – *Idiosoma schoknechtorum*

The Mortlock River Shield-backed Trapdoor Spider is listed as Priority 3 by DBCA.

The Mortlock River Shield-backed Trapdoor Spider occurs in the central-western wheatbelt and north-eastern Jarrah forest, with its known range extending from near Toodyay in the north to Quairading in the east and Jarrahdale in the south (Rix *et al.* 2018). Although there are records of this species about 15km to the south of the study area on DBCA's Threatened and Priority Fauna Database (Figure 10), the range of this species is not currently thought to extend as far north as the study area.



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 Tel: (08) 9246 3242
 CAD Ref: a2779Fa02_10 A4
 Date: June 2021 Rev: A Author: J. Wilcox

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 MGA94 (Zone 50)



**Julimar Project (Hartog and Baudin)
 DBCA Records of
 Invertebrate Fauna**

6. Discussion

6.1 Vertebrate Fauna Assemblage

The predicted faunal assemblage includes up to 16 frogs, 54 reptiles, 99 birds and 31 mammals (25 native and six introduced). As the habitats in the study area are in good condition and part of a larger area of native vegetation, the faunal assemblage is likely to be relatively intact. The observed faunal assemblage on this survey includes one frog, three reptiles, 39 birds and 12 mammals (eight native and four introduced). This is not a complete list of the vertebrate fauna using the study area, as not all groups are sampled at this level of survey, and the survey was undertaken in a single season.

6.2 Conservation Significant Vertebrate Fauna

Fifteen conservation significant vertebrate fauna have been recorded or potentially occur in the study area (Table 7). The species have been grouped into their conservation significance categories and discussed below.

1. Threatened species.

Six threatened species potentially occur in the study area, of which four were recorded during this survey:

- Forest Red-tailed Black-cockatoo (*Calyptorhynchus latirostris banksii*) - **Recorded**
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – **Recorded**
- Baudin's Cockatoo (*Calyptorhynchus baudinii*)
- Chuditch (*Dasyurus geoffroii*) – **Recorded**
- Woylie (*Bettongia penicillata ogilbyi*) – **Recorded**
- Black-flanked Rock-wallaby (*Petrogale lateralis lateralis*)

All three black-cockatoo species are likely to be foraging visitors to the study area, with foraging by Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo confirmed (Figure 8). Baudin's Cockatoo is on the northern limit of its range in the area and is likely to be an occasional visitor only. The woodlands represent high value foraging habitat as they contain favoured cockatoo food-plants such as Marri (*Corymbia calophylla*), Parrotbush (*Banksia sessilis*) and Pingle (*Banksia squarrosa*). The foraging habitat is likely to be important for supporting both non-breeding and breeding birds.

Both Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo are known to breed in the subregion, and potentially breed in the study area. Habitats that have nest hollows that support breeding, supported breeding in the past and/or may support breeding in the future, with nearby foraging and water resources are considered to be 'habitats critical to the survival' of Carnaby's Cockatoo (DPAW 2013). All Jarrah, Marri and Karri forests, woodlands and remnants in regions receiving more than 600mm rain annually are considered to be 'habitats critical to the survival' of the Forest Red-tailed Black-cockatoo and Baudin's Cockatoo (DEC 2008).

The Chuditch was recorded in the study area (Figure 8) and is likely to be a breeding resident. Areas of habitat currently occupied by Chuditch, including for breeding, foraging and/or dispersal, are considered to be 'habitat critical to their survival' (DEC 2012).

The Woylie was recorded in the study area (Figure 8) and is also likely to be a breeding resident. Areas of suitable forest, shrubland or heathland habitat currently occupied by the Woylies are considered to be 'habitat critical to the survival of the species' (Yeatman and Groom 2012).

The Black-flanked Rock-wallaby may disperse through the study area, although the likelihood is low as the habitats of the study area are unsuitable for this species.

2. Migratory species.

One Migratory species potentially occurs in the Study Area:

- Fork-tailed Swift (*Apus pacificus*)

The Fork-tailed Swift is thought to be almost entirely aerial when visiting Australia, so the study area is not likely to provide important habitat for this species.

3. Specially Protected species.

Two Specially Protected species potentially occur in the Study Area:

- Peregrine Falcon (*Falco peregrinus*)
- Brush-tailed Phascogale (*Phascogale tapoatafa*)

The Peregrine Falcon may occur as a foraging visitor, however, the study area is unlikely to be important for this species as its population is large and secure, and its favoured breeding habitat is absent. The Brush-tailed Phascogale is likely to occur in all habitats but was not recorded during the field survey.

4. Priority species

Six Priority species potentially occur in the Study Area, of which two were recorded:

- Dell's Ctenotus (*Ctenotus delli*)
- Barking Owl (southern) (*Ninox connivens connivens*)
- Quenda (*Isoodon fusciventer*)
- Western Brush Wallaby (*Notamacropus irma*) - **Recorded**
- Tammar Wallaby (*Notamacropus eugenii derbianus*) - **Recorded**

The Western Brush Wallaby and Tammar Wallaby were recorded in the study area and are likely to be breeding residents using all habitats. Although not recorded on this survey, the Quenda is regularly recorded at Julimar and is likely to be a breeding resident favouring the creek habitat and woodland areas with dense understory. Dell's Ctenotus is likely to occur in the Jarrah – Marri woodland, as it is known to occur nearby. The Barking Owl is uncommonly recorded, but the habitats of the study area are suitable for this species. If present, the study area would represent part of a home-range for a pair of owls.

5. Locally significant species

One locally significant species was identified; the Carpet Python (*Morelia spilota imbricata*). This species is reliant on large tracts of native vegetation and shelters in tree hollows and hollow logs.

6.3 Conservation Significant Invertebrate Fauna

This report is primarily concerned with vertebrate fauna, however, four invertebrates of conservation significance are known to occur within 20km of the study area. Of these, Carter's Freshwater Mussel (*Westralunio carteri*) is unlikely to occur due to lack of suitable habitat and the Mortlock River Shield-backed Trapdoor Spider (*Idiosoma schoknechtorum*) is unlikely to occur as the study area is outside the known range of the species. Two other spiders potentially occur in the Jarrah – Marri woodland habitat in the study area: the Julimar Shield-backed Trapdoor Spider (*Idiosoma mcclémentsorum*) and Inornate Trapdoor Spider (*Euoplos inornatus*).

6.4 Important Habitats

All habitats have some importance in that they support native fauna, however, habitats may be of particular importance if they:

- support very diverse or unique faunal assemblages
- are restricted or rare in the region (and thus the faunal assemblages are restricted or rare)
- are refugia (e.g., from drought or fire)
- provide ecological linkage
- support conservation significant fauna

The habitats in the study area are common in the Northern Jarrah Forest subregion, and for the most part, the faunal assemblage is likely to be typical of the Jarrah – Marri and Wandoo woodlands of the region. The key importance of the habitats present is twofold. Firstly, the study areas are part of Julimar State Forest, a large area of remnant native vegetation that has value in supporting a relatively intact ecosystem. Large habitat areas are less vulnerable to the impacts of habitat fragmentation and increase the likelihood of faunal populations persisting in the long-term. Secondly, the habitats provide 'habitat critical to the survival' of at least four EPBC Act-listed Threatened species, Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*), Woylie (*Bettongia penicillata ogilbyi*) and Chuditch (*Dasyurus geoffroii*).

6.5 Conclusion

The study area contains three fauna habitats; Jarrah – Marri woodland (1,642.1ha), Wandoo woodland (323.3ha) and Creek (43.2ha), as well as 12.8ha of cleared land. The habitats are likely to support a relatively intact faunal assemblage typical of similar habitat types in the area. The key value of the fauna habitats are as a part of a large area of remnant native vegetation that supports a relatively intact ecosystem and their value as habitat to conservation significant fauna. The habitats of the study area provide habitat critical to the survival of the Woylie, Chuditch, Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo, all of which were confirmed as occurring in the study area.

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Appendix 1. Habitat Assessment Sites.

| Appendix 1 – Habitat Assessment Sites. | |
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| <p>Hab 01</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low open shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: none noted</p> <p>Soil: grey gravelly sand</p> <p>Rock: laterite gravel</p> <p>Important elements: leaf litter, logs, woody debris, tree hollows, mistletoe</p> <p>Wetlands: none</p> |  |
| <p>Hab 02</p> <p>Habitat: Wandoo woodland</p> <p>Landform: low hill</p> <p>Vegetation: Wandoo woodland with scattered Jarrah over grasstrees and mixed low open shrubland.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Orange sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 03</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: grey-brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |




| Appendix 1 – Habitat Assessment Sites. | |
|---|--|
| <p>Hab 04</p> <p>Habitat: Wandoo woodland</p> <p>Landform: low hill</p> <p>Vegetation: Wandoo woodland over grasstrees and some Banksia squarrosa over a mixed low open shrubland.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 05</p> <p>Habitat: Wandoo woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Wandoo woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, small outcroppings</p> <p>Important elements: leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 06</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland with scattered Banksia grandis over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |



| Appendix 1 – Habitat Assessment Sites. | |
|--|--|
| <p>Hab 07</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel</p> <p>Important elements: leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 08</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: Historic logging</p> <p>Soil: grey gravelly sand</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 09</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and woollybush over mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: yellow gravelly sand</p> <p>Rock: laterite gravel, small outcroppings</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |




| Appendix 1 – Habitat Assessment Sites. | |
|---|--|
| <p>Hab 10</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, some rocks</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 11</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with occasional Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel, some rocks</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 12</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with occasional Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel, some rocks</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
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| <p>Hab 13</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and some Hakea sp. over mixed low shrubland.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, small outcrops</p> <p>Important elements: leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 14</p> <p>Habitat: Wandoo -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Wandoo - marri woodland over grasstrees and Macrozamia sp. over very open mixed low shrubland.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 15</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and woollybush over mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
|--|--|
| <p>Hab 16</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and woollybush over mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 17</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and woollybush over mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 18</p> <p>Habitat: Wandoo - Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Wandoo -jarrah - marri woodland over grasstrees and Macrozamia sp. over mixed low shrubland with patchy Banksia sessilis thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
|---|--|
| <p>Hab 19</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland with scattered Wandoo over grasstrees and mixed low shrubland with patchy Banksia sessilis thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 20</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia sessilis thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 21</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed tall shrubland over Boyra.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Grey gravelly sandy-clay</p> <p>Rock: laterite gravel, small outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
|---|--|
| <p>Hab 22</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, small outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 23</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, small outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 24</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: hilltop</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravel</p> <p>Rock: laterite gravel, surface rocks and outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
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| <p>Hab 25</p> <p>Habitat: Jarrah -Marri -Wandoo woodland</p> <p>Landform: minor drainage</p> <p>Vegetation: Jarrah - marri - Wandoo woodland over mixed tall shrubland including grasstrees, Hakea sp., Calothamnus sp. and woollybush.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: seasonal/ephemeral creek</p> |  |
| <p>Hab 26</p> <p>Habitat: Wandoo woodland</p> <p>Landform: minor drainage</p> <p>Vegetation: Wandoo woodland over grasstrees and mixed low shrubland.</p> <p>Fire age: no recent fire</p> <p>Disturbance: Motorbike tracks</p> <p>Soil: Brown sandy clay</p> <p>Rock: some laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows, mistletoe</p> <p>Wetlands: seasonal/ephemeral creek</p> |  |
| <p>Hab 27</p> <p>Habitat: Wandoo woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Wandoo woodland over grasstrees and Macrozamia sp. over open mixed low shrubland.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy clay</p> <p>Rock: some laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
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| <p>Hab 28</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland with scattered <i>Banksia grandis</i> over grasstrees and mixed low shrubland with patchy <i>Banksia squarrosa</i> thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, surface rocks</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 29</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland with scattered <i>Banksia grandis</i> over grasstrees and mixed low shrubland with patchy <i>Banksia squarrosa</i> thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, surface rocks</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 30</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and <i>Macrozamia</i> sp. over mixed low shrubland with patchy <i>Banksia squarrosa</i> thickets (burnt).</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel, minor outcrops</p> <p>Important elements: logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
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| <p>Hab 31</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 32</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets (burnt).</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown gravelly sand</p> <p>Rock: laterite gravel</p> <p>Important elements: logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 33</p> <p>Habitat: Jarrah -Marri - Wandoo woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri - wandoo woodland over grasstrees and Macrozamia sp. over mixed low open shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel, rocks and minor outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

| Appendix 1 – Habitat Assessment Sites. | |
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| <p>Hab 34</p> <p>Habitat: Wandoo woodland</p> <p>Landform: minor drainage</p> <p>Vegetation: Wandoo woodland over grasstrees and Acacia saligna over mixed low open shrubland.</p> <p>Fire age: no recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown clay-loam</p> <p>Rock: laterite gravel, minor outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: seasonal/ephemeral creek</p> |  |
| <p>Hab 35</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown clay-loam</p> <p>Rock: laterite gravel, small outcropping</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |
| <p>Hab 36</p> <p>Habitat: Jarrah -Marri woodland</p> <p>Landform: gentle slope</p> <p>Vegetation: Jarrah - marri woodland over grasstrees and mixed low shrubland with patchy Banksia squarrosa thickets.</p> <p>Fire age: recent fire</p> <p>Disturbance: None noted</p> <p>Soil: Brown sandy gravel</p> <p>Rock: laterite gravel</p> <p>Important elements: some leaf litter, logs, woody debris, tree hollows</p> <p>Wetlands: none</p> |  |

Appendix 2. Frogs that Potentially Occur in the Study Area.

Site visit 2021 = species records from this survey.

Site visit 2020 = species records from the Julimar Project, south of the study area (Western Wildlife 2020).

Faunafile = species recorded in the Western Shield Monitoring Database (see Table 2).

WAM = species records from the Western Australian Museum Database (see Table 2).

FSDB = species records from the Fauna Survey Database (see Table 2).

DBCA = species records from the DBCA Threatened and Priority Species Database (see Table 2).

EPBC = species & species habitat from the EPBC Protected Matters Search Tool (see Table 2).

| Species | Status | Records | | | | | | |
|--|-----------------------------------|-----------------|-----------------|-----------|-----|------|------|-----------|
| | | Site visit 2021 | Site visit 2020 | Faunafile | WAM | FSDB | DBCA | EPBC |
| Limnodynastidae (burrowing frogs) | | | | | | | | |
| Western Spotted Frog | <i>Heleioporus albopunctatus</i> | | | | + | | | |
| Hooting Frog | <i>Heleioporus barycragus</i> | | | | + | + | | |
| Whooping Frog | <i>Heleioporus inornatus</i> | | | | | + | | |
| Moaning Frog | <i>Heleioporus eyrei</i> | | | | + | | | |
| Sand Frog | <i>Heleioporus psammophilus</i> | | | | | + | | |
| Pobblebonk or Banjo Frog | <i>Limnodynastes dorsalis</i> | | | | | + | | |
| Myobatrachidae (ground frogs) | | | | | | | | |
| Quacking Frog | <i>Crinia georgiana</i> | | + | | + | + | | |
| Glauert's Froglet | <i>Crinia glauerti</i> | | | | + | + | | |
| Bleating Froglet | <i>Crinia pseudinsignifera</i> | | + | | + | + | | |
| Ticking Frog | <i>Geocrinia leai</i> | | | | + | | | |
| Humming Frog | <i>Neobatrachus pelobatooides</i> | | | | + | | | |
| Kunapalari Frog | <i>Neobatrachus kunapalari</i> | | | | + | | | |
| Shoemaker Frog | <i>Neobatrachus sutor</i> | | | | + | | | |
| Guenther's Toadlet | <i>Pseudophryne guentheri</i> | + | | | + | | | |
| Hylidae (tree frogs) | | | | | | | | |
| Slender Tree Frog | <i>Litoria adelaidensis</i> | | | | | | | |
| Motorbike Frog | <i>Litoria moorei</i> | | | | + | | | |
| # frog species potentially occurring in the study area: | | | | | | | | 16 |

Appendix 3. Reptiles that Potentially Occur in the Study Area.

Site visit 2021 = species records from this survey.

Site visit 2020 = species records from the Julimar Project, south of the study area (Western Wildlife 2020).

Faunafile = species recorded in the Western Shield Monitoring Database (see Table 2).

WAM = species records from the Western Australian Museum Database (see Table 2).

FSDB = species records from the Fauna Survey Database (see Table 2).

DBCA = species records from the DBCA Threatened and Priority Species Database (see Table 2).

EPBC = species & species habitat from the EPBC Protected Matters Search Tool (see Table 2).

| Species | Status | Records | | | | | | |
|--|--------|-----------------|-----------------|-----------|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Faunafile | WAM | FSDB | DBCA | EPBC |
| Cheluidae (freshwater turtles) | | | | | | | | |
| Long-necked Turtle <i>Chelodina collieii</i> | | | | | + | + | | |
| Carphodactylidae (knob-tailed geckoes) | | | | | | | | |
| Southern Barking Gecko <i>Underwoodisaurus milii</i> | | | | | + | + | | |
| Diplodactylidae (ground geckos) | | | | | | | | |
| Clawless Gecko <i>Crenadactylus ocellatus</i> | | | | | + | | | |
| South Coast Gecko <i>Diplodactylus calcicolus</i> | | | | | + | | | |
| Speckled Stone Gecko <i>Diplodactylus lateroides</i> | | | | | + | + | | |
| Wheatbelt Ground Gecko <i>Diplodactylus granariensis</i> | | | | | + | + | | |
| Fine-faced Gecko <i>Diplodactylus pulcher</i> | | | | | + | | | |
| Reticulated Velvet Gecko <i>Hesperoedura reticulata</i> | | | | | + | | | |
| Gekkonidae (geckoes) | | | | | | | | |
| Southern Spiny-tailed Gecko <i>Strophurus spinigerus</i> | | | | | | | | |
| Tree Dtella <i>Gehyra variegata</i> | | | | | + | + | | |
| Marbled Gecko <i>Christinus marmoratus</i> | | | | | + | + | | |
| Pygopodidae (legless lizards) | | | | | | | | |
| Granite Worm-lizard <i>Aprasia pulchella</i> | | | | | + | | | |
| Sand-Plain Worm-Lizard <i>Aprasia repens</i> | | | | | + | | | |
| Fraser's Legless Lizard <i>Delma fraseri</i> | | | | | + | + | | |
| Gray's Legless Lizard <i>Delma grayii</i> | | | | | + | | | |
| Burton's Legless Lizard <i>Lialis burtonis</i> | | | | | + | + | | |
| Common Scaleyfoot <i>Pygopus lepidopodus</i> | | | | | | | | |
| Agamidae (dragon lizards) | | | | | | | | |
| Bearded Dragon <i>Pogona minor</i> | | | | | + | + | | |
| Scincidae (skink lizards) | | | | | | | | |
| South-West Cool Skink <i>Acritoscincus trilineatus</i> | | | | | + | | | |
| Fence Skink <i>Cryptoblepharus buchananii</i> | | + | + | | + | + | | |
| <i>Ctenotus australis</i> | | | | | + | | | |
| Darling Range Ctenotus <i>Ctenotus delli</i> | P | | | | + | | + | |
| West Coast Ctenotus <i>Ctenotus fallens</i> | | | | | + | + | | |
| Odd-striped Ctenotus <i>Ctenotus impar</i> | | | | | | | | |
| <i>Ctenotus labillardieri</i> | | | | | | | | |
| <i>Ctenotus schomburgkii</i> | | | | | + | | | |
| Crevice Skink <i>Egernia napoleonis</i> | | | | | + | | | |
| Broad-banded Sandswimmer <i>Eremiascincus richardsonii</i> | | | | | + | | | |
| <i>Hemiergis initialis</i> | | | | | + | + | | |
| <i>Lerista distinguenda</i> | | | | | + | + | | |

Appendix 3. (cont.)

| Species | Status | Records | | | | | | |
|--|--------|-----------------|-----------------|-----------|-----|------|------|-----------|
| | | Site visit 2021 | Site visit 2020 | Faunafile | WAM | FSRD | DBCA | EBPC |
| Scincidae (cont.) | | | | | | | | |
| Bull Skink <i>Liopholis multiscutata</i> | | | | | + | | | |
| Spectacled Rock Skink <i>Liopholis pulchra</i> | | | | | + | | | |
| Dwarf Skink <i>Menetia greyii</i> | | | | | + | + | | |
| Dusky Morethia <i>Morethia obscura</i> | | + | | | + | + | | |
| Western Bluetongue <i>Tiliqua occipitalis</i> | | | | | | | | |
| Bobtail <i>Tiliqua rugosa</i> | | | | + | + | + | | |
| Varanidae (monitors or goannas) | | | | | | | | |
| Gould's Goanna <i>Varanus gouldii</i> | | | | | | + | | |
| Black-headed Tree Goanna <i>Varanus tristis</i> | | | | | + | + | | |
| Typhlopidae (blind snakes) | | | | | | | | |
| Southern Blind Snake <i>Anilios australis</i> | | | | | + | + | | |
| Rotund Blind Snake <i>Anilios pinguis</i> | | | | | + | + | | |
| Beaked Blind Snake <i>Anilios waitii</i> | | | | | + | | | |
| Pythonidae (pythons) | | | | | | | | |
| Stimson's Python <i>Antaresia stimsoni</i> | | | | | + | | | |
| South-West Carpet Python <i>Morelia spilota imbricata</i> | LS | | | | + | | | |
| Elapidae (front-fanged snakes) | | | | | | | | |
| Southern Shovel-nosed Snake <i>Brachyuropsis semifasciatus</i> | | | | | + | | | |
| Yellow-faced Whip-Snake <i>Demansia psammophis</i> | | | | | + | | | |
| Bardick <i>Echiopsis curta</i> | | | | | + | | | |
| Black-naped Snake <i>Neelaps bimaculatus</i> | | | | | | | | |
| Western Tiger Snake <i>Notechis scutatus</i> | | | | + | | | | |
| Gould's Snake <i>Parasuta gouldii</i> | | | | | + | + | | |
| Black-backed Hooded Snake <i>Parasuta nigriceps</i> | | | | | | | | |
| Mulga Snake <i>Pseudechis australis</i> | | | | | + | | | |
| Dugite <i>Pseudonaja affinis</i> | | + | | | + | + | | |
| Gwardar <i>Pseudonaja mengdeni</i> | | | | | + | | | |
| Jan's Banded Snake <i>Simoselaps bertholdi</i> | | | | | + | | | |
| # reptile species potentially occurring in the study area:: | | | | | | | | 54 |

Appendix 4. Birds that Potentially Occur in the Study Area.

Site visit 2021 = species records from this survey.

Site visit 2020 = species records from the Julimar Project, south of the study area (Western Wildlife 2020).

Birdata = species records from the Birdata Database (see Table 2).

BA = species records from the Bird Australia Atlas Database (see Table 2).

WAM = species records from the Western Australian Museum Database (see Table 2).

FSDB = species records from the Fauna Survey Database (see Table 2).

DBCA = species records from the DBCA Threatened and Priority Species Database (see Table 2).

EPBC = species & species habitat from the EPBC Protected Matters Search Tool (see Table 2).

Int = introduced species.

| Species | Status | Records | | | | | | | |
|---|--------|-----------------|-----------------|---------|----|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Birdata | BA | WAM | FSRD | DBCA | EPBC |
| Dromaiidae (emu) | | | | | | | | | |
| Emu <i>Dromaius novaehollandiae</i> | | + | + | + | + | | | + | |
| Anatidae (ducks and swans) | | | | | | | | | |
| Grey Teal <i>Anas gracilis</i> | | | | + | + | | | | |
| Pacific Black Duck <i>Anas superciliosus</i> | | | | + | + | | | | |
| Australian Wood Duck <i>Chenonetta jubata</i> | | | | + | + | | | | |
| Australian Shelduck <i>Tadorna tadornoides</i> | | | | + | + | | | | |
| Phasianidae (pheasants and quails) | | | | | | | | | |
| Stubble Quail <i>Coturnix pectoralis</i> | | | | | + | | | | |
| Threskiornithidae (ibis and spoonbills) | | | | | | | | | |
| Australian White Ibis <i>Threskiornis moluccus</i> | | | | + | + | | | | |
| Straw-necked Ibis <i>Threskiornis spinicollis</i> | | | | + | + | | | | |
| Accipitridae (kites, hawks and eagles) | | | | | | | | | |
| Black-shouldered Kite <i>Elanus caeruleus</i> | | | | | + | + | | | |
| Square-tailed Kite <i>Hamirostra isura</i> | | | | | + | | | | |
| Whistling Kite <i>Haliastur sphenurus</i> | | | | + | + | + | | | |
| Brown Goshawk <i>Accipiter fasciatus</i> | | | | + | + | | | | |
| Collared Sparrowhawk <i>Accipiter cirrocephalus</i> | | | | + | + | | + | | |
| Wedge-tailed Eagle <i>Aquila audax</i> | | + | | + | + | | + | | |
| Little Eagle <i>Aquila morphnoides</i> | | | | + | + | + | | | |
| Turnicidae (button-quails) | | | | | | | | | |
| Painted Button-quail <i>Turnix varia</i> | | + | + | | + | | + | | |
| Columbidae (pigeons and doves) | | | | | | | | | |
| Laughing Turtle-Dove <i>Streptopelia senegalensis</i> | Int. | | | + | + | | | | |
| Common Bronzewing <i>Phaps chalcoptera</i> | | | + | + | + | | + | | |
| Crested Pigeon <i>Ocyphaps lophotes</i> | | | | + | + | | | | |
| Cuculidae (cuckoos) | | | | | | | | | |
| Pallid Cuckoo <i>Cuculus pallidus</i> | | | | + | + | | | | |
| Fan-tailed Cuckoo <i>Cacamantis flabelliformis</i> | | | | + | + | | + | | |
| Horsfield's Bronze-Cuckoo <i>Chrysococcyx basalus</i> | | | | | | | + | | |
| Shining Bronze-Cuckoo <i>Chrysococcyx lucidus</i> | | | | | | | + | | |
| Tytonidae (barn owls) | | | | | | | | | |
| Barn Owl <i>Tyto alba</i> | | | | | | | | | |
| Strigidae (hawk-owls) | | | | | | | | | |
| Barking Owl <i>Ninox connivens connivens</i> | P | | | | | | | + | |
| Southern Boobook Owl <i>Ninox novaeseelandiae</i> | | | | + | + | | + | | |

Appendix 4. (cont.)

| Species | Status | Records | | | | | | | |
|--|-------------|-----------------|-----------------|----------|----|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Birddata | BA | WAM | FSRD | DBCA | EBPC |
| Podargidae (frogmouths) Tawny Frogmouth <i>Podargus strigoides</i> | | | | + | + | + | | | |
| Aegothelidae (owlet-nightjar) Australian Owlet-nightjar <i>Aegotheles cristatus</i> | | | | | | + | | | |
| Apodidae (swifts) Fork-tailed Swift <i>Apus pacificus</i> | Mi | | | | | | | | + |
| Alcedinidae (forest kingfishers) Laughing Kookaburra <i>Dacelo novaeguineae</i> Sacred Kingfisher <i>Todiramphus sanctus</i> | Int. | + | + | + | + | | + | | |
| Meropidae (bee-eaters) Rainbow Bee-eater <i>Merops ornatus</i> | | | | + | + | | | | |
| Falconidae (falcons) Brown Falcon <i>Falco berigora</i> Peregrine Falcon <i>Falco peregrinus</i> Australian Hobby <i>Falco longipennis</i> Australian Kestrel <i>Falco cenchroides</i> | OS | | | + | + | | | + | |
| Cacatuidae (cockatoos) Forest Red-tailed Black-Cockatoo <i>Calyptorhynchus banksii</i> Baudin's Black-Cockatoo <i>Calyptorhynchus baudini</i> Carnaby's Black-Cockatoo <i>Calyptorhynchus latirostris</i> Western Long-billed Corella <i>Cacatua pastinator</i> Little Corella <i>Cacatua sanguinea</i> Galah <i>Cacatua roseicapilla</i> | T T T | + | + | + | + | | + | + | |
| Psittacidae (lorikeets and parrots) Purple-crowned Lorikeet <i>Glossopsitta porphyrocephala</i> Western Rosella <i>Platycercus icterotis</i> Red-capped Parrot <i>Platycercus spurius</i> Australian Ringneck <i>Platycercus zonarius</i> Elegant Parrot <i>Neophema elegans</i> | | | | + | + | | + | | |
| Climacteridae (tree-creepers) Rufous Tree-creeper <i>Climacteris rufus</i> | | + | | + | + | | + | | |
| Maluridae (fairy-wrens) Red-winged Fairy-wren <i>Malurus elegans</i> Splendid Fairy-wren <i>Malurus splendens</i> | | + | | + | + | | + | | |

Appendix 4. (cont.)

| Species | Status | Records | | | | | | | |
|---|--------------------------------------|-----------------|-----------------|----------|----|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Birddata | BA | WAM | FSRD | DBCA | EBPC |
| Meliphagidae (honeyeaters) | | | | | | | | | |
| Red Wattlebird | <i>Anthochaera carunculata</i> | + | | + | + | + | + | | |
| Western Wattlebird | <i>Anthochaera lunulata</i> | | | | + | | | | |
| Brown-headed Honeyeater | <i>Melithreptus brevirostris</i> | | | + | + | | | | |
| White-naped Honeyeater | <i>Melithreptus chloropsis</i> | + | | | + | | + | | |
| Singing Honeyeater | <i>Gavicalis virescens</i> | + | + | + | + | | + | | |
| Brown Honeyeater | <i>Lichmera indistincta</i> | + | + | + | + | | + | | |
| New Holland Honeyeater | <i>Phylidonyris novaehollandiae</i> | | | + | + | | + | | |
| White-cheeked Honeyeater | <i>Phylidonyris nigra</i> | + | | + | + | | + | | |
| Tawny-crowned Honeyeater | <i>Glyciphila melanops</i> | + | | + | + | | + | | |
| Yellow-plumed Honeyeater | <i>Ptilotula ornata</i> | + | | + | + | | | | |
| Western Spinebill | <i>Acanthorhynchus superciliosus</i> | + | + | + | + | | + | | |
| Pardalotidae (pardalotes) | | | | | | | | | |
| Spotted Pardalote | <i>Pardalotus punctatus</i> | | | + | + | + | + | | |
| Striated Pardalote | <i>Pardalotus striatus</i> | + | | + | + | | + | | |
| Acanthizidae (thornbills and allies) | | | | | | | | | |
| White-browed Scrubwren | <i>Sericornis frontalis</i> | | | | + | | | | |
| Weebill | <i>Smicronis brevirostris</i> | + | + | + | + | | + | | |
| Western Gerygone | <i>Gerygone fusca</i> | + | + | + | + | | + | | |
| Inland Thornbill | <i>Acanthiza apicalis</i> | + | + | + | + | | + | | |
| Western Thornbill | <i>Acanthiza inornata</i> | + | + | + | + | | + | | |
| Yellow-rumped Thornbill | <i>Acanthiza chrysorrhoa</i> | + | + | + | + | | | | |
| Pomatostomidae (babblers) | | | | | | | | | |
| White-browed Babbler | <i>Pomatostomus superciliaris</i> | | | + | + | | + | | |
| Artamidae (woodswallows) | | | | | | | | | |
| Black-faced Woodswallow | <i>Artamus cinereus</i> | | | + | + | | | | |
| Dusky Woodswallow | <i>Artamus cyanopterus</i> | + | | + | + | + | | | |
| Cracticidae (butcherbirds, currawongs & magpies) | | | | | | | | | |
| Pied Butcherbird | <i>Cracticus nigrogularis</i> | | | + | + | | | | |
| Grey Butcherbird | <i>Cracticus torquatus</i> | | + | + | + | | | | |
| Australian Magpie | <i>Cracticus tibicen</i> | + | + | + | + | | + | | |
| Grey Currawong | <i>Strepera versicolor</i> | + | | + | + | | + | | |
| Campephagidae (cuckoo-shrikes) | | | | | | | | | |
| Black-faced Cuckoo-shrike | <i>Coracina novaehollandiae</i> | + | | + | + | | | | |
| White-winged Triller | <i>Lalage tricolor</i> | | | | | | | | |
| Neosittidae (sittellas) | | | | | | | | | |
| Varied Sittella | <i>Daphoenositta chrysoptera</i> | + | | + | + | | + | | |
| Pachycephalidae (whistlers) | | | | | | | | | |
| Crested Shrike-tit | <i>Falcunculus frontatus</i> | | | | + | | | | |
| Rufous Whistler | <i>Pachycephala rufiventris</i> | + | + | + | + | | + | | |
| Western Golden Whistler | <i>Pachycephala occidentalis</i> | + | + | + | + | | + | | |
| Grey Shrike-thrush | <i>Colluricincla harmonica</i> | + | + | + | + | + | + | | |
| Rhipiduridae (fantails) | | | | | | | | | |
| Grey Fantail | <i>Rhipidura albiscapa</i> | + | + | + | + | | + | | |
| Willie Wagtail | <i>Rhipidura leucophrys</i> | | + | + | + | | | | |

Appendix 4. (cont.)

| Species | Status | Records | | | | | | | |
|--|---|-----------------|-----------------|----------|----|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Birddata | BA | WAM | FSRD | DBCA | EBPC |
| Monarchidae (monarchs, flycatchers and allies) | | | | | | | | | |
| Restless Flycatcher | <i>Myiagra inquieta</i> | | | | + | | | | |
| Magpie-lark | <i>Grallina cyanoleuca</i> | | | + | + | | | | |
| Corvidae (ravens and crows) | | | | | | | | | |
| Australian Raven | <i>Corvus coronoides</i> | + | + | + | + | + | + | | |
| Petroicidae (Australian robins) | | | | | | | | | |
| Western Yellow Robin | <i>Eopsaltria australis griseogularis</i> | + | | | + | | + | | |
| Jacky Winter | <i>Microeca fascinans</i> | | | + | | | | | |
| Red-capped Robin | <i>Petroica goodenovii</i> | | | + | + | + | + | | |
| Scarlet Robin | <i>Petroica boodang</i> | + | + | + | + | | + | | |
| Hirundinidae (swallows) | | | | | | | | | |
| White-backed Swallow | <i>Cheramoeca leucosternus</i> | | | | + | | + | | |
| Welcome Swallow | <i>Hirundo neoxena</i> | | | + | + | | | | |
| Tree Martin | <i>Petrochelidon nigricans</i> | + | + | + | + | + | + | | |
| Locustellidae (songlarks, grassbirds and allies) | | | | | | | | | |
| Rufous Songlark | <i>Cincloramphus mathewsi</i> | | | + | + | | | | |
| Zosteropidae (white-eyes) | | | | | | | | | |
| Silveryeye | <i>Zosterops lateralis</i> | + | + | + | + | | + | | |
| Dicaeidae (flower-peckers) | | | | | | | | | |
| Mistletoebird | <i>Dicaeum hirundinaceum</i> | + | | + | + | | + | | |
| Motacillidae (pipits and true wagtails) | | | | | | | | | |
| Australian Pipit | <i>Anthus australis</i> | | + | | | | | | |
| # bird species potentially occurring in the study area: | | 99 | | | | | | | |

Appendix 5. Mammals that Potentially Occur in the Study Area.

Site visit 2021 = species records from this survey.

Site visit 2020 = species records from the Julimar Project, south of the study area (Western Wildlife 2020).

Faunafle = species from the Western Shield Monitoring Database (see Table 2).

Quenda = species records from the Quenda Community Survey (see Table 2).

WAM = species records from the Western Australian Museum Database (see Table 2).

FSDB = species records from the Fauna Survey Database (see Table 2).

DBCA = species records from the DBCA Threatened and Priority Species Database (see Table 2).

EPBC = species & species habitat from the EPBC Protected Matters Search Tool (see Table 2).

Int = introduced species.

| Species | Status | Records | | | | | | | |
|---|--------|-----------------|-----------------|----------|--------|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Faunafle | Quenda | WAM | FSDB | DBCA | EPBC |
| Tachyglossidae (echidnas) | | | | | | | | | |
| Echidna <i>Tachyglossus aculeatus</i> | | + | + | | | + | + | | |
| Dasyuridae (dasyurid marsupials) | | | | | | | | | |
| Mardo (Yellow-footed Antechinus) <i>Antechinus flavipes</i> | T | + | + | | | | | | |
| Chuditch <i>Dasyurus geoffroii</i> | SP | + | + | | | + | + | + | + |
| Brush-tailed Phascogale <i>Phascogale tapoatafa</i> | | | | + | | | | + | |
| Little Long-tailed Dunnart <i>Sminthopsis dolichura</i> | | | | | | + | + | | |
| Gilbert's Dunnart <i>Sminthopsis gilberti</i> | | | | | | + | + | | |
| Grey-bellied Dunnart <i>Sminthopsis griseoventer</i> | | | | | | + | | | |
| Peramelidae (bandicoots) | | | | | | | | | |
| Quenda or Southern Brown Bandicoot <i>Isoodon fusciventer</i> | P | | + | + | + | | + | + | |
| Burramyidae (pygmy possums) | | | | | | | | | |
| Western Pygmy Possum <i>Cercartetus concinnus</i> | | | | | | + | | | |
| Tarsipedidae (honey possum) | | | | | | | | | |
| Honey Possum <i>Tarsipes rostratus</i> | | | | | | + | + | | |
| Phalangeridae (possums) | | | | | | | | | |
| Brush-tailed Possum <i>Trichosurus vulpecula</i> | | + | + | | | | + | | |
| Potoroidae (bettongs and potoroos) | | | | | | | | | |
| Woylie <i>Bettongia penicillata ogilbyi</i> | T | + | | | | | | + | + |
| Macropodidae (kangaroos and wallabies) | | | | | | | | | |
| Western Brush Wallaby <i>Notamacropus irma</i> | P | + | | | | + | | + | |
| Tammar Wallaby <i>Notamacropus eugenii derbianus</i> | P | + | | | | + | + | + | |
| Western Grey Kangaroo <i>Macropus fuliginosus</i> | | + | + | | | + | + | | |
| Black-flanked Rock-wallaby <i>Petrogale lateralis lateralis</i> | T | | | | | | | + | + |
| Mollosidae (mastiff bats) | | | | | | | | | |
| White-striped Bat <i>Austonomus australis</i> | | | | | | | + | | |
| South-western Free-tailed Bat <i>Mormopterus kitcheneri</i> | | | | | | | + | | |
| Vespertilionidae (vesper bats) | | | | | | | | | |
| Gould's Wattled Bat <i>Chalinolobus gouldii</i> | | | | | | | + | | |
| Chocolate Wattled Bat <i>Chalinolobus morio</i> | | | | | | | + | | |
| Southern Forest Bat <i>Vespedalus regulus</i> | | | | | | + | + | | |
| Lesser Long-eared Bat <i>Nyctophilus geoffroyi</i> | | | | | | | + | | |
| Gould's Long-eared Bat <i>Nyctophilus gouldii</i> | | | | | | | | | |
| Greater Long-eared Bat <i>Nyctophilus major</i> | | | | | | | + | | |

Appendix 5. (cont.)

| Species | Status | Records | | | | | | | |
|---|--------|-----------------|-----------------|----------|--------|-----|------|------|------|
| | | Site visit 2021 | Site visit 2020 | Faunafle | Quenda | WAM | FSDB | DBCA | EBPC |
| Muridae (rats and mice) | | | | | | | | | |
| House Mouse <i>Mus musculus</i> | Int. | | + | + | | + | + | | |
| Western Bush Rat <i>Rattus fuscipes</i> | | | | | | | + | | |
| Black Rat <i>Rattus rattus</i> | Int. | | | + | | + | | | |
| Leporidae (rabbits and hares) | | | | | | | | | |
| Rabbit <i>Oryctolagus cuniculus</i> | Int. | + | + | + | | + | + | | |
| Canidae (foxes and dogs) | | | | | | | | | |
| European Red Fox <i>Vulpes vulpes</i> | Int. | + | + | | | | + | | |
| Felidae (cats) | | | | | | | | | |
| Feral Cat <i>Felis catus</i> | Int. | + | + | | | + | + | | |
| Suidae (pigs) | | | | | | | | | |
| Pig <i>Sus scrofa</i> | Int. | + | | | | | + | | |
| # mammal species: | | 31 | | | | | | | |

Appendix 6. EPBC Protected Matters Search Tool Results.

Threatened and Migratory species listed for the 5km radius surrounding 31.473°S, 116.235°E on the EPBC Protected Matters Search Tool.

| Species | Status | Type of Presence |
|---|---|--|
| <i>Calidris ferruginea</i> Curlew Sandpiper | Critically Endangered & Migratory (wetland) | Species or species habitat MAY occur within area |
| <i>Numenius madagascariensis</i> Eastern Curlew | Critically Endangered & Migratory (wetland) | Species or species habitat MAY occur within area |
| <i>Calyptorhynchus banksii naso</i> Forest Red-tailed Black Cockatoo | Vulnerable | Species or species habitat LIKELY TO occur within area |
| <i>Calyptorhynchus latirostris</i> Carnaby's Black-Cockatoo | Endangered | Species or species habitat KNOWN TO occur within area |
| <i>Leipoa ocellata</i> Malleefowl | Vulnerable | Species or species habitat LIKELY TO occur within area |
| <i>Rostratula australis</i> Australian Painted Snipe | Endangered & Migratory | Species or species habitat LIKELY TO occur within area |
| <i>Dasyurus geoffroii</i> Chuditch | Vulnerable | Species or species habitat KNOWN TO occur within area |
| <i>Bettongia penicillata ogilbyi</i> Woylie | Endangered | Species or species habitat MAY occur within area |
| <i>Petrogale lateralis lateralis</i> Black-flanked Rock Wallaby | Endangered | Species or species habitat LIKELY TO occur within area |
| <i>Apus pacificus</i> Fork-tailed Swift | Migratory (terrestrial) | Species or species habitat LIKELY TO occur within area |
| <i>Motacilla cinerea</i> Grey Wagtail | Migratory (terrestrial) | Species or species habitat MAY occur within area |
| <i>Tringa hypoleucos</i> Common Sandpiper | Migratory (wetland) | Species or species habitat MAY occur within area |
| <i>Calidris acuminata</i> Sharp-tailed Sandpiper | Migratory (wetland) | Species or species habitat MAY occur within area |
| <i>Calidris melanotos</i> Pectoral Sandpiper | Migratory (wetland) | Species or species habitat MAY occur within area |
| <i>Pandion haliaetus</i> Osprey | Migratory (wetland) | Species or species habitat MAY occur within area |

Appendix 7. Fauna Recorded in the Study Area April - May 2021.

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|----------|--------------------------------------|----------------------------------|---------|--------|------------------------|---------|
| Eastings | Northing | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 424862 | 6514156 | <i>Acanthiza apicalis</i> | Inland Thornbill | Hab 01 | | Day Sighting | 14/5/21 |
| 430223 | 6521150 | <i>Acanthiza apicalis</i> | Inland Thornbill | Hab 14 | | Day Sighting | 19/4/21 |
| 425452 | 6515764 | <i>Acanthiza apicalis</i> | Inland Thornbill | Hab 24 | | Day Sighting | 17/5/21 |
| 425183 | 6516343 | <i>Acanthiza apicalis</i> | Inland Thornbill | Hab 26 | | Day Sighting | 17/5/21 |
| 430381 | 6521456 | <i>Acanthiza apicalis</i> | Inland Thornbill | Hab 28 | | Day Sighting | 17/5/21 |
| 426352 | 6516268 | <i>Acanthiza apicalis</i> | Inland Thornbill | Hab 30 | | Day Sighting | 17/5/21 |
| 424862 | 6514156 | <i>Acanthiza chrysorrhoa</i> | Yellow-rumped Thornbill | Hab 01 | | Day Sighting | 14/5/21 |
| 425034 | 6515700 | <i>Acanthiza chrysorrhoa</i> | Yellow-rumped Thornbill | Hab 25 | | Day Sighting | 17/5/21 |
| 425377 | 6514343 | <i>Acanthiza inornata</i> | Western Thornbill | Hab 02 | | Day Sighting | 14/5/21 |
| 426196 | 6514314 | <i>Acanthiza inornata</i> | Western Thornbill | Hab 03 | | Day Sighting | 14/5/21 |
| 426328 | 6518803 | <i>Acanthiza inornata</i> | Western Thornbill | Hab 17 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Acanthiza inornata</i> | Western Thornbill | Hab 25 | | Day Sighting | 17/5/21 |
| 424801 | 6515090 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 05 | | Day Sighting | 14/5/21 |
| 425845 | 6515913 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 07 | | Day Sighting | 19/4/21 |
| 425483 | 6517023 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 08 | | Day Sighting | 19/4/21 |
| 425914 | 6517706 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 09 | | Digging | 19/4/21 |
| 428216 | 6519229 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 12 | | Day Sighting | 14/5/21 |
| 427762 | 6520153 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 15 | | Day Sighting | 14/5/21 |
| 426328 | 6518803 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 17 | | Day Sighting | 19/4/21 |
| 425452 | 6515764 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 24 | | Day Sighting | 17/5/21 |
| 425034 | 6515700 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 25 | | Day Sighting | 17/5/21 |
| 425183 | 6516343 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 26 | | Day Sighting | 17/5/21 |
| 426133 | 6516895 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 31 | | Day Sighting | 17/5/21 |
| 426425 | 6517425 | <i>Acanthorhynchus superciliosus</i> | Western Spinebill | Hab 32 | | Day Sighting | 17/5/21 |
| 427203 | 6515585 | <i>Antechinus flavipes</i> | Mardo | Cg41B | | Camera trap | 30/4/21 |
| 425377 | 6514343 | <i>Anthochaera carunculata</i> | Red Wattlebird | Hab 02 | | Day Sighting | 14/5/21 |
| 427730 | 6516248 | <i>Aquila audax</i> | Wedge-tailed Eagle | Hab 21 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Artamus cyanopterus</i> | Dusky Woodswallow | Hab 25 | | Day Sighting | 17/5/21 |
| 427752 | 6516184 | <i>Bettongia penicillata ogilbyi</i> | Woylie | Cg23B | CR | Camera trap | 30/4/21 |
| 427203 | 6515585 | <i>Bettongia penicillata ogilbyi</i> | Woylie | Cg41B | CR | Camera trap | 30/4/21 |
| 426406 | 6514020 | <i>Calyptorhynchus banksii naso</i> | Forest Red-tailed Black-cockatoo | No site | VU | Day Sighting | 14/5/21 |
| 424745 | 6514055 | <i>Calyptorhynchus banksii naso</i> | Forest Red-tailed Black-cockatoo | No site | VU | Foraging signs (Marri) | 17/5/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|----------|-------------------------------------|----------------------------------|---------|--------|------------------------|---------|
| Eastings | Northing | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 424608 | 6513620 | <i>Calyptorhynchus banksii naso</i> | Forest Red-tailed Black-cockatoo | No site | VU | Foraging signs (Marri) | 17/5/21 |
| 430080 | 6521820 | <i>Calyptorhynchus banksii naso</i> | Forest Red-tailed Black-cockatoo | No site | VU | Foraging signs (Marri) | 17/5/21 |
| 426518 | 6517525 | <i>Calyptorhynchus latirostris</i> | Carnaby's Cockatoo | No site | EN | Foraging signs (Marri) | 17/5/21 |
| 425738 | 6516352 | <i>Calyptorhynchus latirostris</i> | Carnaby's Cockatoo | No site | EN | Foraging signs (Marri) | 17/5/21 |
| 430080 | 6521820 | <i>Calyptorhynchus latirostris</i> | Carnaby's Cockatoo | No site | EN | Foraging signs (Marri) | 17/5/21 |
| 427347 | 6517754 | <i>Calyptorhynchus latirostris</i> | Carnaby's Cockatoo | No site | EN | Foraging signs (Marri) | 17/5/21 |
| 425377 | 6514343 | <i>Climacteris rufus</i> | Rufous Tree-creeper | Hab 02 | | Day Sighting | 14/5/21 |
| 426283 | 6513863 | <i>Climacteris rufus</i> | Rufous Tree-creeper | Hab 04 | | Day Sighting | 14/5/21 |
| 424786 | 6515060 | <i>Colluricincla harmonica</i> | Grey Shrike-thrush | Cg15B | | Camera trap | 30/4/21 |
| 425377 | 6514343 | <i>Colluricincla harmonica</i> | Grey Shrike-thrush | Hab 02 | | Day Sighting | 14/5/21 |
| 424801 | 6515090 | <i>Colluricincla harmonica</i> | Grey Shrike-thrush | Hab 05 | | Day Sighting | 14/5/21 |
| 430381 | 6521456 | <i>Colluricincla harmonica</i> | Grey Shrike-thrush | Hab 28 | | Day Sighting | 17/5/21 |
| 429923 | 6521437 | <i>Coracina novaehollandiae</i> | Black-faced Cuckoo-shrike | Hab 29 | | Day Sighting | 17/5/21 |
| 430228 | 6521152 | <i>Corvus coronoides</i> | Australian Raven | Cg24B | | Camera trap | 30/4/21 |
| 425034 | 6515700 | <i>Corvus coronoides</i> | Australian Raven | Hab 25 | | Day Sighting | 17/5/21 |
| 430182 | 6521780 | <i>Cracticus tibicen</i> | Australian Magpie | Hab 27 | | Day Sighting | 17/5/21 |
| 427762 | 6520153 | <i>Cryptoblepharus buchannanii</i> | Fence Skink | Hab 15 | | Day Sighting | 19/4/21 |
| 429923 | 6521437 | <i>Cryptoblepharus buchannanii</i> | Fence Skink | Hab 29 | | Day Sighting | 17/5/21 |
| 425377 | 6514343 | <i>Dacelo novaeguineae</i> | Laughing Kookaburra | Hab 02 | | Day Sighting | 14/5/21 |
| 425183 | 6516343 | <i>Daphoenositta chrysoptera</i> | Varied Sittella | Hab 26 | | Day Sighting | 17/5/21 |
| 425817 | 6515924 | <i>Dasyurus geoffroii</i> | Chuditch | Cg03B | VU | Camera trap | 30/4/21 |
| 427725 | 6520187 | <i>Dasyurus geoffroii</i> | Chuditch | Cg07B | VU | Camera trap | 30/4/21 |
| 425661 | 6515068 | <i>Dasyurus geoffroii</i> | Chuditch | Cg09B | VU | Camera trap | 30/4/21 |
| 427463 | 6518633 | <i>Dasyurus geoffroii</i> | Chuditch | Cg10B | VU | Camera trap | 30/4/21 |
| 428217 | 6519226 | <i>Dasyurus geoffroii</i> | Chuditch | Cg13B | VU | Camera trap | 30/4/21 |
| 424786 | 6515060 | <i>Dasyurus geoffroii</i> | Chuditch | Cg15B | VU | Camera trap | 30/4/21 |
| 427033 | 6514981 | <i>Dasyurus geoffroii</i> | Chuditch | Cg16B | VU | Camera trap | 30/4/21 |
| 428374 | 6517930 | <i>Dasyurus geoffroii</i> | Chuditch | Cg20B | VU | Camera trap | 30/4/21 |
| 427173 | 6519312 | <i>Dasyurus geoffroii</i> | Chuditch | Cg22B | VU | Camera trap | 30/4/21 |
| 427752 | 6516184 | <i>Dasyurus geoffroii</i> | Chuditch | Cg23B | VU | Camera trap | 30/4/21 |
| 430228 | 6521152 | <i>Dasyurus geoffroii</i> | Chuditch | Cg24B | VU | Camera trap | 30/4/21 |
| 429003 | 6519168 | <i>Dasyurus geoffroii</i> | Chuditch | Cg25B | VU | Camera trap | 30/4/21 |
| 425922 | 6517696 | <i>Dasyurus geoffroii</i> | Chuditch | Cg26B | VU | Camera trap | 30/4/21 |
| 428392 | 6519868 | <i>Dasyurus geoffroii</i> | Chuditch | Cg27B | VU | Camera trap | 30/4/21 |
| 427203 | 6515585 | <i>Dasyurus geoffroii</i> | Chuditch | Cg41B | VU | Camera trap | 30/4/21 |
| 426713 | 6518003 | <i>Dasyurus geoffroii</i> | Chuditch | Cg42B | VU | Camera trap | 30/4/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|-----------|---|--------------------------|---------|--------|--------------|---------|
| Eastings | Northings | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 425474 | 6517022 | <i>Dasyurus geoffroi</i> | Chuditch | Cg46B | VU | Camera trap | 30/4/21 |
| 425401 | 6513632 | <i>Dasyurus geoffroi</i> | Chuditch | No site | VU | Scats | 17/5/21 |
| 425183 | 6516343 | <i>Dicaeum hirundinaceum</i> | Mistletoebird | Hab 26 | | Day Sighting | 17/5/21 |
| 430182 | 6521780 | <i>Dicaeum hirundinaceum</i> | Mistletoebird | Hab 27 | | Day Sighting | 17/5/21 |
| 427463 | 6518633 | <i>Dromaius novaehollandiae</i> | Emu | Cg10B | | Camera trap | 30/4/21 |
| 426196 | 6514314 | <i>Dromaius novaehollandiae</i> | Emu | Hab 03 | | Scats | 14/5/21 |
| 425452 | 6515764 | <i>Dromaius novaehollandiae</i> | Emu | Hab 24 | | Scats | 17/5/21 |
| 426425 | 6517425 | <i>Dromaius novaehollandiae</i> | Emu | Hab 32 | | Scats | 17/5/21 |
| 427517 | 6516919 | <i>Dromaius novaehollandiae</i> | Emu | Hab 35 | | Scats | 17/5/21 |
| 429923 | 6521437 | <i>Eopsaltria australis griseogularis</i> | Western Yellow Robin | Hab 29 | | Day Sighting | 17/5/21 |
| 424786 | 6515060 | <i>Felis catus</i> | Cat | Cg15B | | Camera trap | 30/4/21 |
| 425474 | 6517022 | <i>Felis catus</i> | Cat | Cg46B | | Camera trap | 30/4/21 |
| 424801 | 6515090 | <i>Gavicalis virescens</i> | Singing Honeyeater | Hab 05 | | Day Sighting | 19/4/21 |
| 427762 | 6520153 | <i>Gavicalis virescens</i> | Singing Honeyeater | Hab 15 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Gavicalis virescens</i> | Singing Honeyeater | Hab 25 | | Day Sighting | 17/5/21 |
| 424862 | 6514156 | <i>Gerygone fusca</i> | Western Gerygone | Hab 01 | | Day Sighting | 14/5/21 |
| 425483 | 6517023 | <i>Gerygone fusca</i> | Western Gerygone | Hab 08 | | Day Sighting | 14/5/21 |
| 430223 | 6521150 | <i>Gerygone fusca</i> | Western Gerygone | Hab 14 | | Day Sighting | 19/4/21 |
| 428390 | 6518713 | <i>Gerygone fusca</i> | Western Gerygone | Hab 19 | | Day Sighting | 14/5/21 |
| 425452 | 6515764 | <i>Gerygone fusca</i> | Western Gerygone | Hab 24 | | Day Sighting | 17/5/21 |
| 425034 | 6515700 | <i>Gerygone fusca</i> | Western Gerygone | Hab 25 | | Day Sighting | 17/5/21 |
| 430381 | 6521456 | <i>Gerygone fusca</i> | Western Gerygone | Hab 28 | | Day Sighting | 17/5/21 |
| 426352 | 6516268 | <i>Gerygone fusca</i> | Western Gerygone | Hab 30 | | Day Sighting | 17/5/21 |
| 426328 | 6518803 | <i>Glyciphila melanops</i> | Tawny-crowned Honeyeater | Hab 17 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Glyciphila melanops</i> | Tawny-crowned Honeyeater | Hab 25 | | Day Sighting | 17/5/21 |
| 424862 | 6514156 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 01 | | Day Sighting | 14/5/21 |
| 426283 | 6513863 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 04 | | Day Sighting | 14/5/21 |
| 424801 | 6515090 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 05 | | Day Sighting | 14/5/21 |
| 424801 | 6515090 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 05 | | Day Sighting | 19/4/21 |
| 427762 | 6520153 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 15 | | Day Sighting | 19/4/21 |
| 426328 | 6518803 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 17 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 25 | | Day Sighting | 17/5/21 |
| 425183 | 6516343 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 26 | | Day Sighting | 17/5/21 |
| 426425 | 6517425 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 32 | | Day Sighting | 17/5/21 |
| 427742 | 6517514 | <i>Lichmera indistincta</i> | Brown Honeyeater | Hab 34 | | Day Sighting | 17/5/21 |
| 425661 | 6515068 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Cg09B | | Camera trap | 30/4/21 |
| 427463 | 6518633 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Cg10B | | Camera trap | 30/4/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|-----------|---------------------------------------|------------------------|--------|--------|--------------|---------|
| Eastings | Northings | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 424786 | 6515060 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Cg15B | | Camera trap | 30/4/21 |
| 427173 | 6519312 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Cg22B | | Camera trap | 30/4/21 |
| 426342 | 6518785 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Cg31B | | Camera trap | 30/4/21 |
| 428439 | 6518705 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Cg32B | | Camera trap | 30/4/21 |
| 424862 | 6514156 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 01 | | Scats | 14/5/21 |
| 426196 | 6514314 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 03 | | Scats | 14/5/21 |
| 424801 | 6515090 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 05 | | Scats | 14/5/21 |
| 426719 | 6518003 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 10 | | Scats | 14/5/21 |
| 427509 | 6518602 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 11 | | Scats | 14/5/21 |
| 428216 | 6519229 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 12 | | Day Sighting | 19/4/21 |
| 427762 | 6520153 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 15 | | Scats | 14/5/21 |
| 427143 | 6519313 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 16 | | Scats | 14/5/21 |
| 428388 | 6517924 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 20 | | Scats | 14/5/21 |
| 427730 | 6516248 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 21 | | Scats | 14/5/21 |
| 425452 | 6515764 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 24 | | Scats | 17/5/21 |
| 430381 | 6521456 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 28 | | Day Sighting | 17/5/21 |
| 427348 | 6517763 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 33 | | Day Sighting | 17/5/21 |
| 427517 | 6516919 | <i>Macropus fuliginosus</i> | Western Grey Kangaroo | Hab 35 | | Scats | 17/5/21 |
| 427752 | 6516184 | <i>Malurus splendens</i> | Splendid Fairy-wren | Cg23B | | Camera trap | 30/4/21 |
| 430223 | 6521150 | <i>Malurus splendens</i> | Splendid Fairy-wren | Hab 14 | | Day Sighting | 14/5/21 |
| 427762 | 6520153 | <i>Malurus splendens</i> | Splendid Fairy-wren | Hab 15 | | Day Sighting | 19/4/21 |
| 430381 | 6521456 | <i>Malurus splendens</i> | Splendid Fairy-wren | Hab 28 | | Day Sighting | 17/5/21 |
| 425377 | 6514343 | <i>Melithreptus chloropsis</i> | White-naped Honeyeater | Hab 02 | | Day Sighting | 14/5/21 |
| 430381 | 6521456 | <i>Morethia obscura</i> | | Hab 28 | | Day Sighting | 17/5/21 |
| 425661 | 6515068 | <i>Notamacropus eugenii derbianus</i> | Tammar Wallaby | Cg09B | P4 | Camera trap | 30/4/21 |
| 425474 | 6517022 | <i>Notamacropus eugenii derbianus</i> | Tammar Wallaby | Cg46B | P4 | Camera trap | 30/4/21 |
| 427725 | 6520187 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg07B | P4 | Camera trap | 30/4/21 |
| 427463 | 6518633 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg10B | P4 | Camera trap | 30/4/21 |
| 428217 | 6519226 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg13B | P4 | Camera trap | 30/4/21 |
| 424786 | 6515060 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg15B | P4 | Camera trap | 30/4/21 |
| 428374 | 6517930 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg20B | P4 | Camera trap | 30/4/21 |
| 427173 | 6519312 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg22B | P4 | Camera trap | 30/4/21 |
| 429003 | 6519168 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg25B | P4 | Camera trap | 30/4/21 |
| 428392 | 6519868 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg27B | P4 | Camera trap | 30/4/21 |
| 426342 | 6518785 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg31B | P4 | Camera trap | 30/4/21 |
| 428439 | 6518705 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg32B | P4 | Camera trap | 30/4/21 |
| 427203 | 6515585 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg41B | P4 | Camera trap | 30/4/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|----------|----------------------------------|--------------------------|---------|--------|--------------|---------|
| Eastings | Northing | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 426713 | 6518003 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg42B | P4 | Camera trap | 30/4/21 |
| 425474 | 6517022 | <i>Notamacropus irma</i> | Western Brush Wallaby | Cg46B | P4 | Camera trap | 30/4/21 |
| 428348 | 6519731 | <i>Notamacropus irma</i> | Western Brush Wallaby | No site | P4 | Day Sighting | 14/5/21 |
| 428400 | 6518890 | <i>Notamacropus irma</i> | Western Brush Wallaby | No site | P4 | Day Sighting | 19/4/21 |
| 423170 | 6514320 | <i>Notamacropus irma</i> | Western Brush Wallaby | No site | P4 | Dead | 19/4/21 |
| 428409 | 6517924 | <i>Notamacropus irma</i> | Western Brush Wallaby | No site | P4 | Day Sighting | 14/5/21 |
| 426196 | 6514314 | <i>Pachycephala occidentalis</i> | Golden Whistler | Hab 03 | | Day Sighting | 14/5/21 |
| 425845 | 6515913 | <i>Pachycephala occidentalis</i> | Golden Whistler | Hab 07 | | Day Sighting | 19/4/21 |
| 425452 | 6515764 | <i>Pachycephala occidentalis</i> | Golden Whistler | Hab 24 | | Day Sighting | 17/5/21 |
| 424862 | 6514156 | <i>Pachycephala rufiventris</i> | Rufous Whistler | Hab 01 | | Day Sighting | 14/5/21 |
| 425377 | 6514343 | <i>Pachycephala rufiventris</i> | Rufous Whistler | Hab 02 | | Day Sighting | 14/5/21 |
| 427730 | 6516248 | <i>Pachycephala rufiventris</i> | Rufous Whistler | Hab 21 | | Day Sighting | 14/5/21 |
| 424862 | 6514156 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 01 | | Day Sighting | 14/5/21 |
| 425377 | 6514343 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 02 | | Day Sighting | 14/5/21 |
| 426196 | 6514314 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 03 | | Day Sighting | 14/5/21 |
| 429007 | 6519159 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 18 | | Day Sighting | 14/5/21 |
| 425452 | 6515764 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 24 | | Day Sighting | 17/5/21 |
| 425034 | 6515700 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 25 | | Day Sighting | 17/5/21 |
| 425183 | 6516343 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 26 | | Day Sighting | 17/5/21 |
| 430182 | 6521780 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 27 | | Day Sighting | 17/5/21 |
| 430381 | 6521456 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 28 | | Day Sighting | 17/5/21 |
| 426425 | 6517425 | <i>Pardalotus striatus</i> | Striated Pardalote | Hab 32 | | Day Sighting | 17/5/21 |
| 429007 | 6519159 | <i>Petrochelidon nigricans</i> | Tree Martin | Hab 18 | | Day Sighting | 19/4/21 |
| 427725 | 6520187 | <i>Petroica boodang</i> | Scarlet Robin | Cg07B | | Camera trap | 30/4/21 |
| 424862 | 6514156 | <i>Petroica boodang</i> | Scarlet Robin | Hab 01 | | Day Sighting | 14/5/21 |
| 426283 | 6513863 | <i>Petroica boodang</i> | Scarlet Robin | Hab 04 | | Day Sighting | 14/5/21 |
| 427509 | 6518602 | <i>Petroica boodang</i> | Scarlet Robin | Hab 11 | | Day Sighting | 19/4/21 |
| 425183 | 6516343 | <i>Petroica boodang</i> | Scarlet Robin | Hab 26 | | Day Sighting | 17/5/21 |
| 426425 | 6517425 | <i>Petroica boodang</i> | Scarlet Robin | Hab 32 | | Day Sighting | 17/5/21 |
| 427762 | 6520153 | <i>Phylidonyris nigra</i> | White-cheeked Honeyeater | Hab 15 | | Day Sighting | 19/4/21 |
| 425183 | 6516343 | <i>Phylidonyris nigra</i> | White-cheeked Honeyeater | Hab 26 | | Day Sighting | 17/5/21 |
| 426283 | 6513863 | <i>Platycercus spurius</i> | Red-capped Parrot | Hab 04 | | Day Sighting | 14/5/21 |
| 425034 | 6515700 | <i>Platycercus spurius</i> | Red-capped Parrot | Hab 25 | | Day Sighting | 17/5/21 |
| 427348 | 6517763 | <i>Platycercus spurius</i> | Red-capped Parrot | Hab 33 | | Day Sighting | 17/5/21 |
| 425377 | 6514343 | <i>Platycercus zonarius</i> | Australian Ringneck | Hab 02 | | Day Sighting | 14/5/21 |
| 426196 | 6514314 | <i>Platycercus zonarius</i> | Australian Ringneck | Hab 03 | | Day Sighting | 14/5/21 |
| 427762 | 6520153 | <i>Platycercus zonarius</i> | Australian Ringneck | Hab 15 | | Day Sighting | 19/4/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|-----------|---------------------------------|--------------------------|--------|--------|--------------|---------|
| Eastings | Northings | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 427730 | 6516248 | <i>Platyercus zonarius</i> | Australian Ringneck | Hab 21 | | Day Sighting | 14/5/21 |
| 427033 | 6514981 | <i>Platyercus zonarius</i> | Australian Ringneck | Hab 23 | | Day Sighting | 19/4/21 |
| 425452 | 6515764 | <i>Platyercus zonarius</i> | Australian Ringneck | Hab 24 | | Day Sighting | 17/5/21 |
| 425034 | 6515700 | <i>Platyercus zonarius</i> | Australian Ringneck | Hab 25 | | Day Sighting | 17/5/21 |
| 429923 | 6521437 | <i>Platyercus zonarius</i> | Australian Ringneck | Hab 29 | | Day Sighting | 17/5/21 |
| 425474 | 6517022 | <i>Pseudonaja affinis</i> | Dugite | Cg46B | | Camera trap | 30/4/21 |
| 425183 | 6516343 | <i>Pseudophryne guentheri</i> | Guenther's Toadlet | Hab 26 | | Day Sighting | 17/5/21 |
| 425034 | 6515700 | <i>Ptilotula ornata</i> | Yellow-plumed Honeyeater | Hab 25 | | Day Sighting | 17/5/21 |
| 425183 | 6516343 | <i>Ptilotula ornata</i> | Yellow-plumed Honeyeater | Hab 26 | | Day Sighting | 17/5/21 |
| 424862 | 6514156 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 01 | | Day Sighting | 14/5/21 |
| 425377 | 6514343 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 02 | | Day Sighting | 14/5/21 |
| 424801 | 6515090 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 05 | | Day Sighting | 19/4/21 |
| 425483 | 6517023 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 08 | | Day Sighting | 14/5/21 |
| 428216 | 6519229 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 12 | | Day Sighting | 14/5/21 |
| 427762 | 6520153 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 15 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 25 | | Day Sighting | 17/5/21 |
| 430381 | 6521456 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 28 | | Day Sighting | 17/5/21 |
| 429923 | 6521437 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 29 | | Day Sighting | 17/5/21 |
| 426352 | 6516268 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 30 | | Day Sighting | 17/5/21 |
| 427517 | 6516919 | <i>Rhipidura albiscapa</i> | Grey Fantail | Hab 35 | | Day Sighting | 17/5/21 |
| 424862 | 6514156 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 01 | | Day Sighting | 14/5/21 |
| 425377 | 6514343 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 02 | | Day Sighting | 14/5/21 |
| 426196 | 6514314 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 03 | | Day Sighting | 14/5/21 |
| 426283 | 6513863 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 04 | | Day Sighting | 14/5/21 |
| 424801 | 6515090 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 05 | | Day Sighting | 14/5/21 |
| 425845 | 6515913 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 07 | | Day Sighting | 14/5/21 |
| 425483 | 6517023 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 08 | | Day Sighting | 19/4/21 |
| 427509 | 6518602 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 11 | | Day Sighting | 19/4/21 |
| 428301 | 6519899 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 13 | | Day Sighting | 14/5/21 |
| 430223 | 6521150 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 14 | | Day Sighting | 19/4/21 |
| 427143 | 6519313 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 16 | | Day Sighting | 14/5/21 |
| 428390 | 6518713 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 19 | | Day Sighting | 19/4/21 |
| 425452 | 6515764 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 24 | | Day Sighting | 17/5/21 |
| 425034 | 6515700 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 25 | | Day Sighting | 17/5/21 |
| 430182 | 6521780 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 27 | | Day Sighting | 17/5/21 |
| 430381 | 6521456 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 28 | | Day Sighting | 17/5/21 |
| 429923 | 6521437 | <i>Smicrorhis brevisrostris</i> | Weebill | Hab 29 | | Day Sighting | 17/5/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|-----------|--------------------------------|----------------------|--------|--------|--------------|---------|
| Eastings | Northings | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 426352 | 6516268 | <i>Smicrornis brevirostris</i> | Weebill | Hab 30 | | Day Sighting | 17/5/21 |
| 426133 | 6516895 | <i>Smicrornis brevirostris</i> | Weebill | Hab 31 | | Day Sighting | 17/5/21 |
| 426425 | 6517425 | <i>Smicrornis brevirostris</i> | Weebill | Hab 32 | | Day Sighting | 17/5/21 |
| 427742 | 6517514 | <i>Smicrornis brevirostris</i> | Weebill | Hab 34 | | Day Sighting | 17/5/21 |
| 427517 | 6516919 | <i>Smicrornis brevirostris</i> | Weebill | Hab 35 | | Day Sighting | 17/5/21 |
| 428374 | 6517930 | <i>Sminthopsis sp.</i> | dunnart sp. | Cg20B | | Camera trap | 30/4/21 |
| 425474 | 6517022 | <i>Sminthopsis sp.</i> | dunnart sp. | Cg46B | | Camera trap | 30/4/21 |
| 426342 | 6518785 | <i>Strepera versicolor</i> | Grey Currawong | Cg31B | | Camera trap | 30/4/21 |
| 425474 | 6517022 | <i>Strepera versicolor</i> | Grey Currawong | Cg46B | | Camera trap | 30/4/21 |
| 426283 | 6513863 | <i>Strepera versicolor</i> | Grey Currawong | Hab 04 | | Day Sighting | 14/5/21 |
| 425483 | 6517023 | <i>Strepera versicolor</i> | Grey Currawong | Hab 08 | | Day Sighting | 19/4/21 |
| 425183 | 6516343 | <i>Strepera versicolor</i> | Grey Currawong | Hab 26 | | Day Sighting | 17/5/21 |
| 430182 | 6521780 | <i>Sus scrofa</i> | Pig | Hab 27 | | Scats | 17/5/21 |
| 425817 | 6515924 | <i>Tachyglossus aculeata</i> | Echidna | Cg03B | | Camera trap | 30/4/21 |
| 427725 | 6520187 | <i>Tachyglossus aculeata</i> | Echidna | Cg07B | | Camera trap | 30/4/21 |
| 425661 | 6515068 | <i>Tachyglossus aculeata</i> | Echidna | Cg09B | | Camera trap | 30/4/21 |
| 424786 | 6515060 | <i>Tachyglossus aculeata</i> | Echidna | Cg15B | | Camera trap | 30/4/21 |
| 427033 | 6514981 | <i>Tachyglossus aculeata</i> | Echidna | Cg16B | | Camera trap | 30/4/21 |
| 428374 | 6517930 | <i>Tachyglossus aculeata</i> | Echidna | Cg20B | | Camera trap | 30/4/21 |
| 427173 | 6519312 | <i>Tachyglossus aculeata</i> | Echidna | Cg22B | | Camera trap | 30/4/21 |
| 427752 | 6516184 | <i>Tachyglossus aculeata</i> | Echidna | Cg23B | | Camera trap | 30/4/21 |
| 430228 | 6521152 | <i>Tachyglossus aculeata</i> | Echidna | Cg24B | | Camera trap | 30/4/21 |
| 429003 | 6519168 | <i>Tachyglossus aculeata</i> | Echidna | Cg25B | | Camera trap | 30/4/21 |
| 428392 | 6519868 | <i>Tachyglossus aculeata</i> | Echidna | Cg27B | | Camera trap | 30/4/21 |
| 426342 | 6518785 | <i>Tachyglossus aculeata</i> | Echidna | Cg31B | | Camera trap | 30/4/21 |
| 428439 | 6518705 | <i>Tachyglossus aculeata</i> | Echidna | Cg32B | | Camera trap | 30/4/21 |
| 427203 | 6515585 | <i>Tachyglossus aculeata</i> | Echidna | Cg41B | | Camera trap | 30/4/21 |
| 426713 | 6518003 | <i>Tachyglossus aculeata</i> | Echidna | Cg42B | | Camera trap | 30/4/21 |
| 424862 | 6514156 | <i>Tachyglossus aculeata</i> | Echidna | Hab 01 | | Digging | 14/5/21 |
| 424801 | 6515090 | <i>Tachyglossus aculeata</i> | Echidna | Hab 05 | | Digging | 14/5/21 |
| 427762 | 6520153 | <i>Tachyglossus aculeata</i> | Echidna | Hab 15 | | Digging | 14/5/21 |
| 428390 | 6518713 | <i>Tachyglossus aculeata</i> | Echidna | Hab 19 | | Digging | 19/4/21 |
| 425034 | 6515700 | <i>Tachyglossus aculeata</i> | Echidna | Hab 25 | | Scats | 17/5/21 |
| 430182 | 6521780 | <i>Tachyglossus aculeata</i> | Echidna | Hab 27 | | Day Sighting | 17/5/21 |
| 430228 | 6521152 | <i>Trichosurus vulpecula</i> | Brush-tailed Possum | Cg24B | | Camera trap | 30/4/21 |
| 425474 | 6517022 | <i>Trichosurus vulpecula</i> | Brush-tailed Possum | Cg46B | | Camera trap | 30/4/21 |
| 426425 | 6517425 | <i>Turnix varia</i> | Painted Button-quail | Hab 32 | | Day Sighting | 17/5/21 |

| Appendix 7 – fauna recorded in the study area | | | | | | | |
|---|-----------|----------------------------|-------------|--------|--------|--------------|---------|
| Eastings | Northings | Taxon Name | Common Name | Site | Status | ObsType | Date |
| 424786 | 6515060 | <i>Vulpes vulpes</i> | Fox | Cg15B | | Camera trap | 30/4/21 |
| 427033 | 6514981 | <i>Vulpes vulpes</i> | Fox | Cg16B | | Camera trap | 30/4/21 |
| 427752 | 6516184 | <i>Vulpes vulpes</i> | Fox | Cg23B | | Camera trap | 30/4/21 |
| 425922 | 6517696 | <i>Vulpes vulpes</i> | Fox | Cg26B | | Camera trap | 30/4/21 |
| 427203 | 6515585 | <i>Vulpes vulpes</i> | Fox | Cg41B | | Camera trap | 30/4/21 |
| 426283 | 6513863 | <i>Zosterops lateralis</i> | Silvereye | Hab 04 | | Day Sighting | 14/5/21 |
| 424801 | 6515090 | <i>Zosterops lateralis</i> | Silvereye | Hab 05 | | Day Sighting | 19/4/21 |
| 425034 | 6515700 | <i>Zosterops lateralis</i> | Silvereye | Hab 25 | | Day Sighting | 17/5/21 |
| 425183 | 6516343 | <i>Zosterops lateralis</i> | Silvereye | Hab 26 | | Day Sighting | 17/5/21 |