

BYFORD DEPOT, BYFORD

DETAILED FLORA AND VEGETATION ASSESSMENT

PUBLIC TRANSPORT AUTHORITY

NOVEMBER 2022

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EXECUTIVE SUMMARY

Focused Vision Consulting Pty Ltd (FVC) was commissioned by the Public Transport Authority (PTA) to undertake a flora and vegetation assessment of the Byford Depot (survey area) to inform the impact assessment process.

A two-phase, detailed flora and vegetation assessment, including targeted significant flora and vegetation survey was carried out by experienced botanists and ecologists in the Byford Depot survey area during early September and late October 2021.

The key findings and conclusions of the flora and vegetation assessment of the survey area are as follows:

- No Threatened flora species were recorded; however, one State-listed priority species, *Johnsonia pubescens* subsp. *cygnorum* (P2) was recorded within vegetation unit CcHtXpKa.
- The survey area has been subject to historic disturbances and more than half (59.77%) of the survey area has been cleared.
- One Declared Pest (DP) plant and Weed of National Significance (WoNS), **Zantedeschia aethiopica*, listed under then *Biosecurity and Agriculture Management Act 2007* (BAM Act) was recorded.
- Eight vegetation units (six of which are remnant vegetation; Cc, CcHtKaXp, CcXp, CoMvv, ErCc and KaHtKr) were described and mapped within the survey area, consisting of five woodlands, one shrublands and two altered (planted and rehabilitation) units.
- In the broader region (within a 500 m buffer of the survey area), 12 broad vegetation units, five of which are also represented within the survey area (Cc, CcXp, ErCc, Planted and Rehab) were defined and mapped.
- Eight Commonwealth or State-listed Threatened Ecological Communities (TECs) were identified through database searches as potentially occurring within the survey area.
- The Marri/Xanthorrhoea woodland (CcXp), the Marri/Hakea/Kingia/Xanthorrhoea woodlands (CcHtKaXp) and Kingia/Hakea/Kunzea shrubland vegetation units have been inferred to be representative of Floristic Community Type (FCT) (of the) Swan Coastal Plan (SCP) 3a, the *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils.
- None of the other vegetation units are considered to be representative of any Commonwealth-listed TECs or State-listed Priority Ecological Communities (PECs).
- The condition of the vegetation in the survey area ranges from 'Completely Degraded' to 'Very Good', with only 9.25% observed to be in 'Good' or better condition.
- The desktop assessment determined that eight TECs or PECs do or could occur in the survey area, including five Commonwealth-listed TECs, with the most likely of these considered to be Mound Springs TEC, FCTs SCP 9, 3a, 3b, 3c and 20b, and the Banksia woodlands TEC. The field survey and floristic analysis determined that of these, FCT SCP 3a is represented within vegetation units CcXp, CcXpKa and KaHtXp, comprising 11.73 ha (23.34%) of the survey area.

1 INTRODUCTION

1.1 BACKGROUND

Focused Vision Consulting Pty Ltd (FVC) was commissioned by the Public Transport Authority (PTA) to undertake a flora and vegetation assessment of the Byford Depot (survey area) to inform the impact assessment process.

1.2 LOCATION

The Byford Depot survey area is located adjacent to Brickwood Nature Reserve, extending along Soldiers Road and the South-West Highway from Abernethy Road to Cardup Siding Road within the Shire of Serpentine-Jarrahdale. It is situated approximately 30 km south-southeast of the Perth Central Business District (CBD), has a total area of 50.25 ha and is hereafter referred to as the 'survey area' (**Figure 1**).

1.3 SCOPE OF WORK

A two-phase, detailed (formerly referred to as 'Level 2') flora and vegetation assessment, including targeted significant flora and, vegetation surveys, was carried out in accordance with the Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a), with the key objectives to:

- define and map the vegetation present and its floral species composition
- determine the presence or absence of Threatened and Priority Ecological Communities
- determine the presence or absence of significant flora.

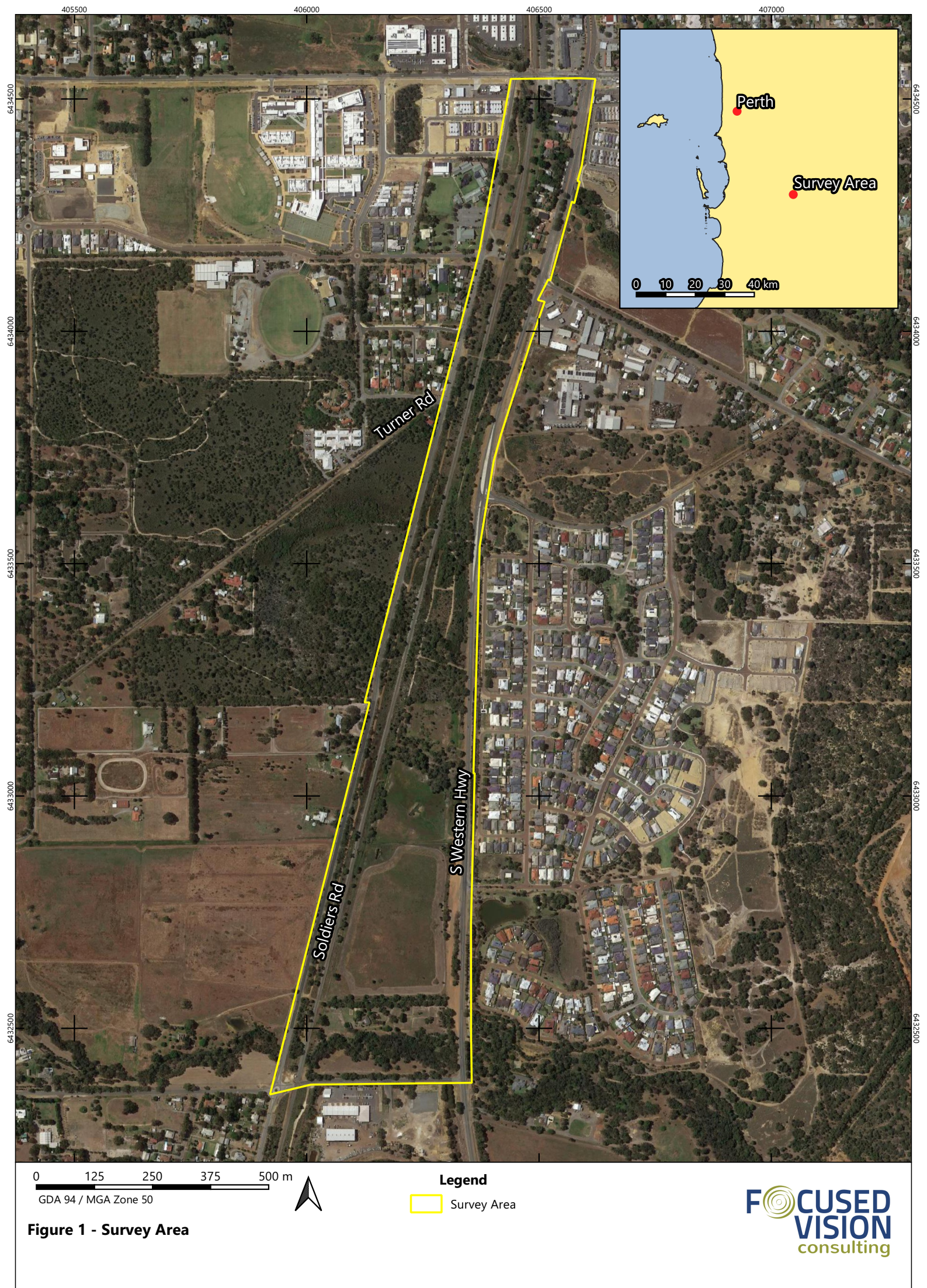
The field survey included, but was not limited to:

- Detailed vegetation unit mapping of the survey area
- Detailed vegetation condition mapping of the survey area
- Determination of the presence of critical habitat for and/or if the survey area hosts Threatened flora
- Compilation of an inventory of all flora taxa recorded within the survey area, including introduced (weed) species
- Photographs of representative Floristic Community Types (FCTs)
- Track log records included in the report as a figure for the survey area
- Adequate quadrat sampling to allow analysis of the data to be undertaken (as per Department of Biodiversity Conservation and Attractions (DBCA) 2021a, Draft *Vegetation survey methods and analysis to determine floristic community types on the southern Swan Coastal Plain*).

FCT analysis of the data collected was required to determine which of the Gibson *et al.* (1994) sites are most similar to the surveyed vegetation and hence which FCTs have greatest affinity to the surveyed vegetation, as per DBCA (2021a).

A comprehensive report (this report) was required to be prepared, outlining the following:

1. the findings of the desktop review
2. the field survey method(s) used
3. the field survey results
4. figures and track log records
5. conclusions and recommendations for site management.



2 LEGISLATIVE CONTEXT

The flora and vegetation assessments were conducted in accordance with the following legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Western Australian *Environmental Protection Act 1986* (EP Act)
- Western Australian *Biodiversity Conservation Act 2016* (BC Act).

The assessments complied with requirements for environmental survey and reporting in Western Australia, as outlined in:

- EPA (2008) *Guidance Statement No. 33: Environmental Guidance for Planning and Development*
- EPA (2016a) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*
- EPA (2016b) *Environmental Factor Guideline – Flora and Vegetation*.

2.1 THREATENED AND PRIORITY FLORA

The DBCA assigns conservation status to endemic plant species that are geographically restricted to few known populations or threatened by local processes. Allocating conservation status to plant species assists in protecting populations and conserving species from potential threats (DBCA 2018a).

The BC Act provides a statutory basis for the listing of TECs, threatened and specially protected species, critical habitat and key threatening processes (DBCA 2021a). Whilst not awarded any statutory protection, the DBCA maintains the Priority flora list, for species of conservation concern. Therefore, both Threatened and Priority flora are important focuses of flora and vegetation surveys and their definitions are presented in **Table 1**.

Table 1 - Definitions of Threatened and Priority Flora Species (DBCA 2019a)

Conservation Code	Category
T	<p>Threatened Species</p> <p>Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the BC Act.</p> <p>Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice for Threatened Flora.</p>
P1	<p>Priority 1 – 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>
P2	<p>Priority 2 – 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>
P3	<p>Priority 3 – 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>
P4	<p>Priority 4 – 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>

Species at risk of extinction are recognised as Threatened at a Commonwealth level and are categorised according to the EPBC Act as summarised in **Table 2**.

Table 2 - Categories of EPBC Act Threatened Flora Species (DBCA 2019a)

Conservation Code	Category
EX	<p>Extinct</p> <p>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).</p>
EW	<p>Extinct in the Wild</p> <p>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).</p> <p>Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.</p>
CR	<p>Critically Endangered</p> <p>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”.</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.</p>
EN	<p>Endangered</p> <p>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”.</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.</p>
VU	<p>Vulnerable</p> <p>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”.</p> <p>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.</p>

Any species listed under State and Commonwealth legislation as being of conservation significance is broadly considered to be a significant species. This incorporates species that are endangered, vulnerable and rare or covered by international conventions. Significance is not limited to species covered by State and Commonwealth legislation but also includes species of local significance and species showing significant range extensions or at the edge of their known range.

2.2 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat, which are subject to processes that threaten to destroy or significantly modify the assemblage across its range (DEC 2007).

The Minister for the Environment may list an ecological community as a TEC in one of the following categories: Presumed Totally Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). A publicly available database, listing TECs within Western Australia (WA), is maintained by the DBCA.

TECs in WA are protected under the State BC Act and some are also protected under the Commonwealth EPBC Act. The TECs on the Commonwealth register are also listed on the Department of Agriculture, Water and Environment (DAWE) website (DAWE 2021a), and in the Protected Matters Database (DAWE 2021b, 2021c).

Additional to TECs, ecological communities that are considered potentially of conservation significance (and potentially TECs) that do not currently meet survey criteria or that are not adequately defined; are rare but not threatened; have been recently removed from the TEC list; or require regular monitoring, are considered to be Priority Ecological Communities (PECs) (DEC 2013).

2.3 VEGETATION OF SIGNIFICANCE

Alongside and in addition to significance according to statutory listings, vegetation may be considered significant at a National, State, regional or local level.

2.3.1 Nationally Significant Vegetation

Vegetation communities may be considered to be of National significance where they support the following Commonwealth-listed Matters of National Environmental Significance (MNES):

- populations of Threatened (EPBC listed) species
- TECs listed as nationally (EPBC) significant
- RAMSAR Wetlands of International Importance (DAWE 2021d).

2.3.2 State Significant Vegetation

Vegetation communities may be considered to be of State significance where they:

- support State listed Threatened flora, fauna and TECs afforded protection under the BC Act (EPA 2008, WALGA 2004a)
- occur within the State-managed conservation estate (areas protected under the *Conservation and Land Management Act 1984*) or areas that have been formally recommended by the DBCA for inclusion in the State conservation estate (EPA 2008).

2.3.3 Regionally Significant Vegetation

Vegetation communities may be considered to be of regional significance where they:

- support populations of Priority Flora or ecological communities (EPA 2016b, Government of Western Australia 2000a)
- are formally protected or recognised as Environmentally Sensitive Areas (ESAs), or under planning schemes for conservation, such as Bush Forever (EPA 2008, WALGA 2004a)
- support conservation category wetlands including associated vegetation (Government of Western Australia 2000a and 2000b)
- maintain important ecological processes or significant ecosystems (EPA 2016b)
- support high diversity of flora, fauna, communities, or community structure (Government of Western Australia 2000a)
- contain flora species of restricted distribution, species exhibiting range extensions and undescribed species (EPA 2016b)
- have a restricted regional distribution (EPA 2016b)
- are represented by less than 30% of their pre-European extent (Commonwealth of Australia 2001).

2.3.4 Locally Significant Vegetation

Vegetation communities may be considered to be locally significant where they:

- occur as small, isolated communities (Government of Western Australia 2000a, WALGA 2004a)
- have a restricted local extent (proportion) (EPA 2016b) and/or are locally restricted to only one or a few locations (WALGA 2004a).

2.4 VEGETATION CLEARING, EXTENT AND STATUS

Clearing of native vegetation is regulated in WA under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Any clearing of native vegetation is an offence, unless carried out under a clearing permit or if the clearing is for an exempt purpose (DWER 2018). A clearing permit may be required under Part V of the EP Act, whereby permit applications to clear native vegetation must be assessed against the '10 Clearing Principles' as outlined in the regulations (DER 2014).

Where clearing of native vegetation is proposed to occur, there are several key criteria applied to the assessment of clearing permit applications, in the interests of biodiversity conservation (DER 2014).

The objective of the EPA in relation to flora and vegetation is 'to protect flora and vegetation so that biological diversity and ecological integrity are maintained' (EPA 2016a). This objective is documented in the EPA Factor Guideline - Flora and Vegetation (EPA 2016a). The EPA considers it is important that ecological communities are maintained above the threshold level of 30% of the original pre-clearing extent of the community in unconstrained areas and 10% within 'constrained' areas (EPA 2008).

2.5 ENVIRONMENTALLY SENSITIVE AREAS

Environmentally Sensitive Areas (ESAs) are areas that require special protection due to aspects such as landscape, fauna or historical value and are generally considered to be areas of high conservation value. ESAs are declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (Government of Western Australia 2005).

There are several types of ESAs relating to flora and vegetation, declared under Part V of the EP Act, which include:

- a defined wetland and the area within 50 m of that wetland
- the area covered by vegetation within 50 m of rare (Threatened) flora, to the extent where the vegetation is continuous with the vegetation in which the rare (Threatened) flora is located
- the area covered by a TEC
- Bush Forever sites.

2.6 INTRODUCED FLORA

Over 1,200 introduced (weed) species have been recognised to occur within Western Australia (EPA 2007). Weeds are plants that are not indigenous to an area and have been introduced either directly or indirectly through human activity. They establish in natural ecosystems and adversely modify natural processes, having the potential to dominate and simplify the ecosystems and thus decrease habitat value provided for native fauna. Weeds pose a threat to many native flora species due to their ability to rapidly grow and out-compete for available water, space, sunlight, and nutrients (EPA 2007).

2.6.1 Weeds of National Significance

Under the National Weed Strategy, there are currently 32 weed species listed as Weeds of National Significance (WoNS) (DAWE 2021e). Each weed listed was considered for inclusion based on the following criteria:

- invasive tendencies
- impacts
- potential for spread
- socioeconomic and environmental values.

2.6.2 Declared Pest Plants

The Western Australian Organism List (WAOL) details organisms listed as Declared Pests (DPs), including pest plants, under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (Department of Primary Industries and Regional Development (DPIRD) 2021). Under the BAM Act, DPs are listed under one of the following categories:

- **C1 (exclusion)**, that applies to pests not established in Western Australia; control measures are to be taken to prevent their entry and establishment
- **C2 (eradication)**, that applies to pests that are present in Western Australia but in low numbers or in limited areas where eradication is still a possibility
- **C3 (management)**, that applies to plants that should have some form of management applied that will alleviate the harmful impacts of the plant, reduce the numbers or distribution of the plant, or prevent or contain the spread of the plant (DPIRD 2017).

2.6.3 Environmental Weeds

Introduced flora species have also been ranked by a number of attributes, including invasiveness, distribution and environmental impacts in the various regions in the *Environmental Weed Strategy* (Department of Conservation and Land Management (CALM) 1999). To advance the above categorisation, the Invasive Plant Prioritisation Process for DBCA was developed in 2008 (Department of Parks and Wildlife (DPAW) 2013).

3 EXISTING ENVIRONMENT

3.1 CLIMATE

The survey area occurs on the Swan Coastal Plain, which has a warm Mediterranean climate, characterised by hot, dry summers and cool to mild wet winters (Mitchell *et al.* 2002). The Bureau of Meteorology (BoM) Jandakot Aero weather station (site 009172) is closest (approximately 17 km to the north-west) to the survey area and has been operating since 1972. The average annual long-term rainfall recorded at the station is 811.5 mm. The annual mean maximum temperature ranges from 19.1°C in winter to 31.5°C in summer (**Figure 2**). Rainfall data for the three months preceding the September field assessment indicates that July 2021 recorded well above average monthly rainfall, whilst June and August recorded below average monthly rainfall. Despite this, climatic conditions were considered optimal in the context of seasonal conditions required for spring flora and vegetation assessments (**Figure 2**).

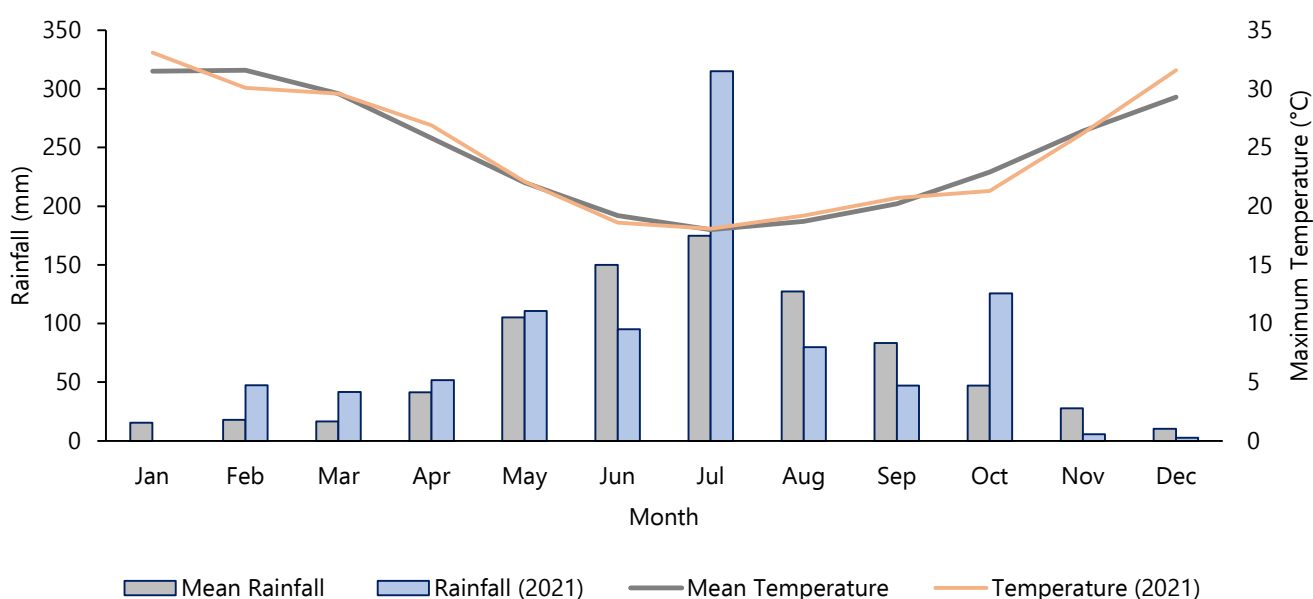


Figure 2 - Climate Data for Jandakot Aero Weather Station (Site 009172) (BoM 2021)

3.2 IBRA REGION

There are 89 recognised Interim Biogeographic Regionalisation for Australia (IBRA) regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (DAWE 2021f). The survey area lies within the Swan Coastal Plain IBRA region (SWA) and, at a finer scale, within the Perth subregion (Mitchell *et al.* 2002).

The Swan Coastal Plain bioregion is a low-lying coastal plain, mainly covered with *Banksia* and Tuart woodlands on sandy soils. Swampy areas are dominated by paperbark, and outwash plains by *Casuarina obesa*. *Melaleuca* shrublands and *C. obesa*-Marri (*Corymbia calophylla*) woodlands are located extensively in the south, while Jarrah woodland dominates duricrusted Mesozoic sediments to the east.

The Perth subregion is comprised of colluvial and aeolian sands, alluvial river flats, coastal limestone and heath and/or Tuart woodlands on limestone, *Banksia* and Jarrah-*Banksia* woodlands on Quaternary marine dunes of varying ages, Marri on colluvial and alluvial soils, and seasonal wetlands (Mitchell *et al.* 2002).

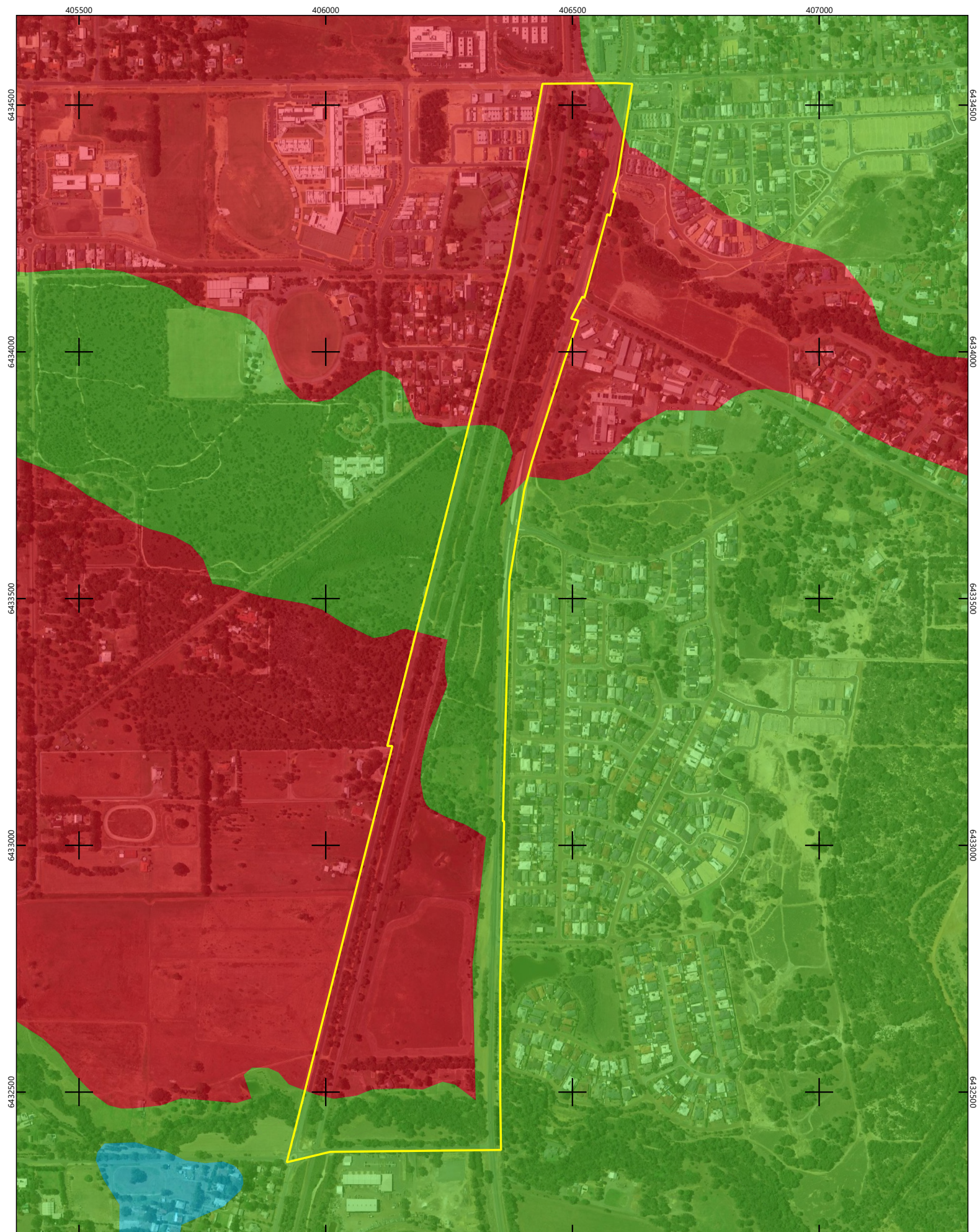
3.3 GEOLOGY AND SOILS

The Swan Coastal Plain supports five major geomorphological systems (landforms) that lie parallel to the coast. From west to east these are: Quindalup Dunes; Spearwood Dunes; Bassendean Dunes; Pinjarra Plain; and Ridge Hill Shelf (Churchward and McArthur 1980; Gibson *et al.* 1994).

The survey area is situated on two soil systems, the Forrestfield System and the Pinjarra System which are described in **Table 3**. The spatial extent of each system is presented in **Figure 3**.

Table 3 – Soil Systems of the Survey Area (Schoknecht *et al.* 2004)

System	Soil Unit	Description
Forrestfield System	213Fo	Undulating foot slopes of the Darling and Whicher Scarps. Duplex sandy gravels, pale deep sands and grey deep sandy duplexes. Woodland of <i>Eucalyptus marginata</i> (Jarrah), <i>Corymbia calophylla</i> (marri), wandoo and some <i>Banksia grandis</i> .
Pinjarra System	213Pj	Swan Coastal Plain from Perth to Capel. Poorly drained coastal plain with variable alluvial and aeolian soils. Variable vegetation includes <i>Eucalyptus marginata</i> (Jarrah), <i>Corymbia calophylla</i> (marri), wandoo, paperbark, sheoaks and <i>Eucalyptus rudis</i> .



0 125 250 375 500 vm

GDA 94 / MGA Zone 50



Figure 3 - Soils of the Survey Area

Legend

- Survey Area
- Bassendean System
- Forrestfield System
- Pinjarra System

3.4 VEGETATION

Vegetation of the Swan Coastal Plain has been broadly mapped by Beard (1990), and later re-assessed by Shepherd *et al.* (2002) into vegetation associations. Mapping depicted the native vegetation as it was presumed to be at the time of European settlement and is referred to as pre-European vegetation mapping.

Two vegetation associations (3 and 968) occur within the survey area. The majority of the survey area (48,878 ha, 97.25%) is represented by vegetation association 968, with a small portion (1,381 ha, 2.75%) to the north of the survey area represented by vegetation association 3. The remaining extent of vegetation associations 3 and 968 across a range of contexts is presented in **Table 4** and spatially in **Figure 4**.

Table 4 - Pre-European Vegetation of the Survey Area (Beard 1990, DBCA 2018b)

Extent Context	Veg. Association No.	Broad Vegetation Description	Pre-European Extent (ha)	Current Extent (ha)	% Pre-European Extent Remaining
Western Australia	3	Medium forest; Jarrah-Marri	2,661,404.62	1,803,437.48	67.76
	968	Medium woodland; Jarrah, Marri and Wandoo	296,877.84	95,048.82	32.02
Swan Coastal Plain IBRA Region	3	Medium forest; Jarrah-Marri	17,364.58	3,150.77	18.14
	968	Medium woodland; Jarrah, Marri and Wandoo	136,188.20	9,017.32	6.62
Perth IBRA Subregion	3	Medium forest; Jarrah-Marri	16,754.96	2,789.47	16.65
	968	Medium woodland; Jarrah, Marri and Wandoo	136,188.20	9,017.32	6.62
Shire of Serpentine-Jarrahdale	3	Medium forest; Jarrah-Marri	46,915.31	37,963.61	80.92
	968	Medium woodland; Jarrah, Marri and Wandoo	24,351.49	1,121.13	4.60

The vegetation of the Swan Coastal Plain has also been characterised by Heddle *et al.* (1980) based on vegetation in association with landforms and underlying geology. The survey area is situated on the Guildford complex and the Forrestfield complex (Heddle *et al.* 1980) (**Table 5, Figure 5**). The Guildford complex covers 71.04% (35,707 ha) of the northern and southern ends of the survey area (**Figure 5**). The vegetation ranges from a mixture of open forest to tall open forest of *Corymbia calophylla* (Marri) – *Eucalyptus wandoo* (Wandoo) – *Eucalyptus marginata* (Jarrah) and woodland of *Eucalyptus wandoo* (Wandoo) (with rare occurrences of *Eucalyptus lane-poolei* (Salmon White Gum)). Minor components include *Eucalyptus rudis* (Flooded Gum) and *Melaleuca raphiophylla* (Swamp Paperbark) (Heddle *et al.* 1980).

The Forrestfield complex covers 28.96% (14,553 ha) of the middle region of the survey area (Heddle *et al.* 1980) (**Figure 5**). The vegetation ranges from open forest of *Corymbia calophylla* (Marri) – *Eucalyptus wandoo* (Wandoo) – *Eucalyptus marginata* (Jarrah) to open forest of *Eucalyptus marginata* (Jarrah) – *Corymbia calophylla* (Marri) – *Allocasuarina fraseriana* (Sheoak) – *Banksia* species. There is also fringing woodland of *Eucalyptus rudis* (Flooded Gum) in the gullies that dissect this landform.

Table 5 - Remaining Extent of Forrestfield Complex and Guildford Complex (DBCA 2018c)

Location	Vegetation Complex	Pre-European Extent (ha)	Current Extent (ha)	% Remaining
Swan Coastal Plain	Guildford Complex	90,513.13	4,607.91	5.09
	Forrestfield Complex	22,812.92	2,803.36	12.29
Shire of Serpentine-Jarrahdale	Guildford Complex	12,986.67	552.25	4.25
	Forrestfield Complex	4,514.76	411.02	9.10

The objective of the Environmental Protection Authority (EPA) in relation to flora and vegetation is: *To protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016b). The EPA considers it is important that vegetation associations are maintained above a threshold level of 30% of unconstrained areas and 10% for constrained areas, of the original pre-clearing extent of each association (EPA 2008). A level of 30% pre-clearing extent is considered to be the level below which species loss appears to accelerate exponentially at the ecosystem level (EPA 2008).

The following key criteria are applied to vegetation clearing from a biodiversity perspective, which justifies the retention targets (EPA 2000):

- the 'threshold level' below which species loss appears to accelerate exponentially within an ecosystem level, is regarded as being at a level of 30% (of the pre-European, i.e. pre-1750 extent of the vegetation unit)
- a level of 10% of the original extent of a vegetation community is regarded as being a level representing Endangered
- clearing which would increase the threat level to a vegetation community should be avoided.

Within the Perth IBRA Subregion, the remaining extent of Beard vegetation association 968 falls below the 10% threshold, with 6.62% remaining. On the Swan Coastal Plain, 5.90% of the original extent of Hedde's Guildford complex remains. On a finer scale, within the Shire of Serpentine-Jarrahdale, the remaining extents of the Beard vegetation associations 3 and 968 (**Table 4**) and the Hedde Forrestfield and Guildford complexes (**Table 5**) both fall below the 10% threshold.

3.4.1 Floristic Community Types

Regional floristic assessments conducted by Gibson *et al.* (1994) sampled a total of 509 quadrats across the Swan Coastal Plain. This survey considered the patterning of plant distributions on the Plain and assessed the presence or absence of individual species to define floristic groupings based on shared species with the aid of multivariate analysis (Keighery 1997). These floristic groupings are commonly referred to as Floristic Community Types (FCTs).

Analysis of the 509 quadrats distinguished four super groups (Foothills/Pinjarra Plain, Seasonal Wetlands, Uplands centred on Bassendean Dunes and Uplands centred on Spearwood and Quindalup Dunes), and within these supergroups, a further 43 FCTs were classified.

The assessment conducted by Gibson *et al.* (1994) is the point of reference for characterisation of FCTs on the Swan Coastal Plain, which also assists in the classification of vegetation as representative of a range of TECs and PECs.

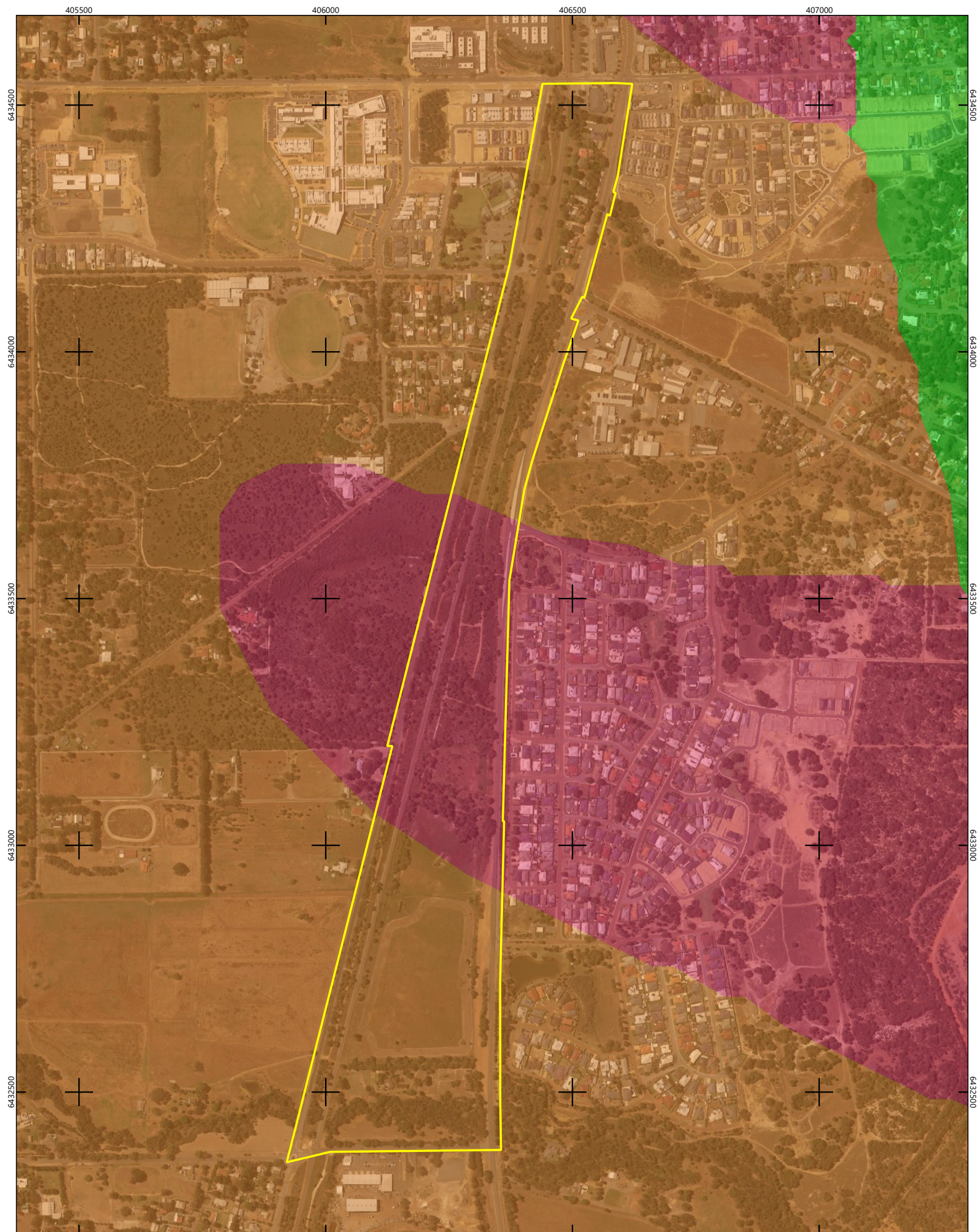


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GDA 94 / MGA Zone 50

Figure 4 - Pre-European Vegetation

Legend

- Survey Area
- 3
- 968



0 125 250 375 500 vm
GDA 94 / MGA Zone 50



Legend

- Survey Area
- Darling Scarp Complex
- Forrestfield Complex
- Guildford Complex



Figure 5 - Vegetation Complexes

3.5 GEOMORPHIC WETLANDS OF THE SWAN COASTAL PLAIN

The Geomorphic Wetlands of the Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain. Wetland management categories are based on their ecological, hydrological and geomorphological significance, and the degree of disturbance that has occurred. The three Wetland Management Categories on the Swan Coastal Plain can be summarised as follows:

- Conservation Category (CC) – wetlands that support a high level of ecological attributes and functions (generally having intact vegetation and natural hydrological processes), or that have a reasonable level of functionality and are representative of wetland types that are rare or poorly protected.
- Resource Enhancement (RE) – wetlands that have been modified (degraded) but still support substantial ecological attributes (wetland dependant vegetation covering more than 10%) and functions (hydrological properties that support wetland dependent vegetation and associated fauna) and have some potential to be restored to CC quality. Typically, such wetlands still support some elements of the original native vegetation, and hydrological function.
- Multiple Use (MU) – wetlands that are assessed as possessing few remaining ecological attributes and functions. While such wetlands can still play an important role in regional or landscape ecosystem management, including water management, they are considered to have low intrinsic ecological value. Typically, they have very little or no native vegetation remaining (less than 10%).

Twelve Geomorphic wetlands of the Swan Coastal Plain occur within the survey area, including three Conservation Category Wetlands (CCW), four Multiple Use Wetlands (MUW) and four Resource Enhancement Wetlands (REW) (**Table 6**). The wetland locations are spatially presented in **Figure 6**.

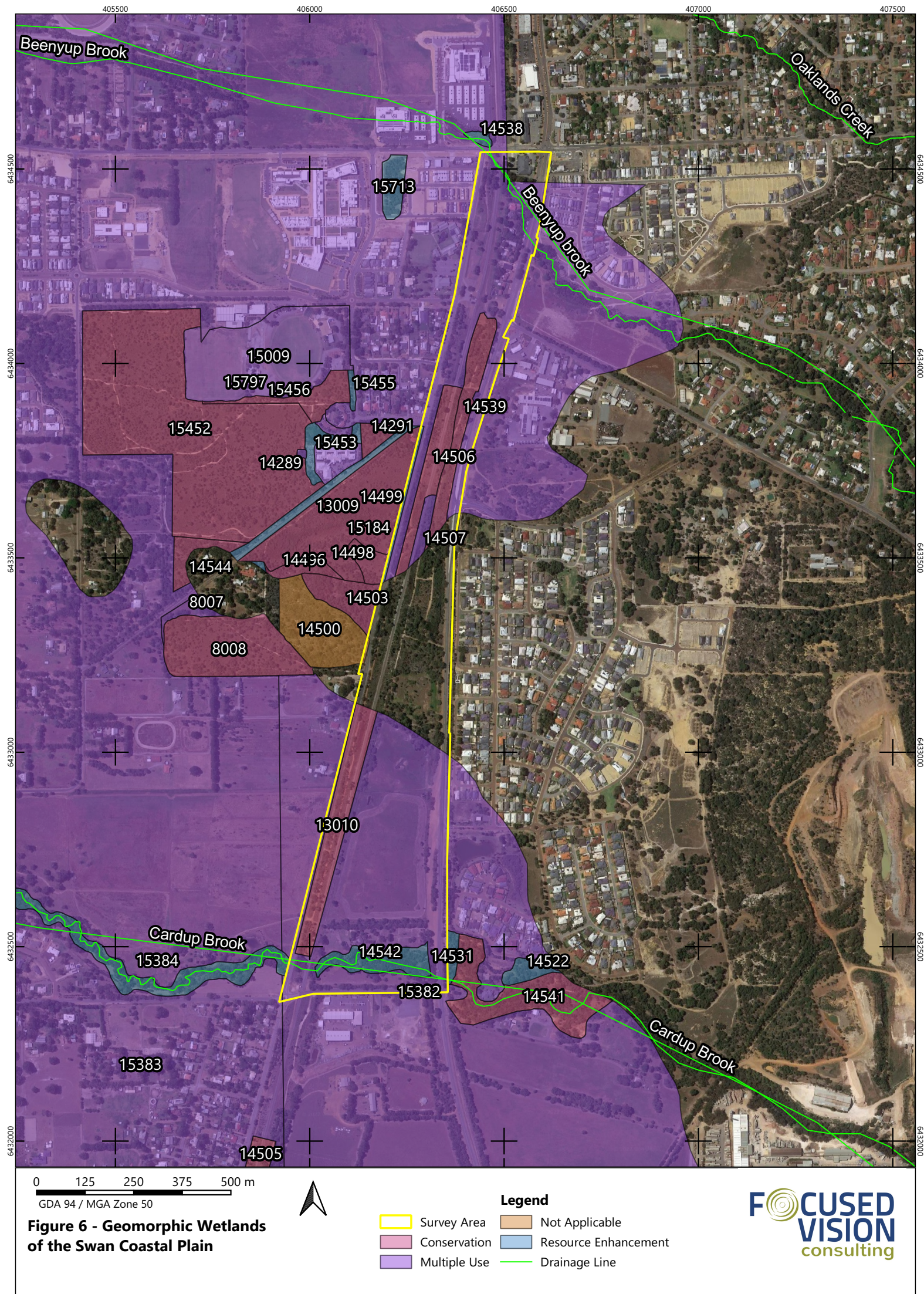
Table 6 – Geomorphic Wetlands within the Survey Area

UFI	Wetland Name	Wetland Classification	Management Category	Location within the Survey Area
13010	unknown	Palusplain	Conservation	Southern area of the survey area, west of the rail alignment.
14499	Brickwood Reserve	Palusplain	Resource Enhancement	Within Brickwood Reserve, west of Soldiers Road. Along western boundary of survey area.
14500	Brickwood Reserve	Dryland	Not Applicable	Within Brickwood Reserve, west of Soldiers Road. Along western boundary of survey area.
14506	Byford Rail Reserve	Palusplain	Conservation	Centre of survey area, under and adjacent to the west of rail alignment.
14507	Armadales Palusplain	Palusplain	Multiple Use	Adjacent to wetland 14506. Centre of survey area, under rail alignment.
14531	Cardup Brook	Palusplain	Resource Enhancement	Slither on east boundary of survey area, east of South Western Highway.
14539	Brickwood Bushland	Palusplain	Conservation	Centre of study area, adjacent to wetland 14506, between rail alignment and South Western Highway.
14542	Cardup Brook	Palusplain	Resource Enhancement	Southern end of survey area, between Pinebrook Road and Cardup Siding Road.
15382	unknown	Palusplain	Multiple Use	Southern third of survey area.
15383	Armadales Palusplain	Palusplain	Multiple Use	Slither in south-west corner of study area, south-west of the Cardup Siding Road and Soldiers Road intersection.
15384	unknown	Creek	Resource Enhancement	Slither on south of the survey area, west of Soldiers Road.
15797	Armadales Palusplain	Palusplain	Multiple Use	Northern third of survey area.

3.6 DRAINAGE AND GROUNDWATER

Two non-perennial minor tributaries (Cardup Brook and Beenyup Brook) run east to west and occur in the southern and northern sections of the survey area, respectively. (**Figure 6**). Oaklands Creek occurs approximately 500 m north and an unnamed watercourse approximately 1 km south (**Figure 6**). The survey area occurs above the Serpentine proclaimed groundwater area. Under the *Rights in Water and Irrigation Act 1914* (WA), it is illegal to take water from a watercourse or groundwater aquifer in a proclaimed area without a licence.

Data contained in the Perth Groundwater Map (DWER 2020) indicates that there is no available groundwater depth data. Data available for the Swan Coastal Plain indicates that the groundwater at the location of the survey area contains 1000-1500 mg/L Total Dissolved Solids (TDS) to the north and 1500-3000 mg/L TDS to the south (DWER 2020).



3.7 RESERVES, CONSERVATION AREAS AND ENVIRONMENTALLY SENSITIVE AREAS

Under the Bush Forever Plan, a total of 51,200 ha of regionally significant bushland areas are protected in 287 Bush Forever Sites in Western Australia (Government of Western Australia 2000a and 2000b). Bush Forever sites are also classified as Environmentally Sensitive Areas (ESAs).

The Bush Forever site (site 350; Byford to Serpentine Rail/Road Reserves and Adjacent Bushland) is found within the survey boundaries, covering 48.13% (24.19 ha) of the centre and south-western portion (**Figure 7**). Two additional Bush Forever sites occur directly adjacent to the survey area, Brickwood Reserve (Site 321) to the west and Cardup Nature Reserve (Site 271) to the south-east. With the presence of the Bush Forever Site 350, the survey area is considered an ESA (**Figure 7** and **Table 7**). Cardup Nature Reserve (Bush Forever site 352) adjacent to the survey area has also been listed as a Class A Nature Reserve and has been documented to support Commonwealth and State-listed TECs. Class A reserves are afforded the greatest degree of protection under the *Land Administration Act 1997* and the listing is used solely to protect areas of high conservation or community value (Landgate 2018).

Table 7 – Summary of Reserves and Conservation Areas in and adjacent to the Survey Area

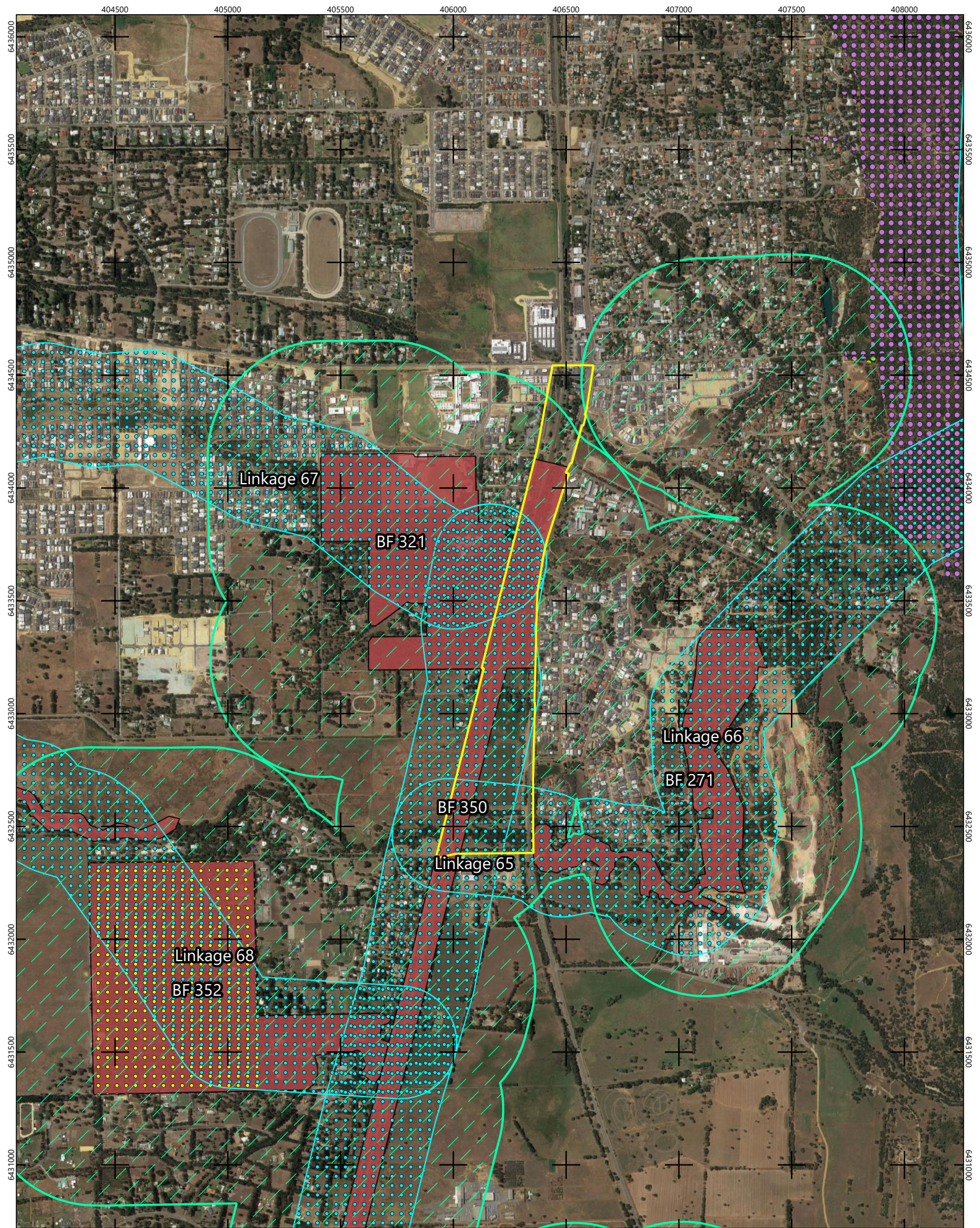
Name	Conservation Type	Proximity to the Survey Area
Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	Bush Forever site 350 Environmentally Sensitive Area	Occurs within the survey area and south along the south-western boundary of the survey area.
Brickwood Reserve and Adjacent Bushland, Byford	Bush Forever site 321 Environmentally Sensitive Area	Occurs directly adjacent to the western boundary of the survey area, adjacent to Soldiers Road.
Cardup Brook Bushland, Cardup/Peel Estate	Bush Forever site 351 Environmentally Sensitive Area	Approximately 1 km west of the survey area.
	Bush Forever site 271 Environmentally Sensitive Area	Occurs directly adjacent to the south-eastern corner of the survey area, extending east along Cardup Brook.
Cardup Nature Reserve	Bush Forever site 352 Class A Nature Reserve Environmentally Sensitive Area	Approximately 800 m south-west of survey area, adjacent to Soldiers Road.

3.8 DISTURBANCE HISTORY

The survey area has a history of disturbance such as inappropriate fire regimes (too frequent), weed invasion, potential future clearing to upgrade the road or railway line, potential for altered surface drainage due to road grading and littering of rubbish (DEC 2012). The South Western Railway was constructed in 1893 from East Perth to Pinjarra later extending to Bunbury (Gunzburg and Austin 2008, Newland and Quinlan 2000). Two gravel access roads have been constructed either side of the South Western Railway and run parallel to the railway tracks within the survey area. The long linear shape of the survey area means a large proportion of the boundary is adjacent to agricultural paddocks and therefore is vulnerable to weed invasion from these paddocks (CALM 2003).

3.9 ECOLOGICAL CONNECTIVITY

The survey area forms part of the Perth Regional Ecological Linkages Network (WALGA 2004b). It is part of linkage 65 which runs in a north-south direction and links the survey area encompassing Bush Forever site 350 (Byford to Serpentine Rail/Road Reserve and adjacent Bushland) with Bush Forever sites 365 (Byford to Serpentine Rail/Road Reserve and adjacent Bushland), 321 (Brickwood Reserve), 352 (Cardup Nature Reserve and adjacent Bushland), 361 (Norman Road Bushland) and 362 (Roman Road Bushland) (**Figure 7**). Linkage 65 also connects with linkage 64, 66 and 67 within 1 km of the survey area and with linkage 68, 69, 70 and 71 further to the south.



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GDA 94 / MGA Zone 50



Figure 7 - Bush Forever, Reserves, Conservation Areas and ESAs

- Byford Depot
- Environmentally Sensitive Areas
- Regional Linkage
- Conservation Park

Legend

- Crown Freehold - Dept Managed
- Nature Reserve
- Bush Forever Site



4 METHODOLOGY

4.1 DESKTOP ASSESSMENT

The desktop assessment for significant flora and ecological communities considered a 2 km buffer around the survey area and incorporated a review of DBCA database search results (DBCA 2021b) for the survey area, as well as a NatureMap database search (DBCA 2021c), Atlas of Living Australia search and interrogation of the DAWE MNES search tool (DAWE 2021c). The database search results were compiled into a table that concluded the likelihood of occurrence of each of the significant species and communities based on habitat preferences of known recorded locations for each species. The likelihood of all significant flora occurring within the survey area was assessed based on known records and their age (currency), distance to the closest known DBCA record and the presence of suitable habitat within the survey area. Based on this assessment, each species was given a likelihood of occurrence category of 'likely to occur', 'may occur' or 'unlikely to occur' in the survey area. Where recent records and suitable species habitat occurs within or within less than 1 km of the survey area, these species were given a category of 'likely to occur'. For species occurring greater than 1 km from the survey area with limited suitable habitat, or for very old records, a category of 'unlikely to occur' or 'may occur' was applied, depending on record relevance.

Habitat preferences for all target species (species considered 'likely' or 'may' occur) were determined during the desktop assessment and planning for the field assessment, to enable accurate targeted searching in the field.

The desktop assessment formed the foundation of the field surveys and ensured that the assessments were targeted to the areas potentially supporting conservation significant values.

4.2 FIELD PREPARATIONS

Field preparations included field safety planning, confirmation of site access permissions and the preparation of a detailed study plan, field guides for significant flora and ecological communities, field maps and equipment (including electronic devices for field data capture).

4.3 FIELD ASSESSMENT

4.3.1 Flora and Vegetation

A two-phase, detailed flora and vegetation field assessment was carried out within the survey area during spring 2021 by experienced botanists and ecologists as presented in **Section 8**. The phase 1 field survey was conducted on 14 and 15 September 2021 and phase 2 was conducted on 22 October 2021.

Flora and vegetation data were collected in the field at sampling points where vegetation was noted to be of differing floristic composition. Pegged quadrats were installed where native vegetation was found to be in 'Good' or better condition, in accordance with the requirements for flora and vegetation assessments as per the Technical Guidance (EPA 2016a). Detailed data collection points (relevés) were recorded where vegetation was not in 'Good' or better condition (EPA 2016a).

During phase 1, a total of five quadrats were established in areas of 'Good' or better condition and five relevés were established in an area of poorer quality vegetation, as per the Technical Guidance (EPA 2016a). The locations of these are presented in **Figure 8**. Each sampled quadrat from the first phase was rescored as part of the second phase survey.

Sampled quadrats were demarcated with a peg (galvanised fence-dropper) at each corner and the north-west corner co-ordinates were recorded using GPS. During sampling, quadrats were marked by measuring tapes. Quadrat dimensions were 10 m x 10 m in accordance with the Technical Guidance (EPA 2016a) and in alignment with the Gibson *et al.* (1994) survey, and the data collected were used to characterise all of the intact native vegetation communities (vegetation in 'Good' or better condition).

The following information was collected at each quadrat and relevé:

- observer
- date
- GPS location (GDA 94)
- representative photograph
- soil type and colour
- topography
- vegetation condition/degradation/disturbances (e.g. grazing, weed invasion, fire)
- flora species observed, including average height and projected foliage cover of dominant species within each stratum
- vegetation community, described in accordance with the National Vegetation Information System (NVIS) (DEH 2003)
- vegetation condition, assessed against the currently accepted scale; an adaptation of the Keighery (1994) condition scale.

Observations and opportunistic data collection were also carried out during foot traverses within and throughout the survey area and track logs of all personnel were captured using GPS-enabled devices to demonstrate survey effort. These combined track logs for the survey area from the first phase of sampling are presented in the **Figure 9**.

The first phase field assessment also included targeted searches for conservation significant flora potentially occurring in the survey area. Selective targeted searching was also carried out during the second phase survey whilst traversing between quadrats and in limited additional areas as appropriate, depending on flowering times and preferred habitats of target species. Any observed flora suspected to be Threatened or Priority was marked using GPS-enabled devices to enable inclusion in the report maps and spatial data layers. Suspected Threatened and Priority flora were collected for further taxonomic identification by FVC taxonomists and specialists at the Western Australian Herbarium.

Two sampling events within the optimal flowering period (spring) during September and October enabled the capturing of species in the second phase that may not have been present during the first phase, particularly annuals and other late spring flowering species.

The flora and vegetation data collected during the two-phase field assessment, from the combination of quadrats and continuous opportunistic observations, contributed to the flora inventory for the survey area. The vegetation units of the survey area have been defined by the flora and vegetation data and how the data relate to other environmental features such as soil type and landform. A map of the vegetation units was then developed using GIS. As per EPA (2016a) Guidelines, vegetation within a 500 m buffer of the linear survey area centreline was extrapolated and mapped utilising aerial imagery and ground truthing of adjacent vegetation units.

Vegetation condition was assessed using the current bushland condition scale, which is an adaptation of Keighery (1994) scale, as described in EPA (2016a). The spatial extent of the varying vegetation condition was mapped using GIS.

All field data was recorded using electronic tablets equipped with the mobile mapping software, Mappt™ and customised data collection forms, tailored to the electronic collection of quadrat and relevé data as well as targeted flora surveys. Draft vegetation unit and condition mapping were also prepared in shapefiles directly into Mappt™ whilst in the field, and this formed the basis of the mapping presented in this report.

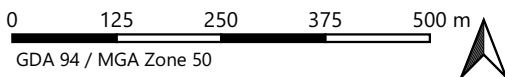
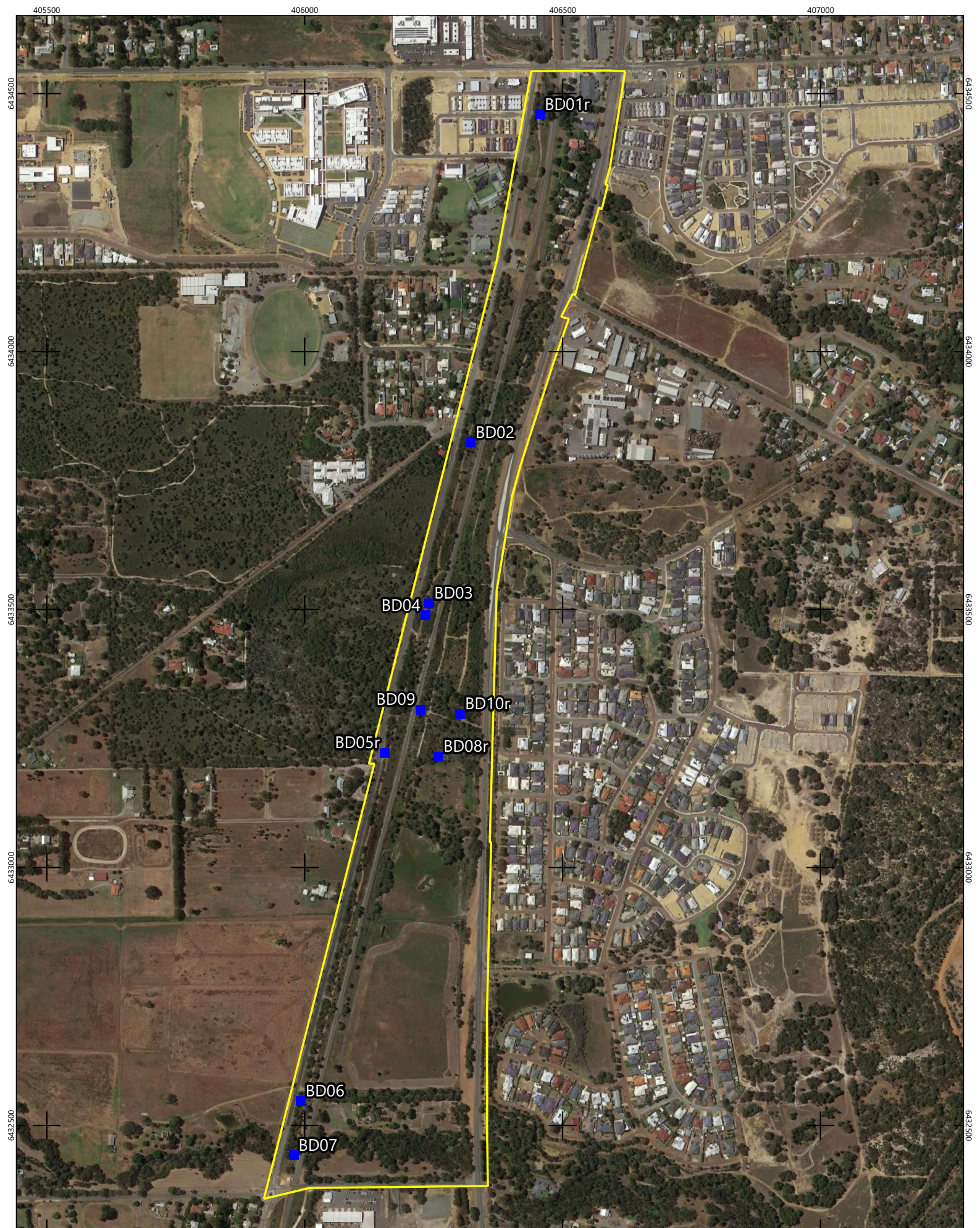



Figure 8 - Quadrat and Relevé Locations

Legend
 Survey Area

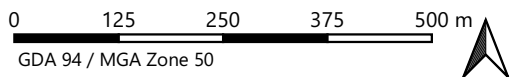
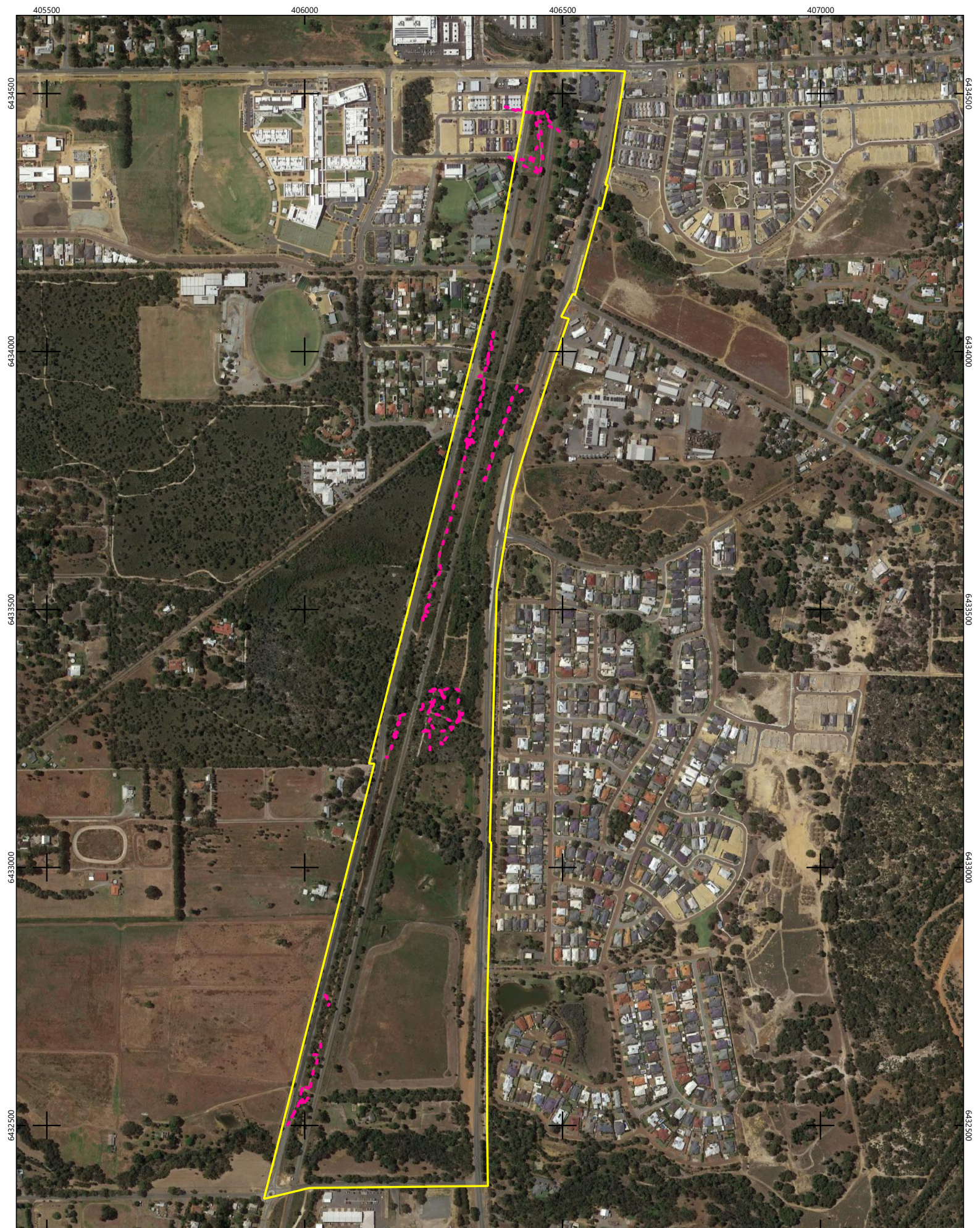


Figure 9 - Search Traverses

Legend

- Survey Area
- Walked Track

4.4 DATA PROCESSING AND ANALYSIS

4.4.1 Flora Identification

Flora identifications were undertaken by FVC's specialist taxonomists, Shibi Chandran and Kathya Tippur and verified by taxonomic specialist and Consulting Botanist, Malcolm Trudgen. Specimens were collected and dried in accordance with WA Herbarium protocols (DBCA 2020a). Specific plant group specialist taxonomists and group authorities were consulted for challenging identifications, where required. Taxonomy and nomenclature follow current protocols of the WA Herbarium. The data processing task allowed for the preparation of species lists, including those for collected flora specimens, once identified.

4.4.2 Floristic Analysis

The Gibson *et al.* (1994) and Keighery *et al.* (2012) studies were carried across the entire Swan Coastal Plain south from Gingin (Southern Swan Coastal Plain). Due to the large extent of the survey areas of those two studies, in order to determine more robust assignment of quadrats to a Floristic Community Type (FCT) a local subset of these sites was selected for inclusion in floristic analysis. These sites were selected based on proximity to the survey area and taking into account the geology and pre-European vegetation associations as analogous to the survey area, in order to produce the resulting dendrograms and statistical analysis.

Recorded quadrat data from the field assessment was analysed in accordance with the *Draft Vegetation survey methods and analysis to determine floristic community types on the southern Swan Coastal Plain* (DBCA 2021a). This methodology analysed data utilising PATN™ software (Belbin 2013), via multivariate cluster analysis of species presence/absence, in order to group sites of floristically similar composition within the survey area. Flexible unweighted pair group mean average (UPGMA) fusion was used to generate the site classification (beta = -0.1) and to group the quadrats data into clusters based on species similarities. In order to assign FCTs, quadrat data were analysed against the Gibson *et al.* (1994) and the Keighery *et al.* (2012) datasets, which were updated to the current species nomenclature as per the Western Australian Herbarium. Floristic analysis via single site insertion (SSI) (into the Gibson *et al.* (1994) and Keighery *et al.* (2012) datasets) was carried out for all quadrats within the survey area against a local subset (103 quadrats) of the entire suite of sites from the Gibson *et al.* (1994) and Keighery *et al.* (2012) surveys encompassing quadrats within 15 km of the survey area.

All quadrat data was processed with singletons and annuals included, for comparison with Gibson *et al.* (1994) and Keighery *et al.* (2012) data (as per advice from Val English, pers. comm., DBCA). An inferred FCT was assigned to each quadrat based on the resulting dendrogram.

Quadrats were also analysed in PATN™ in comparison to the Gibson *et al.* (1994) and the Keighery *et al.* (2012) datasets utilising the Bray-Curtis Dissimilarity Index and the Flexible UPGMA method (beta = -0.1). Results range from 0 to 1, where 0 would indicate that the quadrats are identical (i.e. have zero dissimilarity) (Belbin 2013) and 1 indicating no shared species (Hao *et al.* 2019). The closer the value to 0, the greater the similarity. A dissimilarity index value of greater than 0.6 is considered to be high (Maguire *et al.* 2016) and tends to indicate little similarity.

Conclusions regarding relevant FCTs that would be assigned to each sampled quadrat were based on 'nearest neighbour' in the resulting the dendrogram clusters, and where appropriate, were also further critically analysed by determining similarities to Gibson *et al.* (1994) sites based on some or all of the following characteristics: key dominant flora species, vegetation structure, habitat, geographical location, soils/landforms, vegetation complexes and site hydrological status. The collective results of the FCT analysis concluded with settling on an inferred FCT for each quadrat, with justifications provided.

Other analysis in reference to relevant conservation advice and available information for significant ecological communities was also carried out in order to determine whether TECs or PECs are supported by the survey area.

4.5 SURVEY LIMITATIONS

The current biological assessment was assessed against limitations outlined in the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a) (**Table 8**).

Table 8 – Potential Survey Limitations and Constraints

Aspect	Constraint	Commentary
Availability of regional data, previously available information	No	Regional and local data for the Perth region is abundantly available, as evident in FloraBase records. The Gibson <i>et al.</i> (1994) survey results provide a reference for the FCTs of the Swan Coastal Plain. Part of the survey area is classified as a Bush Forever Site (site 350) and as a result, is well documented (Government of Western Australia 2000a and 2000b). The presence of Commonwealth and State-listed TECs (FCT 3a and 3b) within the survey area has been documented. Numerous documents such as Approved Conservation Advice (DEE 2017a, DEE 2017b and Recovery Plans (DEC 2011, DPaW 2011, DBCA 2020b) are publicly available for both FCTs to assist in defining them.
Scope (detail)	Minor	A two-phase, detailed flora and vegetation assessment was carried out in accordance with EPA (2016a). Seven vegetation units were defined within the survey area. Five quadrats were sampled within vegetation in 'Good' or better condition and five relevés were sampled in an area of 'Degraded-Good' or worse vegetation. Due to the high level of disturbance throughout the survey area and the insufficient area of 'Good' quality vegetation, only one of the defined vegetation units, CcHtKaXp (Marri/Kingia/Hakea/Xanthorrhoea woodland) sampled three quadrats and one relevé. One quadrat was established each within vegetation units KaHtXp (Kingia/Hakea/Kunzea shrubland) and CcXp (Corymbia/Xanthorrhoea woodland), whilst all the remaining vegetation units were sampled from a single relevé. The data collected was considered adequate to define and map the two vegetation units (KaHtCp and CcXp) in better condition, in the relatively small area.
Competency/ Experience of personnel	No	The botanical field surveys were led by botanists who have a minimum of 18 years' experience. All personnel undertaking the field assessments, flora identifications, data analysis, vegetation mapping and reporting are experienced botanists, with specialist skills in their respective fields.
Survey effort/detail/ intensity	No	The two-phase, detailed flora and vegetation assessment was considered adequate to determine the floristic values within the survey area. A total of 123 flora species, from 90 genera from 32 families were recorded during the field survey and comprised of 95 (77.2%) native species and 28 (22.8%) introduced (weed) species. The majority of collections were identified to species level. Some collections were unable to be fully identified to species level, however, none are considered likely to be representative of Threatened or Priority flora. Five quadrats were established in vegetation considered to be in 'Good' or better condition and five relevés was sampled in 'Degraded' vegetation, where some loss of structure and weed infestations has occurred. All quadrats were sampled during September 2021 and rescored in October 2021. The density of quadrats sampled is considered to be high, within a relatively small survey area and in small areas of each vegetation unit present. A large proportion of vegetation within the survey area is of 'Degraded' or poorer condition and limited targeted traverses were conducted within these areas. It is not, however, considered to be a limitation of the survey, due to the low probability of Threatened or Priority flora occurring within these areas. The targeted flora survey within suitable species habitat was considered adequate to identify potential Threatened and Priority flora populations, due to the relatively small survey area and limited extent of vegetation in 'Good' or better condition.
Seasonal timing and climatic conditions	No	The flora and vegetation field assessments were conducted during spring (two days in September, one day in October), during the optimal spring season for biological surveys on the Swan Coastal Plain. Supplementary surveys for the South-West are typically undertaken after autumn rain in order to supplement data collected during the primary survey (EPA 2016a), although draft advice from DBCA (2021f) recommends an early spring and a late spring phase of survey for determination of FCTs on the Swan Coastal Plain. Cumulative rainfall in the three months preceding the September field assessment (June, July and August) was above average and near optimal (Figure 2). A total of 315 mm of rain was recorded during July 2021, well above the long-term mean (174.7 mm). The above average winter 2021 rainfall during the growth stage, would have promoted the production of new leaves and increase the number (and quality) of flowers and fruit (Chen <i>et al.</i> 2019).

Aspect	Constraint	Commentary
Access	Minor	The majority of the survey area was easily accessible via vehicle and on foot and much of this was traversed during September. Access to some areas was not granted, however, the vegetation was easily observable from adjacent accessible areas and public roads. Due to disturbance, some sections of the survey area were not traversed due to good visibility which enabled easy verification of the vegetation by visual observations and the fact that these areas largely comprise of vegetation in 'Degraded-Good' or poorer condition. Visual observations were made throughout these areas, which enabled appropriate mapping of these locations and this approach is not considered to be a limitation of the survey.
Mapping reliability	No	Mapping has been prepared at a scale based on ground-truthed areas, with limited extrapolation given the good accessibility of the survey area. Therefore, mapping reliability is considered high.
Disturbances	Minor limitation	The survey area has a history of disturbance such as inappropriate fire regime (too frequent), weed invasion, potential future clearing to upgrade the road or railway line, potential for altered surface drainage due to road grading and littering of rubbish (DEC 2012). Two gravel access roads have been constructed either side of the South Western Railway and run parallel to the railway tracks. As much of the survey area is cleared or quite degraded, this limited the areas within which quadrats could be sampled. As a result, six vegetation units that were only represented in poorer than 'Good' condition, or in small extents, or both, and were only sampled by one relevé or fewer than three quadrats, as is recommended by the Guidance (EPA 2016).
Survey completeness	No	Part of the survey area is classified as a Bush Forever Site (site 350) and as a result, is well documented with an abundance of information (Government of Western Australia 2000a and 2000b). Some of the survey area was not traversed in detail due to the ability to easily verify the vegetation from visual observations and the fact that these areas largely comprised of vegetation in 'Degraded-Good' or poorer condition. The targeted flora survey within suitable species habitat was considered adequate to identify potential Threatened and Priority flora populations, due to the relatively small survey area and limited extent of vegetation in 'Good' or better condition. Despite this, it is considered that the field assessments for the current survey were completed with sufficient detail for the entire survey area. Although not all vegetation units were sampled by at least three quadrats, given the small size of the survey area, the small area of the vegetation units, the degraded condition of much of the vegetation and the abundance of data available for the area, the survey is considered to have been adequate for defining the flora and vegetation values present.

5 RESULTS

5.1 DESKTOP ASSESSMENT

5.1.1 Threatened and Priority Flora

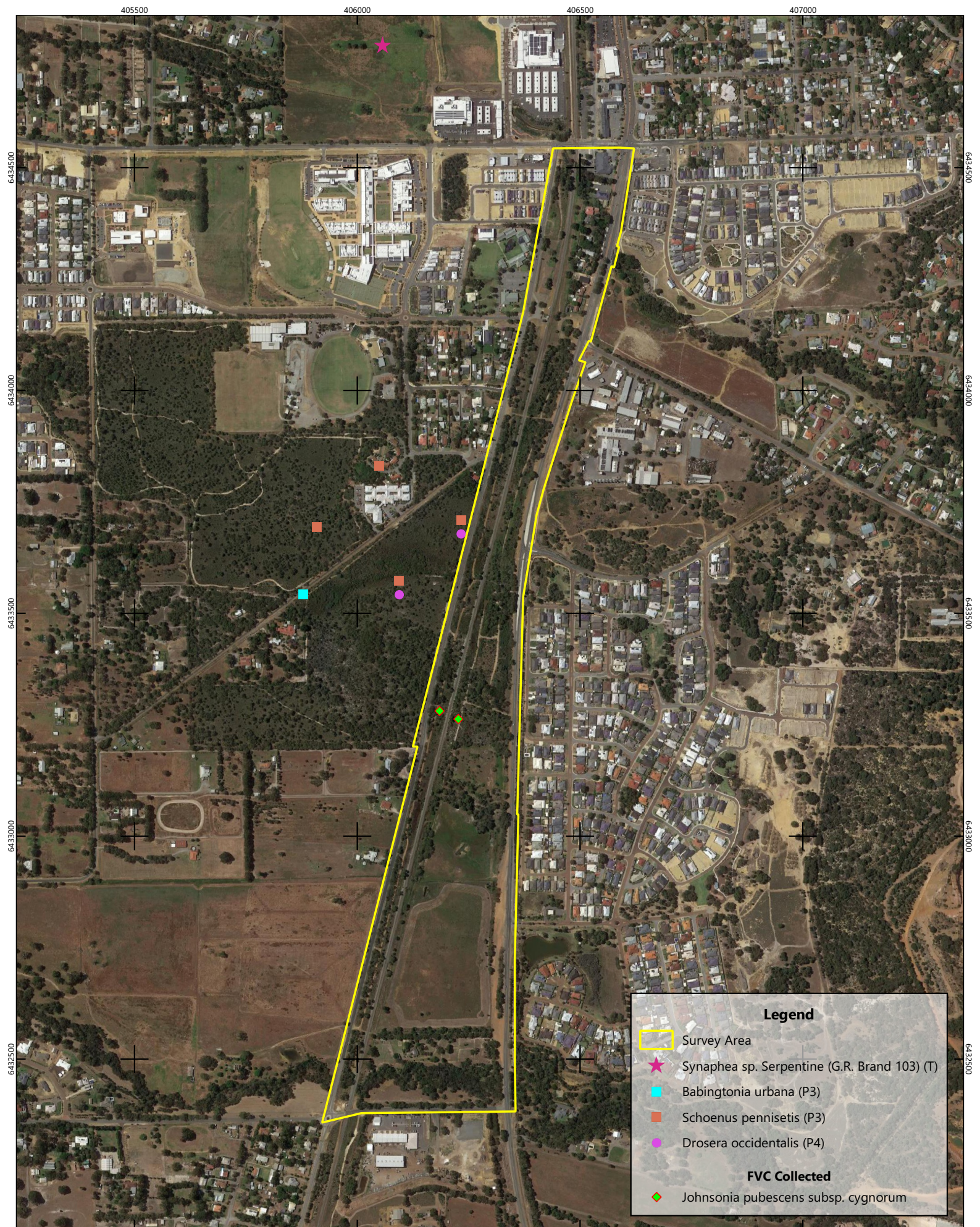
The DBCA database (DBCA 2021b), NatureMap (**Appendix A**) and DAWE Protected Matters Search Tool (DAWE 2021c) identified 20 conservation significant flora species that have the potential to occur within the desktop assessment area (the survey area plus a 2 km buffer applied to the DBCA database search (**Appendix B**)). The list of conservation significant taxa comprised 15 species that are Threatened flora pursuant to the Commonwealth EPBC Act and State BC Act; one Priority 2, two Priority 3 and two Priority 4 species (**Table 9, Figure 10**). Based on known distribution, current records, preferred habitats and the habitats present in the survey area, six taxa were considered 'unlikely' to occur, ten 'may' occur and four were considered 'likely' to occur. No significant flora has previously been recorded within the survey area.

Table 9 – Threatened and Priority Flora Potentially Occurring within the Survey Area

Species	EPBC Act Conservation Status	BC Act/DBCA Conservation Status	Description	Preferred Habitat	Likelihood of Occurrence	Source of Record
<i>Calectasia cyanea</i>	Critically Endangered	Critically Endangered	Clump forming, rhizomatous, woody perennial herb growing to 0.1-0.6 m high and to 0.3 m wide usually with stilt roots. Produces blue or purple flowers from June to October.	White, grey or yellow sand, gravel. Margins of swamps, low depressions and flats.	Unlikely to occur - due to being found at a survey site in the Stirling Ranges.	NatureMap
<i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696)	Critically Endangered	Critically Endangered	Dense, clumped shrub growing to 0.3 m high and 0.4 m wide. Produces yellow flowers in October.	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	May occur - Suitable habitat may occur. Previously recorded 16 km from the survey area.	EPBC PMST
<i>Synaphea</i> sp. Pinjarra Plain (A.S. George 17182)	Endangered	Critically Endangered	Erect, clumping shrub growing to 0.8 m high. Produces yellow flowers from September to November.	Sand, loam and clay soils sometimes with laterite. Winter wet depressions and flats.	May occur - Suitable habitat may occur. Previously recorded 2.3 km from the survey area.	EPBC PMST
<i>Synaphea</i> sp. Serpentine (G.R. Brand 103)	Critically Endangered	Critically Endangered	Erect, compact shrub to 0.3 m high. Produces yellow flowers from September to October.	Grey, yellow or brown sandy clay-loam soils. Edge of wetlands, slopes and flats.	May occur - Suitable habitat may occur. Previously recorded 0.5 km from the survey area.	EPBC PMST DBCA NatureMap
<i>Drakaea elastica</i>	Endangered	Critically Endangered	Tuberous, perennial herb growing to 0.1-0.3 m high with a single bright green, glossy, prostrate heart-shaped leaf. Produces distinctive flower with red and green-yellow parts from October to November.	Bare patches of white or grey sandy soils. Low-lying situations adjoining winter-wet swamps.	May occur - Suitable habitat may occur. Previously recorded 2.8 km from the survey area.	EPBC PMST
<i>Eucalyptus x balanites</i>	Endangered	Critically Endangered	Mallee with rough flaky grey bark growing to 5-8 m high and 15 m wide. Produces white flowers from October to December or from January to February.	White-grey sand, brown sandy loam soils with lateritic gravel. Slopes.	May occur - Suitable habitat may occur. Previously recorded 4.7 km from the survey area.	EPBC PMST
<i>Diuris purdiei</i>	Endangered	Endangered	Tuberous, perennial orchid growing to 0.15-0.45 m high. Produces distinct flattened yellow flowers with brown blotches on their underside from September to October.	Grey-black sand, sandy clay moist soils. Winter-wet swamps.	May occur - Suitable habitat may occur. Previously recorded 4 km from the survey area.	EPBC PMST

Species	EPBC Act Conservation Status	BC Act/DBCA Conservation Status	Description	Preferred Habitat	Likelihood of Occurrence	Source of Record
<i>Grevillea curviloba</i> (formerly <i>Grevillea curviloba</i> subsp. <i>incurva</i>)	Endangered	Endangered	Variable, prostrate shrub with broad dark green leaves or tall erect shrub growing to 2 m high with greyish green leaves. Produces creamy-white flowers on short stalks in leaf axils from September to October.	Grey sand, sandy loam. Winter-wet heath.	Unlikely to occur - Specimen found approximately 55 km from the survey area.	EPBC PMST
<i>Lepidosperma rostratum</i>	Endangered	Endangered	Rhizomatous, tufted perennial grass-like sedge growing to 0.5 m high. Produces brown flowers in narrow, spike-like inflorescence and fruits in June to August.	Peaty sand, clay.	Unlikely to occur - suitable habitat unlikely to occur. Specimen found 7.2 km from survey area.	EPBC PMST
<i>Thelymitra stellata</i>	Endangered	Endangered	Tuberous perennial herb growing to 0.25 m high with a single lily-like leaf to 0.9 m long. Produces up to 6 golden-brown or yellow with orange striped flowers from September to November.	Sandy loam soils with lateritic gravel. Ridges, slopes and gullies in wandoo and jarrah woodland.	Unlikely to occur - suitable habitat unlikely to occur. Closest known occurrence approx. 5 km east on the Darling Scarp.	EPBC PMST
<i>Andersonia gracilis</i>	Endangered	Vulnerable	Slender, erect or open straggly shrub growing to 0.1-0.5 m high. Produces pink to pale mauve flowers in ovoid oblong groups of 4-14 on terminal heads from September to November.	White-grey sand, sandy clay, gravelly loam soils. Winter wet areas, near swamps.	Unlikely to occur - Suitable habitat unlikely. Specimen found 23 km from the survey area.	EPBC PMST
<i>Drakaea micrantha</i>	Vulnerable	Endangered	Tuberous, perennial herb growing to 0.15-0.3 m high with a single silvery-grey, prostrate heart-shaped leaf. Produces distinct flower with red and yellow parts from September to October.	Bare patches of white-grey sandy soils. Winter wet swamps, disturbed areas.	May occur - Suitable habitat may occur. Previously recorded 10 km from the survey area.	EPBC PMST
<i>Diuris micrantha</i>	Vulnerable	Vulnerable	Tuberous, perennial orchid growing to 0.3-0.6 m high with a basal tuft of narrow, linear leaves. Produces up to 7 yellow flowers with red-brown markings from August to October.	Brown/black sandy clay-loam and clayey soils. Winter-wet depressions and swamps, in shallow water.	May occur - Suitable habitat may occur. Specimen found 10 km from the survey area.	EPBC PMST

Species	EPBC Act Conservation Status	BC Act/DBCA Conservation Status	Description	Preferred Habitat	Likelihood of Occurrence	Source of Record
<i>Eleocharis keigheryi</i>	Vulnerable	Vulnerable	Tufted, clumping grass like sedge growing to 0.2-0.4 m high and 0.4 m wide with smooth, erect stems and leaves reduced to straw-coloured sheaths. Produces pale green flowers in a narrow, cylindrical flower spike from August to November (December in favourable conditions).	Clay, sandy loam soils. Emergent in freshwater creeks, claypans and wetlands.	Unlikely to occur - suitable habitat unlikely to occur. Specimen found 16 km from the survey area.	EPBC PMST
<i>Morelotia australiensis</i> (formerly <i>Tetraria australiensis</i>)	Vulnerable	Vulnerable	Tufted perennial grass-like sedge growing to 1 m high with cylindrical stems. Produces brown flowers following fire.	Grey sand over clay soil. Winter wet depressions, swamps, drainage lines and swamp margins.	May occur - Suitable habitat may occur. Previously recorded 2.7 km from the survey area.	EPBC PMST
<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i>		Priority 2	Tufted, perennial, grass like herb (lily) growing to 0.25 m high. Produces greenish cream flowers from September to October.	Grey or yellow sand, sandy clayey soils. Gentle slopes and flats.	Likely to occur - Suitable habitat may occur. Previously recorded 0.8 km from the survey area.	DBCA NatureMap
<i>Babingtonia urbana</i>		Priority 3	Erect to sprawling shrub growing to 0.5 m high. Produces pink flowers from October to March.	Brown clay loam, sandy soils. Flats and winter wet depressions.	Likely to occur - Suitable habitat may occur. One occurrence recorded 400 m from the survey area.	DBCA NatureMap
<i>Schoenus pennisetis</i>		Priority 3	Tufted annual sedge growing to 0.1-0.4 m high. Produces purple-black flowers from August to October.	Grey or brown peaty sand, sandy clay soils. Swamps, winter-wet depressions and flats.	Likely to occur - Suitable habitat may occur. Four occurrences recorded less than 400 m from the survey area.	DBCA NatureMap
<i>Drosera occidentalis</i>		Priority 4	Fibrous-rooted, small red rosetted perennial herb growing to 0.02 m high. Produces white flowers from October to December.	Low lying flat. Grey sandy clay. Disturbed.	Likely to occur - Suitable habitat may occur. Two occurrences recorded less than 200 m from the survey area.	DBCA NatureMap
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		Priority 4	Erect shrub growing to 0.2 to 0.75 m high. Produces pink flowers with white fringes from November to January (also known from May).	Sand, sandy clay soils. Winter-wet depressions.	May occur - Suitable habitat may occur. Previously recorded 5 km from the survey area.	NatureMap



0 125 250 375 500 m

GDA 94 / MGA Zone 50



**Figure 10 - Threatened
and Priority Flora**

5.1.2 Threatened and Priority Ecological Communities

A review of the DBCA Threatened and Priority Ecological Communities (TEC and PEC) database (DBCA 2021d) and the EPBC PMST (DAWE 2021c) identified the potential for eight TECs or PECs to occur in the survey area, including six Commonwealth-listed TECs (**Table 10**). The TECs and PECs known to occur in the survey area and surrounding region (desktop assessment area) are presented spatially in **Figure 11**.

Table 10 – Threatened and Priority Ecological Communities Potentially Occurring within the Survey Area (DBCA 2021d)

Abbreviated Identifier	Community Name	Commonwealth Category	State Category	Location	Source
SCP 09	Dense shrublands on clay flats (floristic community as originally described in Gibson <i>et al.</i> (1994))	Critically Endangered	Vulnerable	TEC or buffer occurs within the survey area	DBCA
Tuart woodlands	Tuart (<i>Eucalyptus gomphocephala</i>) Woodlands and Forests of the Swan Coastal Plain	Critically Endangered	Priority 3	Closest occurrence approx. 15 km west south-west of the survey area	EPBC PMST
Mound Springs SCP	Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)	Endangered	Critically Endangered	TEC or buffer occurs within the survey area	DBCA
SCP 3a	<i>Corymbia calophylla</i> – <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain (floristic community type 3a as originally described in Gibson <i>et al.</i> (1994))	Endangered	Critically Endangered	TEC or buffer occurs within the survey area	EPBC PMST DBCA
SCP 3b	<i>Corymbia calophylla</i> – <i>Eucalyptus marginata</i> woodlands on sandy clay soils of the southern Swan Coastal Plain (floristic community type 3b as originally described in Gibson <i>et al.</i> (1994))		Vulnerable	TEC or buffer occurs within the survey area	DBCA
SCP 3c	<i>Corymbia calophylla</i> – <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in Gibson <i>et al.</i> (1994))	Endangered	Critically Endangered	TEC or buffer occurs within the survey area	EPBC PMST DBCA
SCP 20b	<i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands of the eastern side of the Swan Coastal Plain (floristic community type 20b as originally described in Gibson <i>et al.</i> (1994))		Endangered	TEC or buffer occurs within the survey area	DBCA
Banksia WL SCP	Banksia dominated Woodlands of the Swan Coastal Plain IBRA Region	Endangered	Priority 3	TEC or buffer occurs within the survey area	EPBC PMST DBCA

5.1.2.1 Clay Pans of the Swan Coastal Plain

The Commonwealth listed 'Clay pans of the Swan Coastal Plain' TEC, comprises the four State listed TECs and one State listed PEC:

- SCP 07 – Herb rich saline shrublands in clay pans (Vulnerable)
- SCP 08 – Herb rich shrublands in clay pans (Vulnerable)
- SCP 09 – Dense shrublands on clay flats (Vulnerable)
- SCP 10a – Shrublands on dry clay flats (Endangered)
- Clay pans with mid dense shrublands of *Melaleuca lateritia* over herbs (Priority 1).

The species-diverse clay pan communities of the SCP occur where clay substrates are low in the landscape and form an impermeable layer close to the surface (DBCA 2019b). There are no specific suites of flora that characterise all the clay pans, but they share general characteristics of substrate, landform, hydrology and vegetation structure (DBCA 2019b).

5.1.2.2 SCP09 – Dense Shrublands on Clay Flats, Swan Coastal Plain, (TEC)

This community type consists of shrublands or low open woodlands on clay flats that are inundated for long periods because it usually occurs very low in the landscape. Sedges are more apparent in this ecological community and include *Chorizandra enodis* (black bristlerush), *Cyathochaeta avenacea*, *Lepidosperma longitudinale* (pithy sword-sedge) and *Leptocarpus coangustatus* (formerly *Meeboldina coangustata*). Shrubs include *Hakea varia* (variable-leaved hakea), *Melaleuca viminea* and occasionally *Xanthorrhoea preissii*, *X. drummondii* (grass trees) and *Kingia australis*. This vegetation community has a lower species richness and weed frequency than in the other clay pan community types, presumably because of the longer inundation times (DBCA 2019b).

5.1.2.3 Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain

The *Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain Ecological Community* (Tuart woodlands and forests TEC) occurs as woodland, forest or other structural forms associated with soils of the Swan Coastal Plain with a prominent tree layer of *Eucalyptus gomphocephala* (Tuart) as the defining feature (DEE 2019).

The Tuart woodlands and forests TEC occurs within the Swan Coastal Plain IBRA region within the Perth subregion, from Jurien, 200 km north of Perth, to Sabina River near Busselton, 225 km south of Perth (DEE 2019). The distribution of the ecological community is limited by the distribution of Tuart, although Tuart trees do also occur as a component of other vegetation communities, including the nationally listed Banksia woodlands TEC (DEE 2019).

5.1.2.4 Mound Springs SCP - Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)

The Mound Springs TEC is characterised by a continuous discharge of groundwater in raised areas of peat. Flora species recorded in this community include *Banksia littoralis*, *Melaleuca preissiana* and *Eucalyptus rudis* with *Agonis linearifolia*, *Pteridium esculentum*, *Astartea fascicularis* and *Cyclosorus interruptus*. Several non-vascular plants are also associated with this community (CALM 2006). This TEC has not been previously identified to occur within the survey area, however, a buffer for this TEC occurs 80 m north-west of the survey area boundary.

5.1.2.5 SCP 3a - *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (TEC)

The *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain ecological community is a woodland community located on heavy soils of the eastern side of the Swan Coastal Plain between Ruabon and Guildford (DEE 2017a). This TEC occurs on wetter sites than FCT SCP 3b or 3c and is associated with the median species richness, and lowest level of weed invasion and disturbance (DPaW 2011).

This TEC is typically dominated by; *Corymbia calophylla* (Marri); *Banksia dallanneyi*, *Philotheca spicata*, *Kingia australis* and *Xanthorrhoea preissii*; over herbs, rushes and sedges of *Cyathochaeta avenacea*, *Dampiera linearis*, *Haemodorum laxum*, *Desmocladius fasciculatus*, *Mesomelaena tetragona* and *Tetraria* (now *Morelotia*) *octandra* (DEE 2017a).

5.1.2.6 SCP 3b - *Corymbia calophylla* – *Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (TEC)

The *Corymbia calophylla* - *Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain ecological community (SCP 3b) is characterised by an overstorey of dominated by both *Corymbia calophylla* (Marri) and *Eucalyptus marginata* (Jarrah) (DBCA 2020b). Other typical species include: *Bossiaea eriocarpa*, *Conostylis juncea*, *Hibbertia hypericoides*, *Tetraria* (now *Morelotia*) *octandra*, *Chamaescilla corymbosa*, *Desmocladius fasciculatus*, *Banksia dallanneyi*, *Mesomelaena tetragona*, *Babingtonia camphorosmae*, *Lepidosperma squamatum*, *Neurachne alopecuroidea*, *Philotheca spicata*, *Burchardia congesta*, *Caesia micrantha*, *Kingia australis*, *Drosera erythrorhiza*, *Lomandra hermaphrodita* and *Caladenia flava* (DBCA 2020b). This community is distributed between Wattle Grove and Harvey.

5.1.2.7 SCP 3c - *Corymbia calophylla* – *Xanthorrhoea preissii* woodlands and Swan Coastal Plain (TEC)

The SCP 3c community is found on heavy soils on the eastern side of the Swan Coastal Plain between Bullsbrook and Stratham. It is dominated by *Corymbia calophylla* and *Xanthorrhoea preissii* occasionally with *Eucalyptus wandoo*. The most common shrub species are *Gompholobium marginatum*, *Hypocalymma angustifolium* and *Banksia dallanneyi* (DBCA 2021d).

5.1.2.8 SCP 20b – *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (part of *Banksia* woodlands TEC)

This community occurs on sands at the base of the Darling Scarp primarily on Pinjarra Plain and Ridge Hill Shelf soils. The community comprises woodlands of *Banksia attenuata* often with *Eucalyptus marginata*. The presence of *Hakea stenocarpa*, *Conostylis setosa* and *Johnsonia pubescens* subsp. *cygnorum* is considered an indicator of this community (DEC 2012).

5.1.2.9 *Banksia Woodlands* TEC

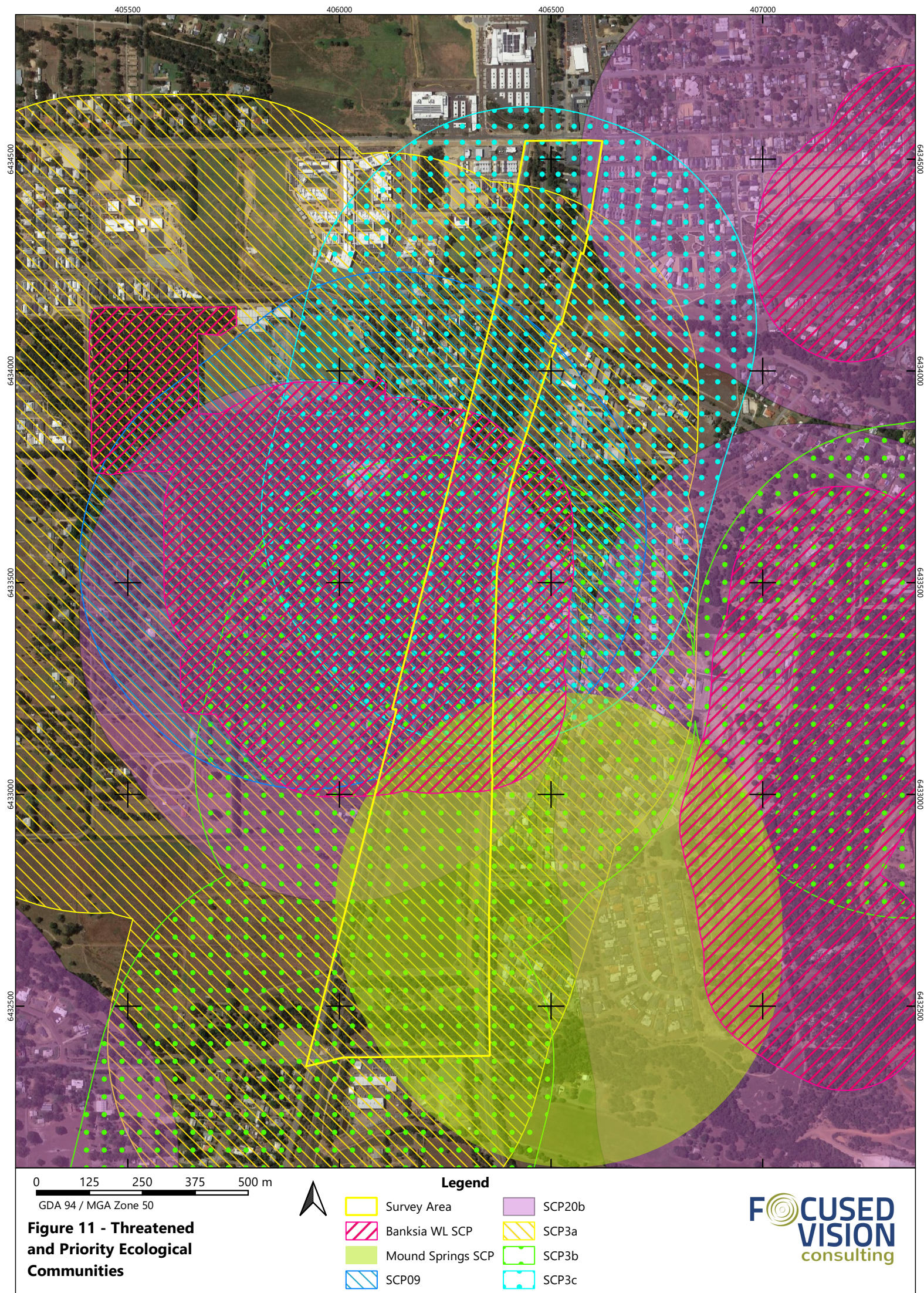
The *Banksia Woodlands of the Swan Coastal Plain Ecological Community* (Banksia woodlands TEC) was approved for inclusion as an Endangered TEC under the EPBC Act on 16 September 2016. This ecological community is woodland associated with some soils of the Swan Coastal Plain with a prominent tree layer of Banksia with scattered Eucalypts and other tree species among or emerging above the canopy. The understorey is comprised of a species rich mix of sclerophyllous shrubs, graminoids and forbs (TSSC 2016).

The Banksia woodlands TEC is largely restricted to the Swan Coastal Plain IBRA bioregion, within the Perth (SWA02) and Dandaragan (SWA01) sub-regions. It extends into the adjacent Jarrah Forrest IBRA region (JA01 and JA02 sub-regions) and areas of the Whicher and Darling escarpments where pockets of Banksia woodland may occur. This TEC mainly occurs on deep Bassendean and Spearwood sands or occasionally on Quindalup sands at the eastern edge (TSSC 2016).

Twenty-one Floristic Community Types (FCTs) described by Gibson *et al.* (1994) in Bush Forever (Government of Western Australia 2000), Keighery *et al.* (2012), and Urban Bushland Council (2011) best correspond to the Banksia woodlands TEC (TSSC 2016) which are summarised in **Table 11**.

Table 11 – Floristic Community Types Corresponding to the Banksia Woodlands TEC (TSSC 2016)

FCT	FCT Name	WA TEC/PEC	EPBC TEC
Supergroup 3 – Uplands centered on Bassendean Dunes and Dandaragan Plateau			
20a	<i>Banksia attenuata</i> woodlands over species rich dense shrublands	Endangered	
20b	Eastern <i>Banksia attenuata</i> and/or <i>Eucalyptus marginata</i> woodlands	Endangered	
20c	Eastern shrublands and woodlands	Critically Endangered	Endangered
21a	Central <i>Banksia attenuata</i> - <i>Eucalyptus marginata</i> woodlands		
21b	Southern <i>Banksia attenuata</i> woodlands	P3	
21c	Low lying <i>Banksia attenuata</i> woodlands or shrublands	P3	
22	<i>Banksia ilicifolia</i> woodlands	P3	
23a	Central <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands		
23b	Northern <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands	P3	
23c	North-eastern <i>Banksia attenuata</i> - <i>Banksia menziesii</i> woodlands		
S09	<i>Banksia attenuata</i> woodlands over dense low shrublands		
Supergroup 4 – Uplands centered on Spearwood and Quindalup Dunes			
24	Northern Spearwood shrublands and woodlands	P3	
25	Southern <i>Eucalyptus gomphocephala</i> – <i>Agonis flexuosa</i> woodlands	P3	
28	Spearwood <i>Banksia attenuata</i> or <i>Banksia attenuata</i> – <i>Eucalyptus</i> woodlands		
Whicher Scarp FCTs (Keighery <i>et al.</i> 2012)			
A1	Central Whicher Scarp Mountain Marri Woodland WHSFCT_A1	P1	
A2	North Whicher Scarp Jarrah and Woody Pear woodland WHSFCT_A2		
A3	North Whicher Scarp <i>Banksia</i> and Woody Pear woodland WHSFCT_A3		
A4	Whicher Scarp <i>Banksia grandis</i> , Jarrah and Marri woodland WHSFCT_A4		
B1	Swan Coastal Plain / North Whicher Scarp <i>Banksia attenuata</i> woodland WHSFCT_B1		
B2	West Whicher Scarp <i>Banksia attenuata</i> woodland WHSFCT_B2	P1	
C2	Whicher Scarp Jarrah woodland on deep coloured sands WHSFCT_C2	P1	



5.2 FIELD ASSESSMENT

5.2.1 Flora

A total of 123 flora species, from 90 genera from 32 families were recorded during the field survey. The dominant families were found to be Fabaceae (18 taxa) and Proteaceae (12 taxa). The total is comprised of 95 (77.2%) native species and 28 (22.8%) introduced (weed) species. The full list of vascular flora species recorded within each vegetation unit (which includes opportunistic species records, additional to flora species recorded within quadrats and relevés) is presented in **Appendix C** and individual quadrat and relevé data is presented in **Appendix D**.

No species listed as Threatened flora under the BC Act or under the EPBC Act were recorded. One Priority species listed by DBCA, *Johnsonia pubescens* subsp. *cygnorum* (P2) was recorded (**Figure 10**). A total of 16 individuals were recorded from two locations, one location consisting of one individual and the other consisting of 15 individuals.

Of the 28 weed species recorded within the survey area, one (Arum Lily, **Zantedeschia aethiopica*) is listed as a DP plant under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) and a WoNS under the *Australian Weed Strategy 2017-2027* (Invasive Plants and Animals Committee 2016, DPIRD 2021, DAWE 2021e).

None of the flora recorded are exhibiting extensions of their currently known range as documented by the WA Herbarium (WAH 1998-).

The species accumulation curve produced for the one vegetation unit sampled by at least three quadrats or relevés (as required to create a curve), demonstrated the adequacy of quadrat sampling, and is presented in **Figure 12**. Based on the logarithmic equation for the Marri/Kingia/Hakea/Xanthorrhoea woodland (CcKaHtXp) ($y=40.971\ln(x)+31.197$), it is estimated that there would be a total species count (natives and weeds) of 126 at 10 quadrats in the survey area and is considered adequate.

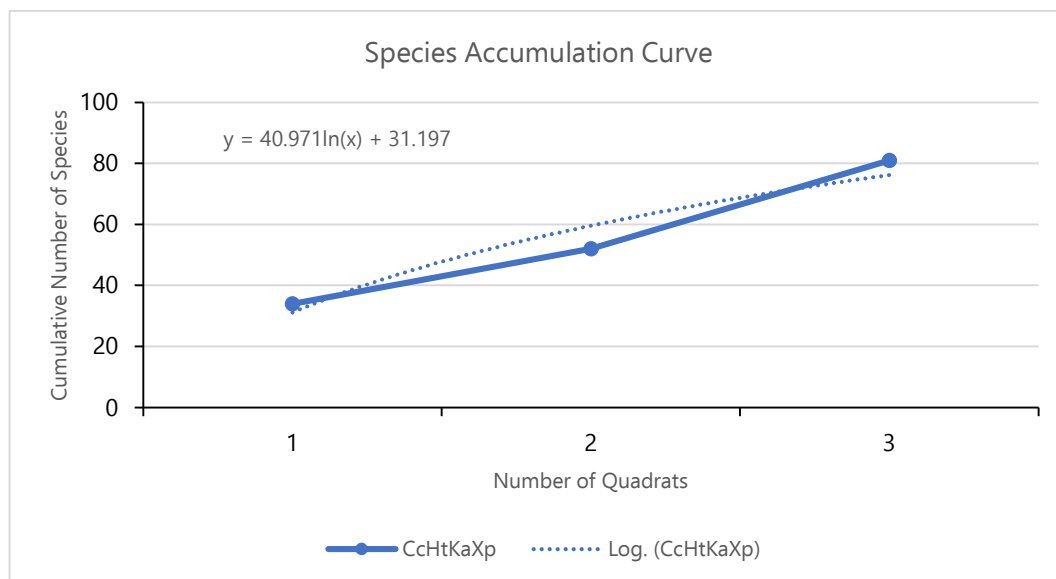



Figure 12 – Species Accumulation Curve for the Marri/Kingia/Hakea/Xanthorrhoea woodland (CcKaHtXp)

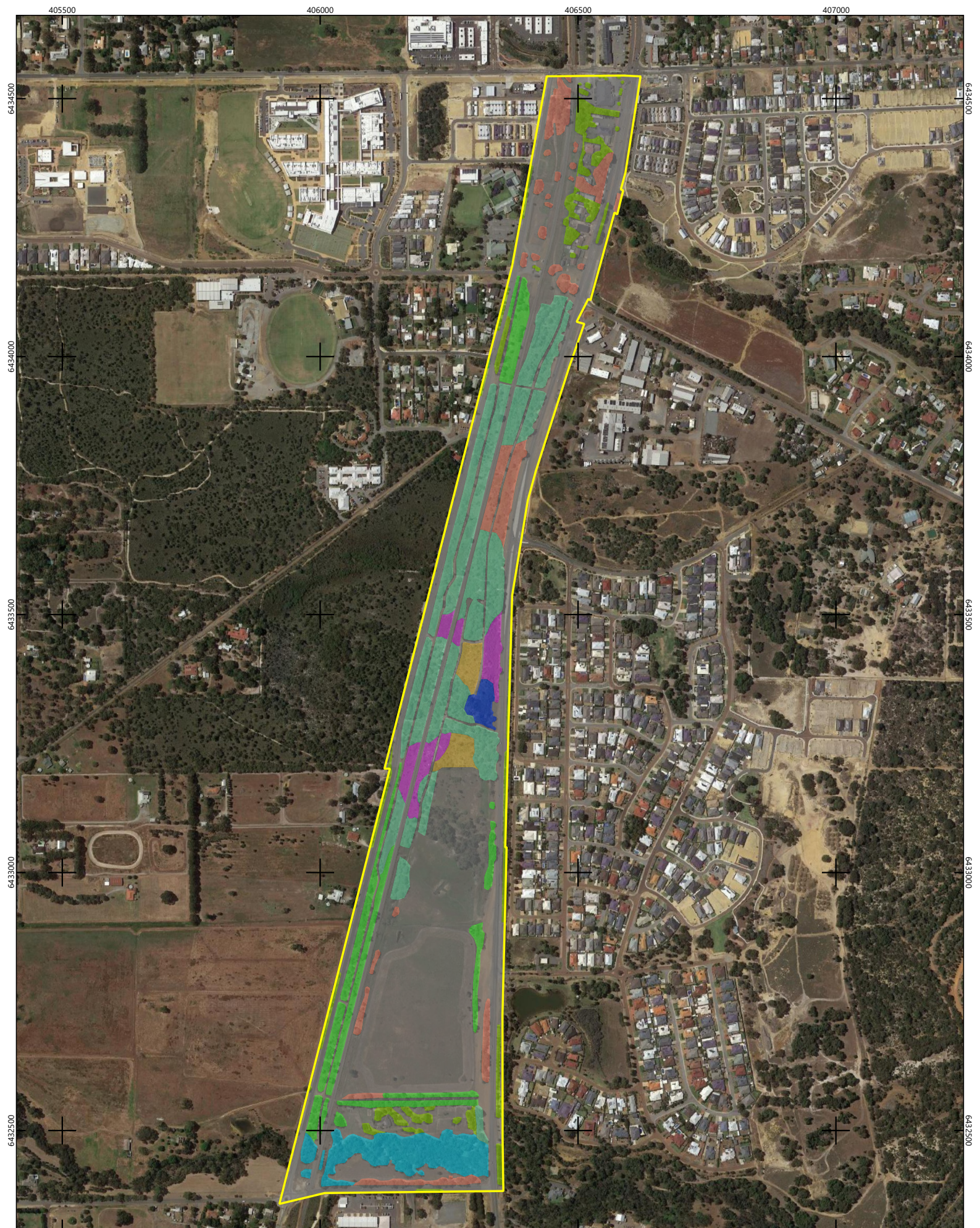
5.2.2 Vegetation

Eight vegetation units were defined and mapped within the survey area. This comprised of five woodlands, one shrublands and two altered units (Planted and Rehab). Each vegetation unit is described in **Table 12** and their spatial extents within the survey area are presented in **Figure 13**.

Table 12 – Summary of Recorded Vegetation Units in the Survey Area

Vegetation Unit	Vegetation Description	Representative Photo	Site Number	Area (ha)	% of Survey Area
Cc Marri Woodland	<i>Corymbia calophylla</i> Woodland over <i>Jacksonia sternbergiana</i> Tall Open Shrubland over <i>*Watsonia meriana</i> and <i>*Oxalis pes-caprae</i> Low Forbland		BD01r	2.69	5.34
CcHtKaXp Marri/ Hakea/ Kingia/ Xanthorrhoea Woodland	<i>Corymbia calophylla</i> Low Open Woodland over <i>Hakea trifurcata</i> , <i>Kingia australis</i> and <i>Xanthorrhoea preissii</i> Tall Open Shrubland over <i>Cyathochaeta avenacea</i> and <i>Mesomelaena tetragona</i> Sparse Sedgeland		BD02, BD03, BD09, BD05r	7.41	14.75
CcXp Marri/ Xanthorrhoea Woodland	<i>Corymbia calophylla</i> Woodland over <i>Xanthorrhoea preissii</i> Sparse Shrubland over <i>Morelotia octandra</i> and <i>Mesomelaena tetragona</i> Sparse Sedgeland		BD06	3.15	6.26
CoMvv Casuarina/ Melaleuca Woodland	<i>Casuarina obesa</i> Low Woodland over <i>Melaleuca viminea</i> subsp. <i>viminea</i> Tall Sparse Shrubland over <i>Cyathochaeta avenacea</i> and <i>Mesomelaena tetragona</i> Sparse Sedgeland		BD08r	0.72	1.44
ErCc Eucalyptus/ Marri Woodland	<i>Eucalyptus rudis</i> and <i>Corymbia calophylla</i> Open Forest over <i>*Watsonia meriana</i> and <i>*Oxalis pes-caprae</i> Low Forbland		BD07r	2.29	4.55
KaHtKr Kingia/ Hakea/ Kunzea Shrubland	<i>Kingia australis</i> , <i>Hakea trifurcata</i> and <i>Kunzea recurva</i> Tall Open Shrubland over <i>Hypolaena exsulca</i> Sparse Rushland		BD04	1.17	2.32

Vegetation Unit	Vegetation Description	Representative Photo	Site Number	Area (ha)	% of Survey Area
Rehab	Rehabilitation with planted endemic, non-endemic species and weeds		BD10r	0.37	0.74
Planted	Planted exotic garden species	No representative photo	NA	2.43	4.83.
			Cleared	30.04	59.77
			TOTAL	50.26	100



0 125 250 375 500 m
GDA 94 / MGA Zone 50

**Figure 13 - Vegetation
Units of the Survey Area**

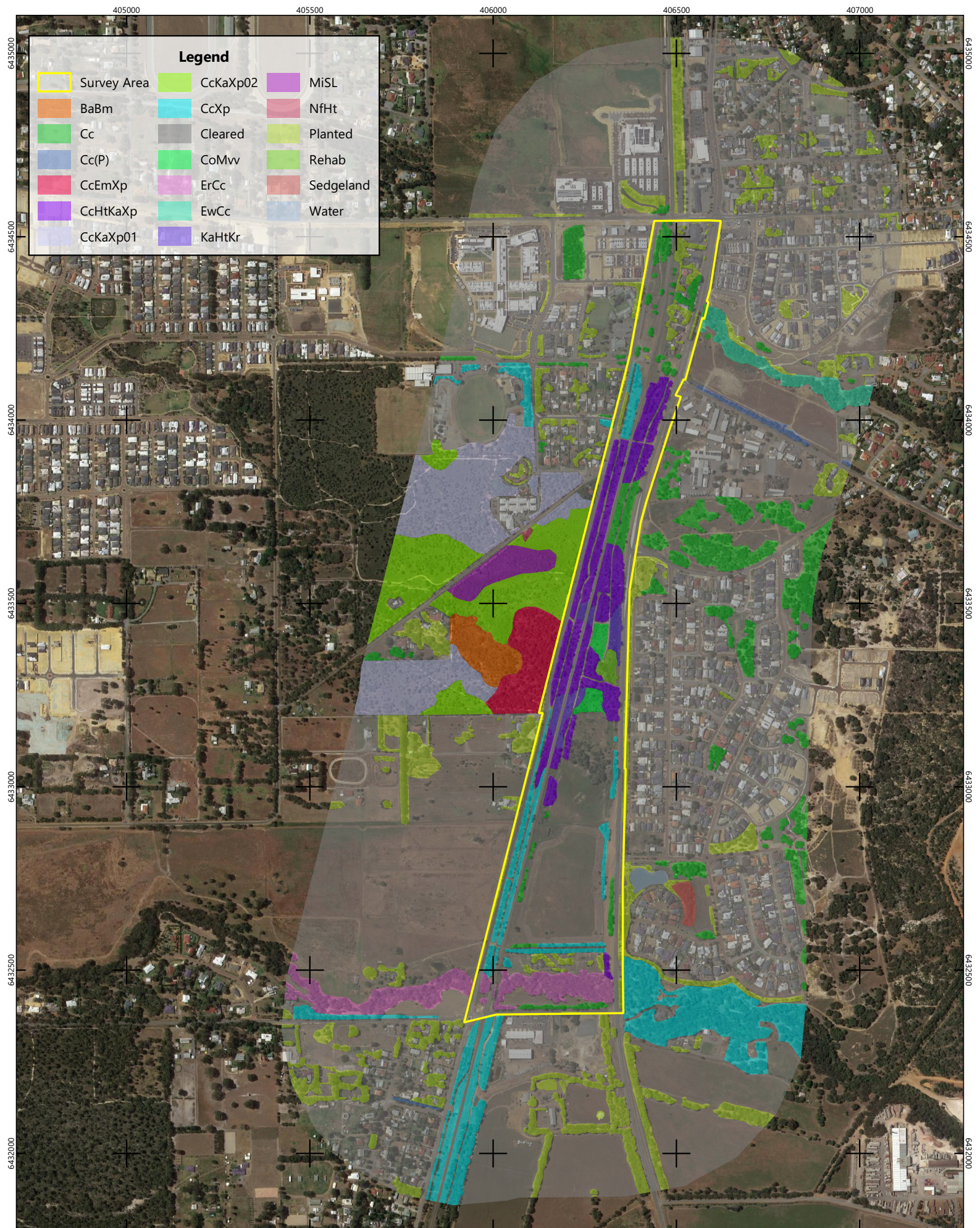
	Survey Area		Cleared		Planted
	Cc		CoMw		Rehab
	CcHtKaXp		ErCc		KaHtKr
	CcXp				

Vegetation within a 500 m buffer of the survey area centreline was extrapolated to determine vegetation units surrounding the survey area, as per the requirements of EPA (2016). It was determined that the survey area plus the 500 m buffer supports 12 broad vegetation units, four of which (CcXp, ErCc, Planted and Rehab) are represented within the survey area, as summarised in **Table 13** and presented in **Figure 14**.

Table 13 – Summary of Recorded Vegetation Units Surrounding the Survey Area (500 m buffer)

Vegetation Unit	Vegetation Description
BaBm <i>Banksia</i> Woodland	<i>Banksia attenuata</i> and <i>Banksia menziesii</i> Low Woodland over <i>Hibbertia hypericoides</i> Low Sparse Shrubland over <i>Mesomelaena psuedostygia</i> Sedgeland
Cc(P) Marri over weeds	<i>Corymbia calophylla</i> Open Woodland over grasses and weeds
CcKaXp01 Marri / <i>Kingia</i> / <i>Xanthorrhoea</i> Woodland	<i>Corymbia calophylla</i> Woodland over <i>Xanthorrhoea presisii</i> and <i>Kingia australis</i> Open to Sparse Shrubland over <i>Mesomelaena tetragona</i> Sedgeland on grey loamy sand
CcKaXp02 Marri / <i>Kingia</i> / <i>Xanthorrhoea</i> Woodland	<i>Corymbia calophylla</i> Woodland over <i>Xanthorrhoea presisii</i> and <i>Kingia australis</i> Open to Sparse Shrubland over <i>Mesomelaena tetragona</i> Sedgeland on brown sandy or loamy clay
CcXp* <i>Corymbia</i> / <i>Xanthorrhoea</i> woodland	<i>Corymbia calophylla</i> Woodland over <i>Xanthorrhoea preissii</i> Sparse Shrubland over <i>Morelotia octandra</i> and <i>Mesomelaena tetragona</i> Sparse Sedgeland
ErCc* Eucalyptus/ <i>Corymbia</i> woodland	<i>Eucalyptus rudis</i> and <i>Corymbia calophylla</i> woodland over <i>*Watsonia meriana</i> and <i>*Oxalis pes-caprae</i> Low Forbland
EwCc	<i>Eucalyptus wandoo</i> and <i>Corymbia calophylla</i> woodland over weeds and grasses
MiSL <i>Melaleuca</i> Shrubland	<i>Melaleuca incana</i> subsp. <i>incana</i> Tall Open Shrubland over <i>Schoenus ?sculptus</i> and <i>Burchardia multiflora</i> Sedgeland
NfHt <i>Nuytsia</i> Woodland	<i>Nuytsia floribunda</i> Low Open Woodland over <i>Xanthorrhoea preisii</i> and <i>Hakea trifurcta</i> Open Shrubland over <i>Mesomelaena tetragona</i> Sedgeland
SH	<i>Melaleuca</i> sp., <i>Astartea</i> sp. or <i>Kunzea</i> sp. Shrubland
Planted*	Planted endemic, non-endemic or garden species
Rehab*	Rehabilitation with planted endemic and non-endemic species
Open Water	Indundated areas devoid of vegetation

*also within the Byford Depot survey area



0 125 250 375 500 m

GDA 94 / MGA Zone 50



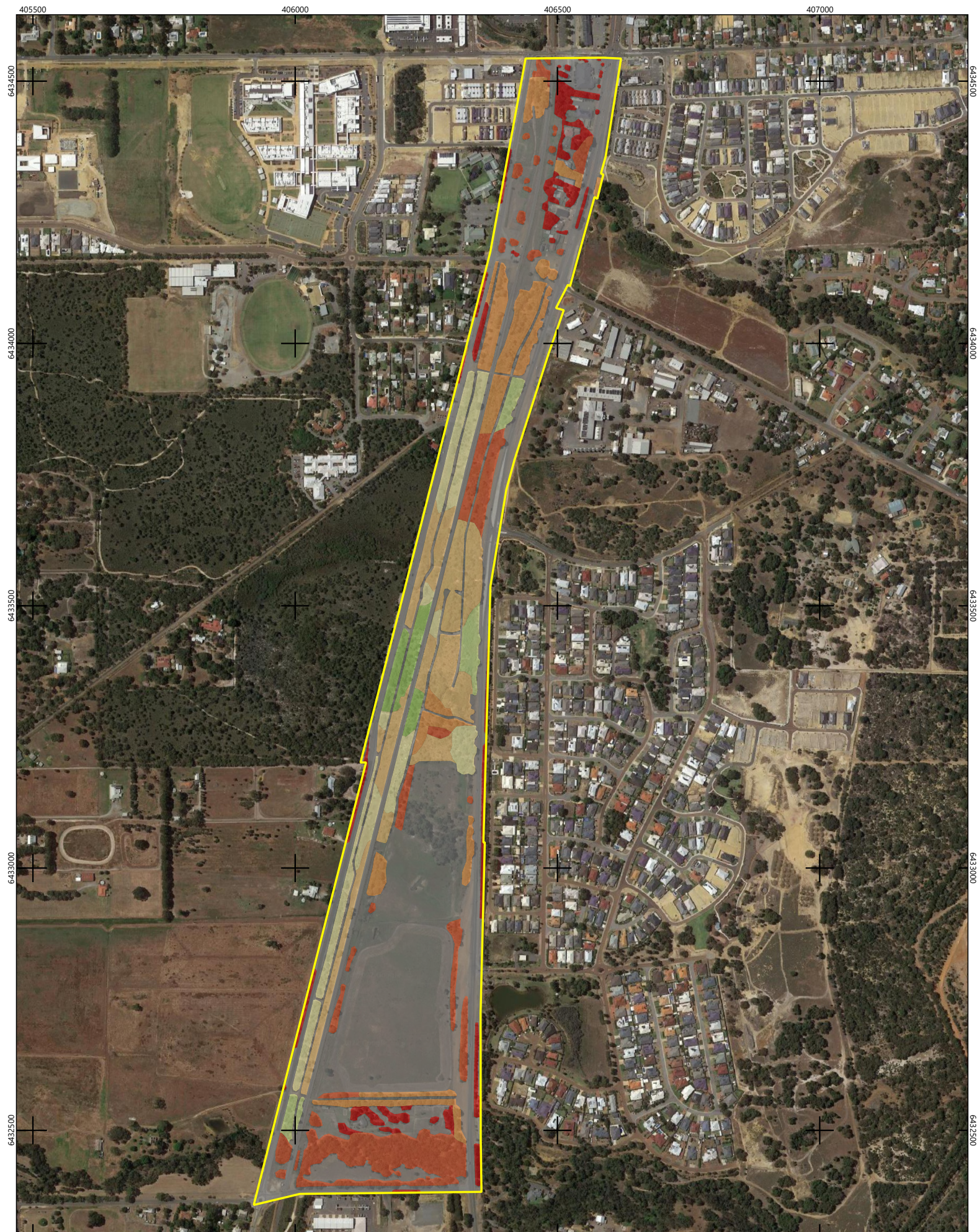
**Figure 14 - Vegetation Units
Surrounding the Survey Area**

5.2.2.1 Vegetation Condition

The condition of the vegetation within the survey area was found to range from 'Completely Degraded' to 'Very Good', with only 9.25% observed to be in 'Good' or better condition. More than half (30.038 ha, 59.77%) of the survey area was cleared. The areas of the varying vegetation condition are summarised in **Table 13** and the spatial extent of this is presented in **Figure 15**.

Table 14 – Summary of Vegetation Condition in the Survey Area

Vegetation Condition Rating	Vegetation Unit	Area (ha)	Total Area (ha)	% of Survey Area
Very Good	CcHtKaXp	0.75	0.85	1.70
	KaHtKr	0.11		
Good-Very Good	CcHtKaXp	0.24	0.87	1.73
	CcXp	0.21		
	KaHtKr	0.42		
Good	CcHtKaXp	1.81	2.93	5.82
	CcXp	0.78		
	KaHtKr	0.34		
Degraded-Good	CcHtKaXp	2.56	4.37	8.69
	CcXp	0.58		
	CoMvv	0.65		
	KaHtKr	0.21		
	Rehab	0.37		
Degraded	Cc	0.59	3.80	7.57
	CcHtKaXp	1.87		
	CcXp	1.25		
	KaHtKr	0.09		
Completely Degraded-Degraded	Cc	2.09	4.97	9.89
	CcHtKaXp	0.19		
	CcXp	0.33		
	CoMvv	0.07		
	ErCc	2.29		
Completely Degraded	Planted	2.43	2.43	4.83
Cleared			30.04	59.77
TOTAL			50.26	100



5.2.2.2 Assessment of Floristic Community Types

Analysis of all quadrats recorded within the survey area was first conducted using the full suite of FVC sampled quadrats (batch analysis) and then via SSI against a local subset of the Gibson *et al.* (1994) and Keighery *et al.* (2012) quadrats. Multivariate cluster analysis was utilised to determine species presence/absence in PATN™ and was conducted in order to assign Gibson *et al.* (1994) or Keighery *et al.* (2012) FCTs that are most likely represented within each quadrat.

The dendrograms resulting from the SSI analysis are presented in **Appendix E** and the results of the floristic analysis, including analysis of dissimilarity are presented in **Table 15**.

Interrogation of the results of the data analysis (**Table 15**) indicates that all quadrats sampled are considered to be representative of FCT SCP 3a (*Corymbia calophylla* – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain), which is a Commonwealth and State-listed TEC.

Based on the floristic analysis results (**Table 15**), the vegetation units described and mapped for the survey area which most closely align with the FCT SCP 3a TEC are:

- CcHtKaXp (Marri/Hakea/Kingia/Xanthorrhoea Woodland)
- CcXp (Marri/Xanthorrhoea Woodland)
- KaHtKr (Kingia/Hakea/Kunzea Shrubland).

Table 15 – Summary of Single Site Insertion PATN™ Analysis Results

Vegetation Unit	Quadrat	Vegetation Condition	SSI Dendrogram Result*	Dissimilarity Indices	SCP Quadrat	FCT	Dissimilarity Indices	SCP Quadrat	FCT	Dissimilarity Indices	SCP Quadrat	FCT	Inferred FCT	Reasoning
CcHtKaXp Marri/ Hakea/ Kingia/ Xanthorrhoea Woodland	BD02	Good	6, 3a, 3b, 3c	0.6800	CARD13	3b	0.7011	BRICK7	3a	0.7143	BRICK6	3a	3a	Greatest similarity to FCT SCP 3a . Four quadrats (BRICK1, BRICK3, BRICK5 and BRICK6) of FCT SCP 3a are located less than 800 m from survey quadrat. No <i>Eucalyptus marginata</i> present (key species for FCT SCP 3b). Dominant species, <i>Kingia australis</i> and <i>Corymbia calophylla</i> more typical of FCT SCP 3a than FCT SCP 3c. Unlikely to be representative of FCT SCP 6 (weed dominated wetlands on heavy soils) due to the lack of <i>Corymbia calophylla</i> within that type.
	BD03	Good	6, 3a, 3b, 3c	0.6279	BRICK6	3a	0.6456	Punr02	3a	0.6552	SERP02	3b	3a	Greatest similarity to FCT SCP 3a . Four quadrats (BRICK1, BRICK3, BRICK5 and BRICK6) of FCT SCP 3a are located less than 600 m from survey quadrat. No <i>Eucalyptus marginata</i> present (key species for FCT SCP 3b). Dominant species, <i>Kingia australis</i> and <i>Corymbia calophylla</i> more typical of FCT SCP 3a than FCT SCP 3c. Unlikely to be representative of FCT SCP 6 (weed dominated wetlands on heavy soils) due to the lack of <i>Corymbia calophylla</i> within that type.
	BD09	Very Good	20b, 21a, 6	0.6421	CARD8	20b	0.6491	CARD13	3b	0.6699	SERP01	3b	3a	BD09 does not contain <i>Banksia</i> species typical of FCT SCP 20b or 21a. Similarly, FCT SCP 6, weed dominated wetlands on heavy soils, do not contain dominant species occurring within BD09. No <i>Eucalyptus marginata</i> present (key species for FCT SCP 3b). Despite the dendrogram and dissimilarity values showing closest affinity to FCT SCP 20b, the next smallest dissimilarity values align with FCT SCP 3b. Dominant species of BD09, <i>Hakea trifurcata</i> previously recorded within FCT SCP 3a but not FCT SCP 3b. Since the other CcHtKaXp quadrats have been clearly inferred to be representative of FCT SCP 3a , the vegetation supporting BD09 is considered likely to also.

Vegetation Unit	Quadrat	Vegetation Condition	SSI Dendrogram Result*	Dissimilarity Indices	SCP Quadrat	FCT	Dissimilarity Indices	SCP Quadrat	FCT	Dissimilarity Indices	SCP Quadrat	FCT	Inferred FCT	Reasoning
CcXp Marri / Xanthorrhoea Woodland	BD06	Good-Very Good	3c, 3a, 3b, 20b, 6	0.6812	Punr02	3a	0.6867	CARD 12	3b	0.7143	CARD11	6	3a	Greatest similarity to FCT SCP 3a . Two quadrats, BRICK1 (FCT SCP 3a) and BRICK2 (FCT SCP 20b) are located less than 1 km from the survey quadrat. No <i>Eucalyptus marginata</i> or <i>Banksia</i> spp. present (key species for FCT SCP 3b and FCT SCP 20b, respectively) recorded in BD06. Although the nearest neighbour in the dendrogram is FCT SCP 3c, there is also clustering with a larger number of FCT SCP 3a sites and lowest dissimilarity index is with a FCT SCP 3a site (Punr02). FVC SCP 3a has not been documented to occur on the location of BD06. The soil type of BD06 aligns with all other quadrats inferred to be FCT SCP 3a. <i>Kingia australis</i> was recorded in BD06 and has only been recorded in one FCT 3c quadrat. Unlikely to be representative of FCT SCP 6 (weed dominated wetlands on heavy soils) due to the lack of <i>Corymbia calophylla</i> within that type.
KaHtKr Kingia/ Hakea/ Kunzea Shrubland	BD04	Very Good	3a, 3b, 3c	0.6410	BRICK6	3a	0.6875	BRICK5	3a	0.6901	Punr02	3a	3a	Consistently greatest similarity to FCT SCP 3a . Four quadrats (BRICK1, BRICK3, BRICK5 and BRICK6) of FCT SCP 3a are located less than 600 m from survey quadrat. No <i>Eucalyptus marginata</i> or <i>Corymbia calophylla</i> present (key species for FCT SCP 3a, 3b and 3c). Dominant species, <i>Kingia australis</i> is more typical of FCT SCP 3a.

*listed in order of nearest neighbour

5.2.3 Threatened and Priority Ecological Communities

The desktop assessment identified the following eight TECs and/or PECs that are known to occur within or in close proximity to the survey area:

- FCT SCP 09 – *Dense shrublands* on Clay Flats, Swan Coastal Plain (Critically Endangered: EPBC Act, Vulnerable BC Act)
- Tuart Woodland – Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain
- Mound Springs SCP – Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) (Endangered: EPBC Act, Critically Endangered BC Act)
- FCT SCP 3a – *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (Endangered: EPBC Act, Critically Endangered BC Act)
- FCT SCP 3b – *Corymbia calophylla* – *Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (Vulnerable BC Act)
- FCT SCP 3c – *Corymbia calophylla* – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (Endangered: EPBC Act, Critically Endangered BC Act)
- FCT SCP 20b – *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain, (Endangered BC Act)
- *Banksia* dominated Woodlands of the Swan Coastal Plain IBRA Region (Endangered: EPBC Act, Priority 3 BC Act).

5.2.3.1 SCP 09 – *Dense shrublands on Clay Flats, Swan Coastal Plain*

DBCA Threatened and Priority Ecological Community database identified FCT SCP 09 (or a buffer of its occurrence) to occur within the survey area (**Figure 11**). Floristic analysis inferred that all survey quadrats showed little similarities to FCT SCP 09, with dissimilarities ranging between 0.8596 (BD04 and BRICK4) to 0.9077 (BD03 and BRICK4). Key species of FCT SCP 09 are not present within the survey quadrats, with dominant species *Corymbia calophylla*, *Kingia australis* and *Xanthorrhoea preissii* more typical of FCT SCP 3a, 3b and 3c. Therefore, none of the recorded vegetation units are considered to be representative of FCT SCP 09.

5.2.3.2 Tuart Woodlands – *Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain*

The desktop assessment indicates that the Commonwealth-listed (Critically Endangered) Tuart woodlands TEC, also listed as a Priority 3 PEC by DBCA has the potential to occur within the survey area; however, the closest recorded occurrence is approximately 15.5 km south-west of survey area. The key species defining this TEC, *Eucalyptus gomphocephala* was not recorded within the survey area; therefore, none of the defined vegetation units are considered representative of this TEC.

5.2.3.3 Mound Springs – *Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)*

The DBCA Threatened Ecological Community database search indicated that the Mound Springs TEC (or a buffer of its occurrence) occurs within the survey area boundary (**Figure 11**). A large proportion of the area mapped by the DBCA as the Mound Springs TEC has been largely cleared and predominantly consists of residential housing, Cardup Brook and a parkland supporting a waterbody. None of the defined vegetation units are considered to be representative of this TEC.

5.2.3.4 SCP 3a – *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils

This FCT occurs on heavy soils on the eastern side of the Swan Coastal Plain. DBCA spatial data identified that a FCT SCP 3a encompasses a large portion of the survey area (**Figure 11**). PATN analysis carried out as part of this assessment inferred that vegetation units CcXp, KaHtXp and CcHtKaXp showed greatest similarities to FCT SCP 3a. With similarities across these four survey quadrats ranging from 0.6279 (BD03 and BRICK6) to 0.7011 (BD02 and BRICK7). These four survey quadrats occur less than 1 km and on the same soil system from Gibson *et al.* (1994) quadrats for FCT SCP 3a.

Further assessment of species composition indicate absence of key species (*Eucalyptus marginata* and *Banksia attenuata*) of FCTs SCP 3b and 20b across all quadrats, while species, *Corymbia calophylla*, *Kingia australis* and *Xanthorrhoea preissii* are either dominant and/or present. As a result of species composition and appropriate soil types, vegetation units CcXp, KaHtKr and CcHtKaXp are considered to be representative of FCT SCP 3a.

5.2.3.5 SCP 3b – *Corymbia calophylla* – *Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain

This FCT occurs on sandy clay soils of the southern Swan Coastal Plain. DBCA spatial data identified that FCT SCP 3b encompasses a large proportion of the survey area (**Figure 11**). Floristic analysis inferred that all survey quadrats showed similarities to FCT SCP 3b. Dissimilarities ranged from 0.6491 (BD09 and CARD13) to 0.7215 (BD06 and CARD13). Assessment of species composition across the survey quadrats presents the absence of key FCT SCP 3b species, *Eucalyptus marginata*; however, presence of dominant species (*Corymbia calophylla*, *Kingia australis* and *Xanthorrhoea preissii*) are typical of FCT SCP 3a, 3b and 3c.

Many of the survey quadrats (BD02, BD03, BD04 and BD06) occur less than 1 km and on the same soil system (Forrestfield F5 Phase and Pinjarra P1e Phase) from Gibson *et al.* (1994) quadrats for FCT SCP 3a. However, BD09 occurs on the same soil system (Pinjarra B1 Phase) as Gibson *et al.* (1994) quadrat BRICK2 (FCT SCP 20b).

As a result of assessment of floristic analysis, species composition and appropriate soil types, it is considered that none of the defined vegetation units are representative of FCT SCP 3b.

5.2.3.6 SCP 3c – *Corymbia calophylla* – *Xanthorrhoea preissii* woodlands and shrublands

The desktop assessment identified that FCT SCP 3c encompasses the centre and northern portion of the survey area (**Figure 11**).

Assessment of species composition across the survey quadrats indicated the presence of a greater number of characteristic species typical of FCT SCP 3a; therefore, it is considered that none of the defined vegetation units are representative of FCT SCP 3c (**Table 15**). Dendrogram results from PATN analysis of data recorded from BD06 (CcXp) indicates affinity to FCT SCP 3c, however, based on soil type, species composition and the previous known occurrence of FCT SCP 3c, this quadrat was concluded to be representative of FCT SCP 3a, rather than 3c. The soil type is considered to be consistent with other quadrats and a relevé (BD02, BD03, BD09 and BD05r) recorded from within the survey area that have been inferred to be representative of FCT SCP 3a. In addition, two recorded species from BD06 (*Kingia australis* and *Lomandra hermaphrodita*) are more typical of FCT 3a than FCT 3c.

5.2.3.7 SCP 20b – *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain

DBCA data indicates that the *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain TEC (or a buffer of its occurrence) encompasses the centre portion of survey area (**Figure 11**). Floristic analysis indicates only survey quadrat, BD09 (vegetation type CcHtKaXp), shows similarities with FCT SCP 20b, with the CARD8 (0.6421) having the greatest similarity. Assessment of species composition presents the absence of key species of FCT SCP 20b, *Banksia attenuata* and *Eucalyptus marginata*; however, one indicator species, *Johnsonia pubescens* subsp. *cygnorum* was found less than 50 m from BD09. Species present within the quadrat consist of *Corymbia calophylla*, *Kingia australis* and *Xanthorrhoea preissii*, are considered typical of FCT SCP 3a

Gibson *et al.* (1994) quadrat BRICK2 (FCT SCP 20b) occurs on the same soil system (Pinjarra B1 Phase) as BD09, approximately 300 m east. Furthermore, CARD8 (FCT SCP 20b) which had the greatest similarity with BD09, has a species composition without any key *Banksia* species. Therefore, it can be concluded that vegetation unit CcHtKaXp is not representative of FCT SCP 20b.

5.2.3.8 *Banksia* Dominated Woodlands of the Swan Coastal Plain

DBCA TEC and PEC database results indicated that the Commonwealth-listed (Endangered) *Banksia* woodlands TEC, also listed as a Priority 3 PEC by DBCA, encompasses the centre portion of the survey area.

Floristic analysis of all quadrats inferred that quadrat BD09, within vegetation unit CcHtKaXp may be representative of FCT SCP 20b. However, due to a lack of characteristic *Banksia* species, it is concluded that the *Banksia* woodlands TEC is not represented in the survey area.

5.3 VEGETATION OF SIGNIFICANCE

5.3.1 Nationally Significant Vegetation

The National significance of the vegetation units was assessed based on presence of:

- populations of Threatened (EPBC listed) species
- TECs listed as nationally (EPBC) significant
- Ramsar Wetlands of International Importance (DAWE 2021c).

5.3.1.1 Threatened Flora

No EPBC-listed Threatened flora were recorded within the survey area and therefore, none of the recorded vegetation units are of National significance due to this factor.

5.3.1.2 Threatened Ecological Communities

Three of the defined vegetation units, CcKaHtXp, CcXp and KaHtKr, were considered to be representative of an EPBC-listed TEC (CT SCP 3a). Therefore, these vegetation units are considered to be of National Significant due to this factor.

5.3.1.3 Ramsar Wetlands

No Ramsar wetlands occur within the survey area and therefore, none of the recorded vegetation units are of National significance due to this factor.

5.3.2 State Significant Vegetation

The State significance of the vegetation units was assessed based on presence of:

- State-listed Threatened flora or TECs
- Land within (or areas recommended by DBCA for inclusion) the State-managed conservation estate.

5.3.2.1 Threatened Flora

No State-listed Threatened flora were recorded within the survey area and therefore, none of the recorded vegetation units are of State significance due to this factor.

5.3.2.2 TECs

Three of the defined vegetation units, CcXp, CcKaHtXp and KaHtKr, are considered to be representative of a State-listed TEC (FCT SCP 3a). Therefore, these vegetation units are considered to be of State significance due to this factor.

5.3.2.3 Conservation Estate

No DBCA Conservation Reserves or Estate occur within survey area. Therefore, none of the defined vegetation units are considered to be of State significance due to this factor.

5.3.3 Regionally Significant Vegetation

The regional significance of the vegetation units was assessed based on:

- the presence of populations of Priority flora or ecological communities
- the presence of ESAs or areas relevant to a conservation scheme
- the presence of conservation category wetlands
- the presence of high diversity of flora, fauna, communities, or community structure
- the presence of flora species exhibiting range extensions or undescribed species
- having a restricted regional distribution
- being represented by less than 30% of the pre-European extent.

5.3.3.1 Priority Flora

One Priority two taxa (*Johnsonia pubescens* subsp. *cygnorum*) was recorded within vegetation unit CcHtKaXp, and therefore, this vegetation unit is of regional significance due to this factor.

5.3.3.2 Priority Ecological Communities

None of the vegetation units are considered to be representative of any PEC and therefore, none of the recorded vegetation units are of regional significance due to this factor.

5.3.3.3 ESAs or Conservation Areas

Part of the survey area occurs within Bush Forever site 350, which is also, therefore, an ESA. Therefore, all remnant vegetation within the Bush Forever site and ESA, is considered to be of regional significance due to this factor.

5.3.3.4 Conservation Category Wetlands

Three conservation category wetlands occur within the survey area and therefore, remnant vegetation that intersects with the mapped wetland (from vegetation units Cc, CcHtKaXp, ErCc and KaHtKr) is considered to be of regional significance due to this factor.

5.3.3.5 High Diversity

More than half of the survey area (59.77%) has been cleared, therefore species richness across the remaining remnant vegetation, excluding planted areas (17.793 ha) (average 5.34 native species per hectare) is considered to be low, and the diversity of the vegetation is not considered to be high given the size of the survey area. The floral composition and vegetation structure of the vegetation units are considered typical of the vegetation of the Swan Coastal Plain. None of the recorded vegetation units are considered to exhibit complex or diverse structure and are therefore, are not considered to be of regional significance due to this factor.

5.3.3.6 Range Extending/Undescribed Flora

None of the recorded flora are occurring beyond their known range and none are undescribed flora, therefore, none of the recorded vegetation units are considered to be of regional significance due to this factor.

5.3.3.7 Restricted Regional Representation and Distribution

The most important aspect in the consideration of regional significance of vegetation is the representation of that vegetation in the region. Within each IBRA Region, some regionally defined vegetation associations (Shepherd *et al.* 2002) comprise a very small proportion of the vegetation associations within that region. Vegetation units are considered significant if they are poorly represented regionally. Vegetation associations are broadly defined based on soil types, rainfall and dominant canopy, and are likely to contain a mosaic variety of vegetation units. Due to these associations comprising of several differing vegetation units, each association is not considered to be restricted within the region as they may contain multiple vegetation units. The more broadly defined vegetation associations represented in the survey area (3 and 968) are not restricted in their representation or distribution, and therefore, none of the recorded vegetation units are considered to be of regional significance due to this factor.

5.3.3.8 Extent Remaining

The two vegetation associations (Beard 1990) represented within the survey area (3 and 968) fall below the unconstrained (30%) area threshold for retention, with vegetation association 3 (covering 2.75% of the survey area) also falling below the constrained (10%) area threshold in comparison to its pre-European extent for the Swan Coastal Plain.

The two vegetation complexes (Hedde *et al.* 1980) within the survey area (Guildford and Forrestfield complexes) fall below the unconstrained (30%) area threshold for retention, with the Guildford complex (occupying 71.04% of the survey area) also falling below the constrained (10%) area threshold in comparison to its pre-European extent for the Swan Coastal Plain.

Therefore, all remnant vegetation units occurring within the survey area are considered to be of regional significance due to this factor.

5.3.4 Locally Significant Vegetation

The local significance of the vegetation units was assessed based on:

- representing small, isolated communities
- their local extent (proportion) and distribution.

5.3.4.1 Small, Isolated Communities

One of the recorded vegetation units CoMvv (0.721 ha, 1.44%) occupies less than 2% of the survey area and is considered to be of local significance due to this factor.

5.3.4.2 Limited Extent and Distribution

Despite vegetation unit CoMvv being represented by a small extent within the survey area, the species *Casuarina obesa* and *Melaleuca viminea* subsp. *viminea* are common across the Swan Coastal Plain (WAH 1998-). The combination of flora taxa occurring within this vegetation unit is considered to be widespread across the Swan Coastal Plain and nearby regions. Based on literature, including the Gibson *et al.* (1994) distribution of sites and other anecdotal information, the recorded vegetation units are considered to be widely distributed and well-represented within the local area (Shire of Serpentine-Jarrahdale) and across the Swan Coastal Plain and surrounding regions. Therefore, none of the recorded vegetation units are considered to be of local significance due to this factor.

6 DISCUSSION

6.1 FLORA

The survey area occurs at the base of the Darling Scarp, on the eastern side of the Swan Coastal Plain where the level of historic clearing is very high, and the original populations of flora species have been greatly reduced in size and connectivity (Malcom Trudgen, pers. comm.). The survey area is a linear corridor, running parallel with the South Western Railway Corridor. This corridor, and particularly the areas surrounding it, have been subject to a high level of disturbance. The vegetation of the survey area has been retained as part of an infrastructure corridor, resulting in the survey area now providing an ecological linkage, with retained vegetation joining reserves in the south, to larger vegetation remnants in the east and west. Consequently, the survey area may have high conservation value for native flora, whether or not the individual taxa recorded in the survey area are of particular conservation significance (Malcolm Trudgen pers. comm.).

A total of 123 flora species, from 90 genera from 32 families were recorded during the field survey. The dominant families were found to be Fabaceae (18 taxa) and Proteaceae (12 taxa). The total is comprised of 95 (77.2%) native species and 28 (22.8%) introduced (weed) species, of which one is considered a DP and WoNS species, **Zantedeschia aethiopica*.

Due to the linear alignment of the survey area and a large proportion of the survey area being cleared, the species diversity within remnant vegetation in the survey area is considered low (5.34 species/ha). Due to the survey area's disturbed and partially cleared nature, a limited number of quadrats were sampled within 'Good' or better-quality vegetation and therefore, sampling adequacy was a minor limitation of the study.

The presence of invasive weeds within the survey area can be attributed to the close proximity to existing infrastructure such as roads, railways and cleared pasture. Introduced species can out-compete native species, particularly adjacent to these high traffic areas. Poorer vegetation condition and higher weed abundance occurs adjacent to road and rail infrastructure where the edge effects from these activities are more pronounced.

6.1.1 Significant Flora

No species listed as Threatened flora under the BC Act or under the EPBC Act were recorded. One Priority species, *Johnsonia pubescens* subsp. *cygnorum* (P2) listed by DBCA and considered likely to occur, was recorded within defined vegetation unit CcHtKaXp. A total of 16 individuals were recorded from two locations within the survey area. This species has not been previously recorded within the survey area, however, DBCA recorded this species within Cardup Nature Reserve, approximately 800 m west of the survey area.

Regarding the further three significant flora species considered likely to occur in the survey area (**Table 9**), the vegetation defined therein is considered to be suitable habitat. However, while suitable habitat for *Babingtonia urbana* (P3), *Schoenus pennisetis* (P3) and *Drosera occidentalis* (P3) is considered to be present, the 'Degraded' condition resulting from high disturbance and weed presence is considered likely to have restricted the species from colonising or persisting in the survey area. Targeted surveys within areas of suitable habitat was considered adequate to identify the potential presence of Threatened and Priority flora.

6.2 VEGETATION

Overall, only 9.25% of the vegetation within the survey area was recorded to be in 'Good' or better condition. The poorer quality of vegetation condition was expected due to the close proximity of the survey area to existing infrastructure and the largely cleared context in which it occurs. A large proportion of survey area has been subject to weed infestation, resulting in poorer quality vegetation.

6.2.1 Connectivity

While much of survey area is adjacent to cleared areas, the survey area acts as an ecological linkage between areas of native vegetation (**Section 3.9**). These linkages are important, as they connect continuous areas of native vegetation, and in effect, create a larger area of native vegetation when combined. The size of an area of native vegetation is directly related to the number of flora species that can survive there (Freudenberger *et al.* 1997), so these connections (by maintaining the larger size of the overall remnant) assist in maintaining flora species abundance and diversity in the survey area and the local region.

6.2.2 Floristic Community Types

The DBCA database search results suggested that TECs are likely to be present in the survey area. PATN analysis indicated that three of the vegetation units (CcXp, CcHtKaXp and KaHtXp) that were defined and mapped within the survey areas are representative of FCT SCP 3a (*Corymbia calophylla* – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain), which is listed as an Endangered TEC by the EBPC Act and Critically Endangered at a State level.

All other vegetation units in the survey area were defined from relevés and floristic analysis could not be performed due to their degraded nature.

Vegetation units CcXp (Marri/ Xanthorrhoea woodland), CcHtKaXp (Marri/ Hakea/ Kingia/ Xanthorrhoea woodland) and KaHtKr (Kingia/ Hakea/ Kunzea shrubland) showed the greatest affinity to FCT SCP 3a (**Table 15**). While part of CcHtKaXp (BD09) showed the some affinity with FCT SCP 20b, no key characteristic *Banksia* species were recorded, and therefore, the vegetation is not representative of FCTs SCP 20b or 21a. It was concluded that BD09 showed the greatest similarity to FCT SCP 3a due to the absence of *Eucalyptus marginata*, a characteristic species of FCTs CP 3b.

A representative image of the vegetation unit from within the survey area, where FCT SCP 3a is considered to be represented, is provided in **Plate 1**.



Plate 1 – FCT SCP 3a, *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain

6.2.3 Threatened and Priority Ecological Communities

Interrogation of the DBCA TEC and PEC database search indicates that eight TECs (or their buffer) (FCT SCP 09, Tuart Woodland, Mound Springs, FCT SCP 3a, FCT SCP 3b, FCT SCP 3c, FCT SCP 20b, and therefore, the Commonwealth listed Banksia woodlands TEC) have been previously reported to occur within the survey area.

FCT SCP 09 and its associated buffer encompasses the centre portion of the survey area, according to the DBCA database. The buffer extends beyond the bounds to the survey area encompassing large areas of residential housing to the east and the entirety of Brickwood Reserve to the west. However, none of the vegetation units defined within the survey area are considered to be representative of this TEC.

The Tuart Woodlands and Forests TEC was identified through the EPBC Protected Matters search, with the closest known occurrence 15.5 km south-west of the survey area. No *Eucalyptus gomphocephala*, the TEC's key defining species, were recorded during the survey, and therefore, it is concluded that this TEC does not occur within the survey area.

The Mound Springs TEC and its associated buffer encompasses a portion of the southern section of the survey area, according to the DBCA database. The buffer extends beyond the bounds of the survey area to the east, encompassing large areas residential housing, Cardup Brook and parkland supporting a waterbody. A mound spring is defined by a continuous discharge of water to support vegetation, of which, the aforementioned waterbody and its associated vegetation could be representative of the Mound Springs TEC. However, the hydrology within the survey area and its defined vegetation units are not considered to be representative of this TEC.

FCT SCP 3a and its associated buffer encompasses almost the entire survey area, excluding the northern portion of the survey area, as documented by the DBCA. The buffer extends beyond the bounds of the survey area encompassing large areas of residential housing to the east and the entirety of Brickwood Reserve to the west, supporting remnant vegetation that could be representative of FCT SCP 3a. Vegetation units CcXp, CcHtKaXp and KaHtKr within the survey area are considered representative of FCT SCP 3a (*Corymbia calophylla* – *Kingia australis* woodlands on heavy soils).

FCT SCP 3b was documented by DBCA to encompass the southern portion of the survey area. The buffer extends beyond the survey area encompassing residential housing to the east, part of Brickwood Reserve and cleared paddocks to the west and the Cardup Brook, cleared paddocks and the continued South Western Rail to the south. Remnant vegetation across these areas could be representative of FCT SCP 3b. None of the defined vegetation units within the survey area are considered to be representative of this TEC.

FCT SCP 3c and its associated buffer encompasses the northern portion of the survey area. The buffer extends beyond the survey area encompassing residential housing and degraded remnant vegetation areas to the east and part of Brickwood Reserve and residential/commercial infrastructure to the west. None of the defined vegetation units within the survey area are considered to be representative of this TEC.

FCT SCP 20b and its associated buffer occurs in the centre of the survey area, with the buffer extending east over residential housing and west over cleared paddocks and part of Brickwood Reserve. Whilst statistical analysis suggests that one quadrat (BD09) from vegetation unit CcHtKaXp shows the greatest affinity to FCT SCP 20b, characteristic species of FCT SCP 20b such as *Banksia attenuata* and *Xylomelum occidentale* were not recorded within the survey area. It is therefore concluded that none of the vegetation units defined within the survey area are representative of this TEC. Similarly, due to a lack of characteristic *Banksia* species across the survey area, the *Banksia* woodlands TEC is also not represented.

6.2.4 Summary of Vegetation Significance

The significance of the vegetation units of the survey area, along with the aspects determining their significance, is summarised in **Table 16**. The level of significance for each vegetation unit is broadly summarised in **Table 17**.

Table 16 – Summary of the Significance of the Recorded Vegetation Units in the Survey Area

Scale	Significance Aspect	Vegetation Units
National Significance	Populations of Threatened (EPBC listed) species	-
	Presence of EPBC listed TECs	CcHtKaXp, CcXp, KaHtKr
	Presence of Ramsar wetlands	-
State Significance	Presence of State-listed Threatened flora	-
	Presence of State-listed TECs	CcHtKaXp, CcXp, KaHtKr
	Land within the Conservation Estate	-
Regional Significance	Presence of Priority flora	CcHtKaXp
	Presence of PECs	-
	Presence of ESAs or areas relevant to a conservation scheme	Cc, CcHtKaXp, CcXp, CoMvv, ErCc, KaHtKr
	Presence of conservation category wetlands	Cc, CcHtKaXp, ErCc KaHtKr
	High diversity of flora, fauna, communities, or community structure	-
	Presence of flora species exhibiting a range extension	-
	Presence of undescribed flora	-
	Having a restricted regional representation and distribution	-
	Represented by less than 30% of the pre-European extent	Cc, CcHtKaXp, CcXp, CoMvv, ErCc, KaHtKr
Local Significance	Small, isolated communities	CoMvv
	Having a limited local extent	-
	Having a limited distribution	-

Table 17 – Summary of Level of Potential Significance of Vegetation Units in the Survey Area

Vegetation Unit	Vegetation Description	Area (ha)	% of Survey Area
Cc Marri W	Regional significance – within an ESA Regional significance – within a conservation category wetland Regional significance – represented by <30% of pre-European extent	2.69	5.34
CcHtKaXp Marri/ Hakea/ Kingia/ Xanthorrhoea Woodland	National significance – presence of EBPC listed TECs State significance – presence of State-listed TECs Regional significance – presence of Priority flora Regional significance – within an ESA Regional significance – within a conservation category wetland Regional significance – Represented by <30% of pre-European extent	7.41	14.75
CcXp Marri/ Xanthorrhoea Woodland	National significance – presence of EBPC listed TECs State significance – presence of State-listed TECs Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent	3.15	6.26
CoMvv <i>Casuarina</i> / <i>Melaleuca</i> Woodland	Regional significance – within an ESA Regional significance – Represented by <30% of pre-European extent Local significance – Small isolated communities	0.72	1.44
ErCc Eucalyptus/ Marri Woodland	Regional significance – within an ESA Regional significance – within a conservation category wetland Regional significance – Represented by <30% of pre-European extent	2.29	4.55
KaHtKr Kingia/ Hakea/ Kunzea Shrubland	National significance – presence of EBPC listed TECs State significance – Presence of State-listed TECs Regional significance – within an ESA Regional significance – within a conservation category wetland Regional significance – Represented by <30% of pre-European extent	1.17	2.32
TOTAL		17.43	34.66

7 CONCLUSIONS

The key findings and conclusions of the flora and vegetation assessment of the survey area are as follows:

- No Threatened flora species were recorded; however, one State-listed priority species, *Johnsonia pubescens* subsp. *cygnorum* (P2) was recorded within vegetation unit CcHtXpKa.
- The survey area has been subject to historic disturbances and more than half (59.77%) of the survey area has been cleared.
- One DP plants and WoNS, **Zantedeschia aethiopica*, listed under then BAM Act was recorded.
- Eight vegetation units (six of which are remnant vegetation, Cc, CcHtKaXp, CcXp, CoMvv, ErCc and KaHtKr) were described and mapped within the survey area, consisting of five woodlands, one shrublands and two altered (planted and rehab) units.
- In the broader region (within a 500 m buffer of the survey area), 12 broad vegetation units, five of which are also represented within the survey area (Cc, CcXp, ErCc, Planted and Rehab) were defined and mapped.
- Eight Commonwealth or State-listed TECs were identified through database searches as potentially occurring within the survey area.
- The Marri/Xanthorrhoea woodland (CcXp), the Marri/Hakea/Kingia/Xanthorrhoea woodlands (CcHtKaXp) and Kingia/Hakea/Kunzea shrubland vegetation units have been inferred to be representative of FCT SCP 3a, the *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils.
- None of the other vegetation units are considered to be representative of any Commonwealth-listed TECs or State-listed PECs.
- The condition of the vegetation in the survey area ranges from 'Completely Degraded' to 'Very Good', with only 9.25% observed to be in 'Good' or better condition.
- The desktop assessment determined that eight TECs or PECs do or could occur in the survey area, including five Commonwealth listed TECs, with the most likely of these considered to be Mound Springs TEC, FCTs SCP 9, 3a, 3b, 3c and 20b, and the Banksia woodlands TEC. The field survey and floristic analysis determined that of these, FCT SCP 3a is represented within vegetation units CcXp, CcXpKa and KaHtXp, comprising 11.73 ha (23.34%) of the survey area.

8 LIST OF PARTICIPANTS

The personnel who contributed to the project are summarised in **Table 18**.

Table 18 – Project Team

Name	Qualification	Years of Relevant Experience	Role
Kellie Bauer–Simpson Principal Ecologist	BSc. (Biological Science)	23	Project manager, field assessment, GIS mapping, technical and authorisation review
Lisa Chappell Senior Botanist/Environmental Scientist	BEnvSc. (Hons) (Environmental Science)	18	Data management, floristic analysis, GIS mapping, report preparation
Kristen Bleby Senior Ecologist	B.Sc. (Hons) Natural Resource Management PhD (Ecology)	10	Report technical review
Megan Gray Ecologist	BSc. (Environmental Biology)	3	Report preparation, data management, GIS mapping
Yasmin Skinner Graduate Ecologist	BSc. (Zoology and Conservation Biology)	1	Report preparation
Kelly Hopkinson Graduate Ecologist	BSc. (Biological Science and Conservation Biology)	1	Report preparation
Shibi Chandran Botanical Taxonomist	BSc. (Zoology) MSc. (Fisheries and Aquaculture)	11	Flora identifications
Kathya Tippur Botanist / Taxonomist	BSc. (Chemistry, Botany, Zoology) MSc. (Botany)	9	Flora identifications
Will Bauer–Simpson Technician/Advisor	Cert IV (Health and Safety)	10	Field assistance, field safety and logistics planning, GIS mapping, spatial analysis, spatial data management
Megan Meadowcroft Administration		5	Data entry, editorial support

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APPENDIX A - DBCA NATUREMAP SEARCH REPORT

Brickwood Reserve_Proposed Byford Depot

Created By Guest user on 06/09/2021

Current Names Only Yes

Core Datasets Only Yes

Method 'By Circle'

Centre 116° 00' 11" E, 32° 13' 50" S

Buffer 2km

Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	527	6980
Other specially protected fauna	1	1
Priority 2	1	2
Priority 3	3	11
Priority 4	2	22
Protected under international agreement	1	1
Rare or likely to become extinct	8	78
TOTAL	543	7095

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
Rare or likely to become extinct				
1.	1213 <i>Calectasia cyanea</i> (Blue Tinsel Lily)		T	
2.	24731 <i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)		T	
3.	24733 <i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)		T	
4.	24734 <i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
5.	24092 <i>Dasyurus geoffroyi</i> (Chuditch, Western Quoll)		T	
6.	24146 <i>Myrmecobius fasciatus</i> (Numbat, Walpurti)		T	
7.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
8.	28354 <i>Synaphea</i> sp. <i>Serpentine</i> (G.R. Brand 103)		T	
Protected under international agreement				
9.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
Other specially protected fauna				
10.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
Priority 2				
11.	19272 <i>Johnsonia pubescens</i> subsp. <i>cygnorum</i>		P2	
Priority 3				
12.	25242 <i>Acanthophis antarcticus</i> (Southern Death Adder)		P3	
13.	45402 <i>Babingtonia urbana</i> (Coastal Plain Babingtonia)		P3	
14.	1008 <i>Schoenus pennisetis</i>		P3	
Priority 4				
15.	3115 <i>Drosera occidentalis</i> (Western Sundew)		P4	
16.	48588 <i>Isodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
Non-conservation taxon				
17.	3307 <i>Acacia divergens</i>			
18.	3310 <i>Acacia drewiana</i>			
19.	3409 <i>Acacia lasiocarpa</i> (Panjang)			
20.	3502 <i>Acacia pulchella</i> (Prickly Moses)			
21.	15483 <i>Acacia pulchella</i> var. <i>pulchella</i>			
22.	15480 <i>Acacia pulchella</i> var. <i>reflexa</i>			
23.	3541 <i>Acacia sessilis</i>			
24.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
25.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
26.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
27.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
28.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
29.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
30.	1790 <i>Adenanthos meisneri</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
31.	23474	<i>Agrostocrinum hirsutum</i>			
32.	1261	<i>Agrostocrinum scabrum</i> (Blue Grass Lily)			
33.	184	<i>Aira caryophyllea</i> (Silvery Hairgrass)	Y		
34.	1732	<i>Allocasuarina humilis</i> (Dwarf Sheoak)			
35.	197	<i>Amphipogon debilis</i>			
36.	198	<i>Amphipogon laguroides</i>			
37.	199	<i>Amphipogon strictus</i> (Greybeard Grass)			
38.	200	<i>Amphipogon turbinatus</i>			
39.	2380	<i>Amyema miquelii</i> (Stalked Mistletoe)			
40.		<i>Aname mainae</i>			
41.		<i>Aname tepperi</i>			
42.	24316	<i>Anas superciliosa</i> (Pacific Black Duck)			
43.	6300	<i>Andersonia aristata</i> (Rice Flower)			
44.	6314	<i>Andersonia lehmanniana</i>			
45.	1411	<i>Anigozanthos manglesii</i> (Mangles Kangaroo Paw, Kurulbrang)			
46.	11261	<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>			
47.	1416	<i>Anigozanthos viridis</i> (Green Kangaroo Paw, Kurulbardang)			
48.	24088	<i>Antechinus flavipes</i> subsp. <i>leucogaster</i> (Yellow-footed Antechinus, Mardo)			
49.	24561	<i>Anthochaera carunculata</i> (Red Wattlebird)			
50.	24562	<i>Anthochaera lunulata</i> (Western Little Wattlebird)			
51.	3686	<i>Aotus cordifolia</i>			
52.	3692	<i>Aotus procumbens</i>			
53.	1117	<i>Aphelia cyperoides</i>			
54.	24991	<i>Aprasia repens</i> (Sand-plain Worm-lizard)			
55.	24285	<i>Aquila audax</i> (Wedge-tailed Eagle)			
56.	1264	<i>Arnocrinum preissii</i>			
57.	25566	<i>Artamus cinereus</i> (Black-faced Woodswallow)			
58.	24353	<i>Artamus cyanopterus</i> (Dusky Woodswallow)			
59.		<i>Asadipus kunderang</i>			
60.	6334	<i>Astroloma pallidum</i> (Kick Bush)			
61.	17233	<i>Austrostipa campylachne</i>			
62.	17237	<i>Austrostipa elegantissima</i>			
63.	233	<i>Avena barbata</i> (Bearded Oat)	Y		
64.	36441	<i>Babingtonia camphorosmae</i> (Camphor Myrtle)			
65.	1800	<i>Banksia attenuata</i> (Slender Banksia, Piara)			
66.	32580	<i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var. <i>dallanneyi</i>			
67.	1834	<i>Banksia menziesii</i> (Firewood Banksia)			
68.		<i>Barnardius zonarius</i>			
69.	739	<i>Baumea acuta</i> (Pale Twig-rush)			
70.	740	<i>Baumea arthropphylla</i>			
71.	743	<i>Baumea juncea</i> (Bare Twigrush)			
72.	5387	<i>Beaufortia macrostemon</i> (Darling Range Beaufortia)			
73.	48868	<i>Bellardia viscosa</i>	Y		
74.	25788	<i>Billardiera fraseri</i> (Elegant Pronaya)			
75.	4420	<i>Boronia fastigiata</i> (Bushy Boronia)			
76.	4429	<i>Boronia molloyae</i> (Tall Boronia)			
77.	1272	<i>Borya scirpoidea</i>			
78.	3710	<i>Bossiaea eriocarpa</i> (Common Brown Pea)			
79.	3714	<i>Bossiaea ornata</i> (Broad Leaved Brown Pea)			
80.	8661	<i>Brachypodium distachyon</i> (False Brome)	Y		
81.	244	<i>Briza maxima</i> (Blowfly Grass)	Y		
82.	245	<i>Briza minor</i> (Shivery Grass)	Y		
83.	249	<i>Bromus diandrus</i> (Great Brome)	Y		
84.	12770	<i>Burchardia congesta</i>			
85.	1385	<i>Burchardia multiflora</i> (Dwarf Burchardia)			
86.	25714	<i>Cacatua pastinator</i> (Western Long-billed Corella)			
87.	25716	<i>Cacatua sanguinea</i> (Little Corella)			
88.	25598	<i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
89.	42307	<i>Cacomantis pallidus</i> (Pallid Cuckoo)			
90.	1276	<i>Caesia micrantha</i> (Pale Grass Lily)			
91.	1277	<i>Caesia occidentalis</i>			
92.	1592	<i>Caladenia flava</i> (Cowslip Orchid)			
93.	15379	<i>Caladenia serotina</i>			
94.	1214	<i>Calectasia grandiflora</i> (Blue Tinsel Lily)			
95.	19309	<i>Calectasia narragara</i>			
96.	36600	<i>Callitris pyramidalis</i> (Swamp Cypress)			
97.	35816	<i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>			
98.	25717	<i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
99.	5441	<i>Calytrix aurea</i>			
100.	5458	<i>Calytrix flavescens</i> (Summer Starflower)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
101.	5460	<i>Calytrix fraseri</i> (Pink Summer Calytrix)			
102.	2952	<i>Cassytha glabella</i> (Tangled Dodder Laurel)			
103.	2956	<i>Cassytha pomiformis</i> (Dodder Laurel)			
104.	2957	<i>Cassytha racemosa</i> (Dodder Laurel)			
105.	6539	<i>Centaureum erythraea</i> (Common Centaury)	Y		
106.	1121	<i>Centrolepis aristata</i> (Pointed Centrolepis)			
107.	1125	<i>Centrolepis drummondiana</i>			
108.	2889	<i>Cerastium glomeratum</i> (Mouse Ear Chickweed)	Y		
109.		<i>Cercophonius sulcatus</i>			
110.		<i>Cethegus fugax</i>			
111.	1280	<i>Chamaescilla corymbosa</i> (Blue Squill)			
112.	11299	<i>Chamaescilla corymbosa</i> var. <i>corymbosa</i>			
113.	31	<i>Cheilanthes austrotenuifolia</i>			
114.	24321	<i>Chenonetia jubata</i> (Australian Wood Duck, Wood Duck)			
115.	17706	<i>Chordifex sinuosus</i>			
116.	763	<i>Chorizandra enodis</i> (Black Bristlerush)			
117.	8971	<i>Chorizema cordatum</i>			
118.	3753	<i>Chorizema dicksonii</i> (Yellow-eyed Flame Pea)			
119.	11900	<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Y		
120.	25675	<i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
121.	24613	<i>Colluricincla harmonica</i> subsp. <i>rufiventris</i> (Grey Shrike-thrush)			
122.	24399	<i>Columba livia</i> (Domestic Pigeon)	Y		
123.	4550	<i>Comesperma calymega</i> (Blue-spike Milkwort)			
124.	4551	<i>Comesperma ciliatum</i>			
125.	4564	<i>Comesperma virgatum</i> (Milkwort)			
126.	1882	<i>Conospermum stoechadis</i> (Common Smokebush)			
127.	15611	<i>Conospermum stoechadis</i> subsp. <i>stoechadis</i> (Common Smokebush)			
128.	6348	<i>Conostephium pendulum</i> (Pearl Flower)			
129.	1418	<i>Conostylis aculeata</i> (Prickly Conostylis)			
130.	12109	<i>Conostylis aculeata</i> subsp. <i>preissii</i>			
131.	1436	<i>Conostylis juncea</i>			
132.	1454	<i>Conostylis setigera</i> (Bristly Cottonhead)			
133.	11597	<i>Conostylis setigera</i> subsp. <i>setigera</i>			
134.	1455	<i>Conostylis setosa</i> (White Cottonhead)			
135.	25568	<i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
136.	24362	<i>Coracina novaehollandiae</i> subsp. <i>novaehollandiae</i> (Black-faced Cuckoo-shrike)			
137.		<i>Cormocephalus aurantiipes</i>			
138.		<i>Cormocephalus hartmeyerii</i>			
139.		<i>Cortinarius australiensis</i>			
140.	25592	<i>Corvus coronoides</i> (Australian Raven)			
141.	24419	<i>Corvus splendens</i> (House Crow)			
142.	17104	<i>Corymbia calophylla</i> (Marri)			
143.	25595	<i>Cracticus tibicen</i> (Australian Magpie)			
144.	25596	<i>Cracticus torquatus</i> (Grey Butcherbird)			
145.	29054	<i>Crepis foetida</i> subsp. <i>foetida</i> (Stinking Hawksbeard)	Y		
146.	25398	<i>Crinia georgiana</i> (Quacking Frog)			
147.	25400	<i>Crinia insignifera</i> (Squelching Froglet)			
148.	25047	<i>Ctenotus impar</i>			
149.	25049	<i>Ctenotus labillardieri</i>			
150.	768	<i>Cyathochaeta avenacea</i>			
151.	815	<i>Cyperus tenellus</i> (Tiny Flatsedge)	Y		
152.	30901	<i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
153.	7420	<i>Dampiera alata</i> (Winged-stem Dampiera)			
154.	7454	<i>Dampiera linearis</i> (Common Dampiera)			
155.	7462	<i>Dampiera pedunculata</i>			
156.	25673	<i>Daphoenositta chrysoptera</i> (Varied Sittella)			
157.	5508	<i>Darwinia citriodora</i> (Lemon-scented Darwinia)			
158.	5531	<i>Darwinia thymoides</i>			
159.	18193	<i>Darwinia thymoides</i> subsp. <i>thymoides</i>			
160.	1218	<i>Dasypogon bromeliifolius</i> (Pineapple Bush)			
161.	6218	<i>Daucus glochidiatus</i> (Australian Carrot)			
162.	3805	<i>Daviesia decurrens</i> (Prickly Bitter-pea)			
163.	19747	<i>Daviesia decurrens</i> subsp. <i>decurrens</i>			
164.	3815	<i>Daviesia horrida</i> (Prickly Bitter-pea)			
165.	16585	<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>			
166.	3832	<i>Daviesia physodes</i>			
167.	3835	<i>Daviesia preissii</i>			
168.	17691	<i>Desmocladius fasciculatus</i>			
169.	25607	<i>Dicaeum hirundinaceum</i> (Mistletoebird)			
170.	306	<i>Dichelachne crinita</i> (Longhair Plumegrass)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
171.	1287 <i>Dichopogon capillipes</i>			
172.	1509 <i>Dioscorea hastifolia</i> (Warrine, Waram)			
173.	24939 <i>Diplodactylus polyophthalmus</i>			
174.	11049 <i>Diuris corymbosa</i>			
175.	3095 <i>Drosera erythrorhiza</i> (Red Ink Sundew)			
176.	3097 <i>Drosera gigantea</i> (Giant Sundew)			
177.	3098 <i>Drosera glanduligera</i> (Pimpernel Sundew)			
178.	3106 <i>Drosera macrantha</i> (Bridal Rainbow)			
179.	3109 <i>Drosera menziesii</i> (Pink Rainbow)			
180.	3118 <i>Drosera pallida</i> (Pale Rainbow)			
181.	8911 <i>Drosera rosulata</i>			
182.	3131 <i>Drosera stolonifera</i> (Leafy Sundew)			
183.	3133 <i>Drosera subhirtella</i> (Sunny Rainbow)			
184.	<i>Egretta novaehollandiae</i>			
185.	349 <i>Ehrharta longiflora</i> (Annual Veldt Grass)	Y		
186.	47937 <i>Elseyornis melanops</i> (Black-fronted Dotterel)			
187.	<i>Eolophus roseicapillus</i>			
188.	24567 <i>Epthianura albifrons</i> (White-fronted Chat)			
189.	376 <i>Eragrostis curvula</i> (African Lovegrass)	Y		
190.	379 <i>Eragrostis elongata</i> (Clustered Lovegrass)			
191.	13950 <i>Eremaea asterocarpa</i> subsp. <i>asterocarpa</i>			
192.	1646 <i>Eriochilus dilatatus</i> (White Bunny Orchid)			
193.	5688 <i>Eucalyptus laeliae</i> (Darling Range Ghost Gum)			
194.	5690 <i>Eucalyptus lane-poolei</i> (Salmon White Gum)			
195.	5708 <i>Eucalyptus marginata</i> (Jarrah, Djara)			
196.	5739 <i>Eucalyptus patens</i> (Swan River Blackbutt, Dwuda)			
197.	5797 <i>Eucalyptus wandoo</i> (Wandoo, Wondu)			
198.	<i>Eucyrtops lator</i>			
199.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
200.	25623 <i>Falco longipennis</i> (Australian Hobby)			
201.	27748 <i>Flavoparmelia rutidota</i>			
202.	18392 <i>Freesia alba</i> x <i>leichtlinii</i>	Y		
203.	900 <i>Gahnia aristata</i>			
204.	7321 <i>Galium divaricatum</i>	Y		
205.	20473 <i>Gastrolobium ebracteolatum</i>			
206.	3924 <i>Gastrolobium spinosum</i> (Prickly Poison)			
207.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
208.	3945 <i>Gompholobium aristatum</i>			
209.	3950 <i>Gompholobium knightianum</i>			
210.	3951 <i>Gompholobium marginatum</i>			
211.	3954 <i>Gompholobium polymorphum</i>			
212.	3955 <i>Gompholobium preissii</i>			
213.	3957 <i>Gompholobium tomentosum</i> (Hairy Yellow Pea)			
214.	16746 <i>Gonocarpus benthamii</i> subsp. <i>benthamii</i>			
215.	6149 <i>Gonocarpus cordiger</i>			
216.	6160 <i>Gonocarpus paniculatus</i>			
217.	7538 <i>Goodenia pulchella</i>			
218.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
219.	1964 <i>Grevillea bipinnatifida</i> (Fuchsia Grevillea)			
220.	19628 <i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>			
221.	2066 <i>Grevillea pilulifera</i> (Woolly-flowered Grevillea)			
222.	1465 <i>Haemodorum discolor</i>			
223.	1468 <i>Haemodorum laxum</i>			
224.	1472 <i>Haemodorum simplex</i>			
225.	1475 <i>Haemodorum spicatum</i> (Mardja)			
226.	438 <i>Hainardia cylindrica</i> (Common Barbgrass)	Y		
227.	2137 <i>Hakea ceratophylla</i> (Horned Leaf Hakea)			
228.	2166 <i>Hakea incrassata</i> (Marble Hakea)			
229.	2175 <i>Hakea lissocarpha</i> (Honey Bush)			
230.	2197 <i>Hakea prostrata</i> (Harsh Hakea)			
231.	2203 <i>Hakea ruscifolia</i> (Candle Hakea)			
232.	2206 <i>Hakea stenocarpa</i> (Narrow-fruited Hakea)			
233.	2212 <i>Hakea sulcata</i> (Furrowed Hakea)			
234.	2214 <i>Hakea trifurcata</i> (Two-leaf Hakea)			
235.	2215 <i>Hakea undulata</i> (Wavy-leaved Hakea)			
236.	2216 <i>Hakea varia</i> (Variable-leaved Hakea)			
237.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
238.	25412 <i>Heleioporus psammophilus</i> (Sand Frog)			
239.	6856 <i>Hemigenia incana</i> (Silky Hemigenia)			
240.	5108 <i>Hibbertia acerosa</i> (Needle Leaved Guinea Flower)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
241.	5114	<i>Hibbertia commutata</i>			
242.	20051	<i>Hibbertia diamesogenos</i>			
243.	5134	<i>Hibbertia huegelii</i>			
244.	5135	<i>Hibbertia hypericoides</i> (Yellow Buttercups)			
245.	11481	<i>Hibbertia spicata</i> subsp. <i>spicata</i>			
246.	5176	<i>Hibbertia vaginata</i>			
247.	47965	<i>Hieraaetus morphnoides</i> (Little Eagle)			
248.	24491	<i>Hirundo neoxena</i> (Welcome Swallow)			
249.	6222	<i>Homalosciadium homalocarpum</i>			
250.	3964	<i>Hovea chorizemifolia</i> (Holly-leaved Hovea)			
251.	3968	<i>Hovea trisperma</i> (Common Hovea)			
252.	12741	<i>Hyalosperma cotula</i>			
253.	5221	<i>Hybanthus floribundus</i>			
254.	6223	<i>Hydrocotyle alata</i>			
255.	6226	<i>Hydrocotyle callicarpa</i> (Small Pennywort)			
256.	6229	<i>Hydrocotyle diantha</i>			
257.	6236	<i>Hydrocotyle pilifera</i>			
258.	5817	<i>Hypocalymma angustifolium</i> (White Myrtle, Kudjid)			
259.	5825	<i>Hypocalymma robustum</i> (Swan River Myrtle)			
260.	8086	<i>Hypochaeris glabra</i> (Smooth Catsear)	Y		
261.	9352	<i>Hypochaeris radicata</i> (Flat Weed, Cats-ear)	Y		
262.	1070	<i>Hypolaena exsulca</i>			
263.	917	<i>Isolepis marginata</i> (Coarse Club-rush)			
264.		<i>Isopeda leishmanni</i>			
265.	2221	<i>Isopogon asper</i>			
266.	7396	<i>Isotoma hypocrateriformis</i> (Woodbridge Poison)			
267.	3992	<i>Isotropis cuneifolia</i> (Granny Bonnets)			
268.	4029	<i>Jacksonia sternbergiana</i> (Stinkwood, Kapur)			
269.	1178	<i>Juncus bufonius</i> (Toad Rush)	Y		
270.	1184	<i>Juncus holoschoenus</i> (Jointleaf Rush)			
271.	1186	<i>Juncus microcephalus</i>	Y		
272.	1195	<i>Juncus subsecundus</i> (Finger Rush)			
273.	4037	<i>Kennedia coccinea</i> (Coral Vine)			
274.	1221	<i>Kingia australis</i> (Kingia, Pulonok)			
275.	5835	<i>Kunzea micrantha</i>			
276.	17461	<i>Kunzea micrantha</i> subsp. <i>micrantha</i>			
277.	5841	<i>Kunzea recurva</i>			
278.	3669	<i>Labichea punctata</i> (Lance-leaved Cassia)			
279.	18585	<i>Lagenophora huegelii</i>			
280.	14083	<i>Lambertia multiflora</i> var. <i>darlingensis</i>			
281.	5033	<i>Lasiopetalum floribundum</i> (Free Flowering Lasiopetalum)			
282.	11464	<i>Laxmannia sessiliflora</i> subsp. <i>australis</i>			
283.	7568	<i>Lechenaultia biloba</i> (Blue Leschenaultia)			
284.	7572	<i>Lechenaultia expansa</i>			
285.	7574	<i>Lechenaultia floribunda</i> (Free-flowering Leschenaultia)			
286.	1075	<i>Lepidobolus preissianus</i>			
287.	925	<i>Lepidosperma angustatum</i>			
288.	930	<i>Lepidosperma costale</i>			
289.	936	<i>Lepidosperma leptostachyum</i>			
290.	937	<i>Lepidosperma longitudinale</i> (Pithy Sword-sedge)			
291.	940	<i>Lepidosperma pubisquamum</i>			
292.	944	<i>Lepidosperma scabrum</i>			
293.	29150	<i>Lepidosperma</i> sp. Margaret River (B.J. Lepschi 1841)			
294.	948	<i>Lepidosperma tetraquetrum</i>			
295.	1653	<i>Leporella fimbriata</i> (Hare Orchid)			
296.	1078	<i>Leptocarpus coangustatus</i>			
297.	46375	<i>Leptocarpus decipiens</i>			
298.	1088	<i>Lepyrodia macra</i> (Large Scale Rush)			
299.	25133	<i>Lerista elegans</i>			
300.	6367	<i>Leucopogon capitellatus</i>			
301.	6439	<i>Leucopogon pulchellus</i> (Beard-heath)			
302.	7676	<i>Levenhookia pusilla</i> (Midget Stylewort)			
303.	7677	<i>Levenhookia stipitata</i> (Common Stylewort)			
304.	25005	<i>Lialis burtonis</i>			
305.	25661	<i>Lichmera indistincta</i> (Brown Honeyeater)			
306.	4363	<i>Linum trigynum</i> (French Flax)	Y		
307.	7407	<i>Lobelia rhytidisperma</i> (Wrinkled-seeded Lobelia)			
308.	7408	<i>Lobelia tenuior</i> (Slender Lobelia)			
309.	476	<i>Lolium perenne</i> (Perennial Ryegrass)	Y		
310.	1222	<i>Lomandra brittanii</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
311.	1228 <i>Lomandra hermaphrodita</i>			
312.	1229 <i>Lomandra integra</i>			
313.	1232 <i>Lomandra micrantha</i> (Small-flower Mat-rush)			
314.	1234 <i>Lomandra nigricans</i>			
315.	1236 <i>Lomandra odora</i> (Tiered Matrush)			
316.	1239 <i>Lomandra preissii</i>			
317.	1240 <i>Lomandra purpurea</i> (Purple Mat Rush)			
318.	<i>Lophoclinium isura</i>			
319.	4059 <i>Lotus angustissimus</i> (Narrowleaf Trefoil)	Y		
320.	1092 <i>Loxocarya cinerea</i>			
321.	1097 <i>Lyginia barbata</i>			
322.	18049 <i>Lyginia imberbis</i>			
323.	36375 <i>Lysimachia arvensis</i> (Pimpernel)	Y		
324.	6456 <i>Lysinema ciliatum</i> (Curry Flower)			
325.	85 <i>Macrozamia riedlei</i> (<i>Zamia</i> , <i>Djiridji</i>)			
326.	25650 <i>Malurus elegans</i> (Red-winged Fairy-wren)			
327.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
328.	17637 <i>Marianthus candidus</i> (White Marianthus)			
329.	5958 <i>Melaleuca radula</i> (Graceful Honey-myrtle)			
330.	5987 <i>Melaleuca viminea</i> (Mohan)			
331.	13280 <i>Melaleuca viminea</i> subsp. <i>viminea</i>			
332.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
333.	955 <i>Mesomelaena pseudostygia</i>			
334.	956 <i>Mesomelaena stygia</i>			
335.	957 <i>Mesomelaena tetragona</i> (Semaphore Sedge)			
336.	485 <i>Microlaena stipoides</i> (Weeping Grass)			
337.	1658 <i>Microtis atrata</i> (Swamp Mignonette Orchid)			
338.	14344 <i>Millotia tenuifolia</i> var. <i>tenuifolia</i> (Soft Millotia)			
339.	4090 <i>Mirbelia dilatata</i> (Holly-leaved Mirbelia)			
340.	4662 <i>Monotaxis grandiflora</i> (Diamond of the Desert)			
341.	25192 <i>Morethia obscura</i>			
342.	24223 <i>Mus musculus</i> (House Mouse)	Y		
343.	25610 <i>Myiagra inquieta</i> (Restless Flycatcher)			
344.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
345.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
346.	<i>Nephila edulis</i>			
347.	492 <i>Neurachne alopecuroides</i> (Foxtail Mulga Grass)			
348.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
349.	2401 <i>Nuytsia floribunda</i> (Christmas Tree, Mudja)			
350.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
351.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
352.	8143 <i>Olearia paucidentata</i> (Autumn Scrub Daisy)			
353.	7346 <i>Opercularia echinocephala</i> (Bristly Headed Stink Weed)			
354.	4355 <i>Oxalis perennans</i>			
355.	4356 <i>Oxalis pes-caprae</i> (Sour-sob)	Y		
356.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
357.	<i>Paralampona marangaroo</i>			
358.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
359.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
360.	1546 <i>Patersonia juncea</i> (Rush Leaved Patersonia)			
361.	1550 <i>Patersonia occidentalis</i> (Purple Flag, Koma)			
362.	1551 <i>Patersonia pygmaea</i> (Pygmy Patersonia)			
363.	<i>Pediana occidentalis</i>			
364.	4346 <i>Pelargonium littorale</i>			
365.	24648 <i>Pelecanus conspicillatus</i> (Australian Pelican)			
366.	6245 <i>Pentapeltis peltigera</i>			
367.	6006 <i>Pericalymma ellipticum</i> (Swamp Teatree)			
368.	16478 <i>Pericalymma ellipticum</i> var. <i>floridum</i>			
369.	15501 <i>Pericalymma spongiocaulum</i>			
370.	2273 <i>Persoonia saccata</i> (Snotty-gobble)			
371.	27947 <i>Pertusaria gibberosa</i>			
372.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
373.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
374.	48066 <i>Petroica boodang</i> (Scarlet Robin)			
375.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
376.	20391 <i>Petrophile juncifolia</i>			
377.	2299 <i>Petrophile linearis</i> (Pixie Mops)			
378.	2308 <i>Petrophile seminuda</i>			
379.	2312 <i>Petrophile striata</i>			
380.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
381.	25587 <i>Phaps elegans</i> (Brush Bronzewing)			
382.	18529 <i>Philotheca spicata</i> (Pepper and Salt)			
383.	1173 <i>Philydrella pygmaea</i> (Butterfly Flowers)			
384.	1479 <i>Phlebocarya filifolia</i>			
385.	554 <i>Phleum pratense</i> (Timothy)	Y		
386.	48071 <i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
387.	24596 <i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
388.	4675 <i>Phyllanthus calycinus</i> (False Boronia)			
389.	4141 <i>Phyllota gracilis</i>			
390.	<i>Phytophthora cinnamomi</i>			
391.	11402 <i>Pimelea imbricata</i> var. <i>piliger</i>			
392.	5266 <i>Pimelea suaveolens</i> (Scented Banjine)			
393.	5269 <i>Pimelea sylvestris</i>			
394.	25720 <i>Platycercus icterotis</i> (Western Rosella)			
395.	24750 <i>Platycercus zonarius</i> subsp. <i>semitorquatus</i> (Twenty-eight Parrot)			
396.	8175 <i>Podolepis gracilis</i> (Slender Podolepis)			
397.	2419 <i>Polygonum aviculare</i> (Wireweed)	Y		
398.	583 <i>Polypogon tenellus</i>			
399.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
400.	4691 <i>Poranthera microphylla</i> (Small Poranthera)			
401.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
402.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
403.	1669 <i>Prasophyllum cyphochilum</i> (Pouched Leek Orchid)			
404.	1670 <i>Prasophyllum drummondii</i> (Swamp Leek Orchid)			
405.	25259 <i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
406.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
407.	13255 <i>Pterochaeta paniculata</i>			
408.	1693 <i>Pterostylis recurva</i> (Jug Orchid)			
409.	2742 <i>Ptilotus manglesii</i> (Pom Poms, Mulamula)			
410.	<i>Purpurecephalus spurius</i>			
411.	8195 <i>Quinetia urvillei</i>			
412.	28224 <i>Ramalina inflata</i> subsp. <i>australis</i>			
413.	<i>Ramaria lorithamnus</i>			
414.	2938 <i>Ranunculus trilobus</i> (Buttercup)	Y		
415.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
416.	<i>Raveniella cirrata</i>			
417.	<i>Raveniella peckorum</i>			
418.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
419.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
420.	24454 <i>Rhipidura leucophrys</i> subsp. <i>leucophrys</i> (Willie Wagtail)			
421.	1556 <i>Romulea rosea</i> (Guildford Grass)	Y		
422.	40425 <i>Rytidosperma caespitosum</i>			
423.	7613 <i>Scaevola glandulifera</i> (Viscid Hand-flower)			
424.	13182 <i>Scaevola repens</i> var. <i>repens</i>			
425.	17055 <i>Schinus molle</i>	Y		
426.	6263 <i>Schoenolaena juncea</i>			
427.	975 <i>Schoenus bifidus</i>			
428.	978 <i>Schoenus brevisetis</i>			
429.	979 <i>Schoenus caespititius</i>			
430.	1002 <i>Schoenus nanus</i> (Tiny Bog Rush)			
431.	1006 <i>Schoenus odontocarpus</i>			
432.	1016 <i>Schoenus subbarbatus</i> (Bearded Bog-rush)			
433.	1017 <i>Schoenus subbulbosus</i>			
434.	1019 <i>Schoenus subflavus</i> (Yellow Bog-rush)			
435.	1026 <i>Schoenus unispiculatus</i>			
436.	6033 <i>Scholtzia involucrata</i> (Spiked Scholtzia)			
437.	<i>Scolopendra laeta</i>			
438.	20663 <i>Senecio multicaulis</i> subsp. <i>multicaulis</i>			
439.	8217 <i>Senecio quadridentatus</i>			
440.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
441.	8225 <i>Siloxerus humifusus</i> (Procumbent Siloxerus)			
442.	30948 <i>Smicromis brevirostris</i> (Weebill)			
443.	8230 <i>Sonchus asper</i> (Rough Sowthistle)	Y		
444.	8231 <i>Sonchus oleraceus</i> (Common Sowthistle)	Y		
445.	1312 <i>Sowerbaea laxiflora</i> (Purple Tassels)			
446.	1558 <i>Sparaxis bulbifera</i>	Y		
447.	4207 <i>Sphaerolobium medium</i>			
448.	4716 <i>Stachystemon vermicularis</i>			
449.	4733 <i>Stackhousia monogyna</i>			
450.	2316 <i>Stirlingia latifolia</i> (Blueboy)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
451.	25589	<i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
452.	25590	<i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
453.	7684	<i>Stylidium amoenum</i> (Lovely Triggerplant)			
454.	30278	<i>Stylidium androsaceum</i>			
455.	7693	<i>Stylidium brunonianum</i> (Pink Fountain Triggerplant)			
456.	7694	<i>Stylidium bulbiferum</i> (Circus Triggerplant)			
457.	7696	<i>Stylidium calcaratum</i> (Book Triggerplant)			
458.	7702	<i>Stylidium ciliatum</i> (Golden Triggerplant)			
459.	7713	<i>Stylidium dichotomum</i> (Pins-and-needles)			
460.	7719	<i>Stylidium ecome</i> (Foot Triggerplant)			
461.	7736	<i>Stylidium hispidum</i> (White Butterfly Triggerplant)			
462.	25829	<i>Stylidium neurophyllum</i> (Coastal Plain Triggerplant)			
463.	7773	<i>Stylidium petiolare</i> (Horn Triggerplant)			
464.	7774	<i>Stylidium piliferum</i> (Common Butterfly Triggerplant)			
465.	7782	<i>Stylidium pulchellum</i> (Thumbelina Triggerplant)			
466.	33106	<i>Stylidium recurvum</i>			
467.	45594	<i>Stylidium tenue</i> subsp. <i>majusculum</i> (Showy Fountain Triggerplant)			
468.	7806	<i>Stylidium utricularioides</i> (Pink Fan Triggerplant)			
469.		<i>Supunna funerea</i>			
470.	2321	<i>Synaphea acutiloba</i> (Granite Synaphea)			
471.	2323	<i>Synaphea gracillima</i>			
472.	2324	<i>Synaphea petiolaris</i> (Synaphea)			
473.	16864	<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>			
474.	29186	<i>Synaphea</i> sp. <i>Udumung</i> (A.S. George 17058)			
475.		<i>Synothele durokoppin</i>			
476.	32439	<i>Syntrichia papillosa</i>			
477.	24331	<i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
478.		<i>Tasmanicosa leuckartii</i>			
479.	20135	<i>Taxandria linearifolia</i>			
480.	1034	<i>Tetraria capillaris</i> (Hair Sedge)			
481.	1036	<i>Tetraria octandra</i>			
482.	667	<i>Tetrarrhena laevis</i> (Forest Ricegrass)			
483.	48341	<i>Tetradlea hirsuta</i> subsp. <i>viminea</i>			
484.	4537	<i>Tetradlea nuda</i>			
485.	1705	<i>Thelymitra crinita</i> (Blue Lady Orchid)			
486.	673	<i>Themeda triandra</i>			
487.	5080	<i>Thomasia foliosa</i>			
488.	24845	<i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
489.	1338	<i>Thysanotus manglesianus</i> (Fringed Lily)			
490.	1343	<i>Thysanotus patersonii</i>			
491.	1351	<i>Thysanotus sparteus</i>			
492.	1354	<i>Thysanotus tenellus</i>			
493.	1357	<i>Thysanotus thyrsoides</i>			
494.	1358	<i>Thysanotus triandrus</i>			
495.	25549	<i>Todiramphus sanctus</i> (Sacred Kingfisher)			
496.	6280	<i>Trachymene pilosa</i> (Native Parsnip)			
497.	1481	<i>Tribonanthes australis</i> (Southern Tiurmdin)			
498.	1483	<i>Tribonanthes longipetala</i> (Branching Tiurmdin)			
499.	8251	<i>Trichocline spathulata</i> (Native Gerbera)			
500.	25723	<i>Trichoglossus haematodus</i> (Rainbow Lorikeet)			
501.	1361	<i>Tricoryne elatior</i> (Yellow Autumn Lily)			
502.	1362	<i>Tricoryne humilis</i>			
503.	1038	<i>Tricostularia neesii</i>			
504.	4292	<i>Trifolium campestre</i> (Hop Clover)	Y		
505.	4293	<i>Trifolium cernuum</i> (Drooping Flower Clover)	Y		
506.	4295	<i>Trifolium dubium</i> (Suckling Clover)	Y		
507.	4313	<i>Trifolium subterraneum</i> (Subterranean Clover)	Y		
508.	4737	<i>Tripterococcus brunonis</i> (Winged Stackhousia)			
509.	33418	<i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>			
510.	48147	<i>Turnix varius</i> (Painted Button-quail)			
511.	24852	<i>Tyto alba</i> subsp. <i>delicatula</i> (Barn Owl)			
512.		<i>Urodacus novaehollandiae</i>			
513.	8255	<i>Ursinia anthemoides</i> (Ursinia)	Y		
514.	28227	<i>Usnea scabrida</i> subsp. <i>scabrida</i>			
515.	25218	<i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
516.	7665	<i>Velleia trinervis</i>			
517.	8257	<i>Vellereophyton dealbatum</i> (White Cudweed)	Y		
518.		<i>Venator immansueta</i>			
519.	7107	<i>Verbascum virgatum</i> (Twiggy Mullein)	Y		
520.	15431	<i>Verticordia acerosa</i> var. <i>acerosa</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
521.	12388 <i>Verticordia acerosa</i> var. <i>preissii</i>			
522.	6076 <i>Verticordia densiflora</i> (Compacted Featherflower)			
523.	15432 <i>Verticordia densiflora</i> var. <i>densiflora</i>			
524.	6107 <i>Verticordia pennigera</i>			
525.	6110 <i>Verticordia plumosa</i> (Plumed Featherflower)			
526.	4320 <i>Vicia hirsuta</i> (Hairy Vetch)	Y		
527.	4325 <i>Viminaria juncea</i> (Swishbush, Koweda)			
528.	722 <i>Vulpia bromoides</i> (Squirrel Tail Fescue)	Y		
529.	724 <i>Vulpia myuros</i> (Rat's Tail Fescue)	Y		
530.	33101 <i>Vulpia myuros</i> forma <i>myuros</i>	Y		
531.	7389 <i>Wahlenbergia preissii</i>			
532.	13103 <i>Watsonia borbonica</i>	Y		
533.	1567 <i>Watsonia meriana</i> (Bulbil Watsonia)	Y		
534.	18118 <i>Watsonia meriana</i> var. <i>meriana</i>	Y		
535.	12072 <i>Wurmbea dioica</i> subsp. <i>alba</i>			
536.	1253 <i>Xanthorrhoea gracilis</i> (Graceful Grass Tree, Mimidi)			
537.	1256 <i>Xanthorrhoea preissii</i> (Grass tree, Palga)			
538.	6284 <i>Xanthosia candida</i>			
539.	6285 <i>Xanthosia ciliata</i>			
540.	6289 <i>Xanthosia huegelii</i>			
541.	2331 <i>Xylomelum occidentale</i> (Woody Pear, Djandin)			
542.	15819 <i>Xyris atrovirida</i>			
543.	25765 <i>Zosterops lateralis</i> (Grey-breasted White-eye, Silvereye)			

Conservation Codes

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

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

APPENDIX B - EPBC PROTECTED MATTERS SEARCH REPORT



EPBC Act Protected Matters Report

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

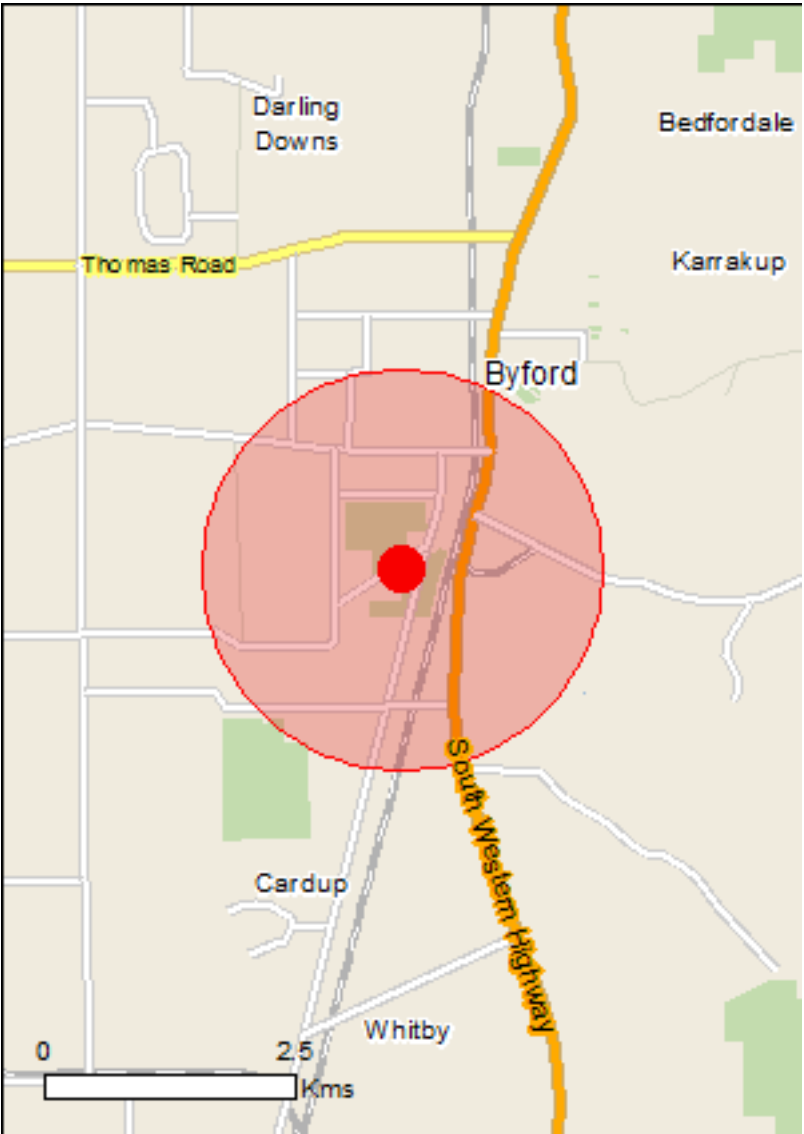
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 06/09/21 12:52:39

- [Summary](#)
- [Details](#)

[Matters of NES](#)[Other Matters Protected by the EPBC Act](#)[Extra Information](#)
- [Caveat](#)
- [Acknowledgements](#)



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Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	26
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	38
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Forrestdale and thomsons lakes	Within 10km of Ramsar	
Peel-yalgorup system	40 - 50km upstream	

Listed Threatened Ecological Communities			[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.			
Name	Status	Type of Presence	
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area	
Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	Endangered	Community known to occur within area	
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may occur within area	

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat likely to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat known to occur within area
Tetraria australiensis Southern Tetraria [10137]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land		[Resource Information]
The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.		
Name		
Commonwealth Land -		
Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Cardup	WA

Invasive Species[Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323] Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-32.23021 116.00119

Acknowledgements

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

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

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

Please feel free to provide feedback via the [Contact Us](#) page.

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APPENDIX C - FLORA SPECIES BY VEGETATION UNIT

*denotes introduced (weed) species

Family	Species	Veg Unit						
		Cc	CcHtKaXp	CcXp	CoMvv	ErCc	KaHtKr	Rehab
Alliaceae	<i>Nothoscordum gracile</i>					+		
Apiaceae	<i>Xanthosia atkinsoniana</i>		+		+		+	
Araceae	* <i>Zantedeschia aethiopica</i>					+		
Asparagaceae	<i>Laxmannia squarrosa</i>		+				+	
Asparagaceae	<i>Lomandra hermaphrodita</i>		+	+				
Asparagaceae	<i>Lomandra preissii</i>		+					
Asparagaceae	<i>Lomandra sonderi</i>		+					
Asparagaceae	<i>Sowerbaea laxiflora</i>		+				+	
Asparagaceae	<i>Thysanotus patersonii</i>							+
Asteraceae	* <i>Hypochaeris glabra</i>		+				+	
Asteraceae	<i>Quinetia urvillei</i>		+					
Asteraceae	<i>Siloxerus humifusus</i>		+					
Asteraceae	* <i>Sonchus oleraceus</i>						+	
Asteraceae	* <i>Ursinia anthemoides</i>		+	+				
Boryaceae	<i>Borya scirpoidea</i>		+					
Brassicaceae	* <i>Brassica tournefortii</i>							+
Casuarinaceae	<i>Casuarina obesa</i>				+			
Colchicaceae	<i>Burchardia congesta</i>			+				
Cyperaceae	<i>Cyathochaeta avenacea</i>	+	+		+		+	
Cyperaceae	<i>Lepidosperma squamatum</i> (narrow form)		+					
Cyperaceae	<i>Lepidosperma tenue</i>		+		+			
Cyperaceae	<i>Mesomelaena tetragona</i>		+	+	+		+	
Cyperaceae	<i>Morelotia octandra</i>		+	+				
Cyperaceae	<i>Netrostylis</i> sp.		+					
Cyperaceae	<i>Schoenus grammatophyllus</i>		+					
Cyperaceae	<i>Tricostularia neesii</i>		+					
Dasypogonaceae	<i>Calectasia narragara</i>		+				+	
Dasypogonaceae	<i>Dasypogon bromeliifolius</i>		+					
Dasypogonaceae	<i>Kingia australis</i>		+	+			+	
Dilleniaceae	<i>Hibbertia</i> sp.		+					
Droseraceae	<i>Drosera erythrorhiza</i>		+				+	
Droseraceae	<i>Drosera glanduligera</i>		+					
Droseraceae	<i>Drosera macrantha</i>		+		+			
Fabaceae	<i>Acacia drewiana</i>		+					
Fabaceae	* <i>Acacia iteaphylla</i>							+
Fabaceae	<i>Acacia lateriticola</i>		+				+	
Fabaceae	* <i>Acacia podalyriifolia</i>	+						+
Fabaceae	<i>Acacia pulchella</i>		+		+			+
Fabaceae	* <i>Acacia pycnantha</i>							+
Fabaceae	<i>Acacia saligna</i>							+
Fabaceae	* <i>Chamaecytisus palmensis</i>							
Fabaceae	<i>Gompholobium capitatum</i>		+					
Fabaceae	<i>Gompholobium knightianum</i>			+				
Fabaceae	<i>Hovea trisperma</i> var. <i>grandiflora</i>		+					
Fabaceae	<i>Jacksonia sternbergiana</i>							
Fabaceae	<i>Kennedia prostrata</i>			+				
Fabaceae	<i>Labichea punctata</i>		+					
Fabaceae	* <i>Trifolium angustifolium</i> var. <i>angustifolium</i>			+				
Fabaceae	* <i>Trifolium campestre</i>			+				
Fabaceae	* <i>Trifolium</i> sp.	+	+	+				
Fabaceae	<i>Viminaria juncea</i>		+					+
Goodeniaceae	<i>Dampiera lindleyi</i>		+		+			
Goodeniaceae	<i>Dampiera linearis</i>		+					
Goodeniaceae	<i>Lechenaultia biloba</i>		+					
Haemodoraceae	<i>Anigozanthos viridis</i> subsp. <i>viridis</i>		+					
Haemodoraceae	<i>Conostylis aculeata</i>		+				+	+
Haemodoraceae	<i>Conostylis setigera</i>		+					
Haemodoraceae	<i>Haemodorum spicatum</i>		+					

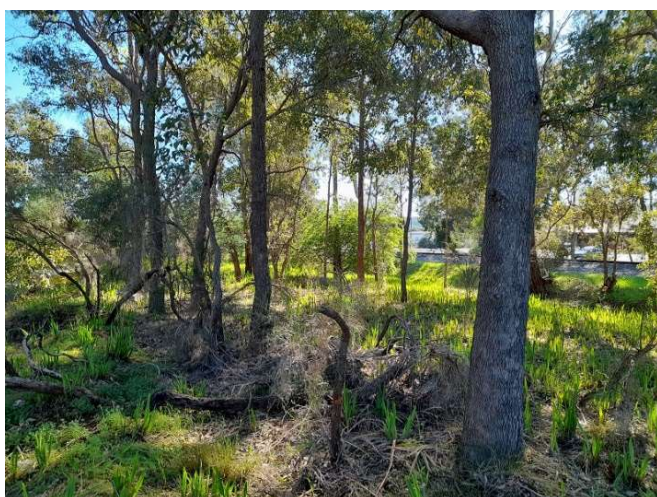
Family	Species	Veg Unit						
		Cc	CcHtKaXp	CcXp	CoMvv	ErCc	KaHtKr	Rehab
Haemodoraceae	<i>Tribonanthes australis</i>		+					
Hemerocallidaceae	<i>Caesia micrantha</i>		+					
Hemerocallidaceae	<i>Caesia occidentalis</i>		+	+			+	
Hemerocallidaceae	<i>Chamaescilla corymbosa</i>		+				+	
Hemerocallidaceae	<i>Johnsonia pubescens</i> subsp. <i>cygnorum</i> (P2)		+					
Hemerocallidaceae	<i>Tricoryne elatior</i>			+				
Iridaceae	<i>*Freesia alba</i> x <i>leichtlinii</i>		+					
Iridaceae	<i>*Ixia maculata</i>		+	+				
Iridaceae	<i>Patersonia occidentalis</i>						+	
Iridaceae	<i>Patersonia pygmaea</i>		+					
Iridaceae	<i>*Romulea rosea</i>		+				+	
Iridaceae	<i>*Sparaxis bulbifera</i>	+	+					
Iridaceae	<i>*Watsonia meriana</i>	+	+	+	+	+	+	+
Lauraceae	<i>Cassytha racemosa</i>		+					
Lentibulariaceae	<i>Utricularia violacea</i>		+					
Loranthaceae	<i>Nuytsia floribunda</i>		+					
Myrtaceae	<i>Calothamnus</i> sp.							+
Myrtaceae	<i>Corymbia calophylla</i>	+	+	+		+		
Myrtaceae	<i>Darwinia citriodora</i>			+				
Myrtaceae	<i>Eucalyptus rudis</i>					+		
Myrtaceae	<i>*Eucalyptus</i> sp.							+
Myrtaceae	<i>Kunzea recurva</i>		+				+	
Myrtaceae	<i>Melaleuca viminea</i> subsp. <i>viminea</i>				+			
Myrtaceae	<i>Pericalymma ellipticum</i>		+				+	
Orchidaceae	<i>*Disa bracteata</i>			+				
Orchidaceae	<i>Diuris</i> sp.		+					
Orchidaceae	<i>Prasophyllum</i> sp.			+				
Orchidaceae	<i>Pyrorchis nigricans</i>		+					
Orchidaceae	<i>Thelymitra antennifera</i>			+			+	
Orchidaceae	<i>Thelymitra</i> sp.							+
Oxalidaceae	<i>*Oxalis pes-caprae</i>	+	+			+		
Oxalidaceae	<i>*Oxalis purpurea</i>		+	+				
Papaveraceae	<i>*Fumaria capreolata</i>					+		
Poaceae	<i>*Briza maxima</i>	+	+	+			+	
Poaceae	<i>*Briza minor</i>		+	+				
Poaceae	<i>Bromus arenarius</i>		+					
Poaceae	<i>*Ehrharta calycina</i>	+	+	+			+	
Poaceae	<i>*Ehrharta longiflora</i>						+	
Poaceae	<i>*Eragrostis curvula</i>	+		+				+
Poaceae	<i>Neurachne alopecuroides</i>		+		+			
Poaceae	<i>*Pentameris airoides</i>		+				+	
Polygalaceae	<i>Comesperma calymega</i>		+					
Proteaceae	<i>Adenanthos meisneri</i>		+					
Proteaceae	<i>Banksia dallanneyi</i>		+					
Proteaceae	<i>Hakea lissocarpa</i>		+					+
Proteaceae	<i>Hakea marginata</i>				+			
Proteaceae	<i>Hakea trifurcata</i>		+				+	
Proteaceae	<i>Hakea undulata</i>							+
Proteaceae	<i>Hakea varia</i>		+					
Proteaceae	<i>Lambertia multiflora</i> var. <i>darlingensis</i>		+					
Proteaceae	<i>Petrophile striata</i>		+					
Proteaceae	<i>Stirlingia latifolia</i>		+					
Proteaceae	<i>Synaphea gracillima</i>		+					
Proteaceae	<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>						+	
Restionaceae	<i>Desmocladus fasciculatus</i>		+				+	
Restionaceae	<i>Hypolaena exsulca</i>		+				+	
Rubiaceae	<i>Opercularia vaginata</i>		+					
Stylidiaceae	<i>Levenhookia pusilla</i>		+					
Stylidiaceae	<i>Stylidium ?brunonianum</i>		+					
Stylidiaceae	<i>Stylidium ?rhypidium</i>		+				+	
Stylidiaceae	<i>Stylidium bulbiferum</i>		+					
Stylidiaceae	<i>Stylidium pulchellum</i>		+					

Family	Species	Veg Unit						
		Cc	CcHtKaXp	CcXp	CoMvv	ErCc	KaHtKr	Rehab
Stylidiaceae	<i>Stylidium recurvum</i>				+			
Xanthorrhoeaceae	<i>Xanthorrhoea gracilis</i>		+					
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>		+	+				

APPENDIX D – VEGETATION SITE DATA

Site BD01r

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	Releve
NW Corner Coordinates	406457mN 6434459mE
Vegetation Unit	Cc - <i>Corymbia calophylla</i> Woodland over <i>Jacksonia sternbergiana</i> Tall Open Shrubland over <i>*Watsonia meriana</i> and <i>*Oxalis pes-caprae</i> Low Forbland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Loamy clay
Litter	50%
Bare Ground	2%
Fire Age	> 10 Years
Vegetation Condition	Degraded
Disturbances/Impacts	Weeds, historic clearing



Phase 1

Species	Height (m)	% Cover
<i>Corymbia calophylla</i>	12	25
<i>Jacksonia sternbergiana</i>	3	2
* <i>Watsonia meriana</i>	0.4	50
* <i>Oxalis pes-caprae</i>	0.05	10
* <i>Trifolium</i> sp.	0.05	10
* <i>Acacia podalyriifolia</i>		+
* <i>Briza maxima</i>		+
* <i>Chamaecytisus palmensis</i>		+
<i>Cyathochaeta avenacea</i>		+
* <i>Ehrharta calycina</i>		+
* <i>Eragrostis curvula</i>		+
* <i>Sparaxis bulbifera</i>		+

Site BD02

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	406321mN 6433824mE
Vegetation Unit	CcHtKaXp - <i>Corymbia calophylla</i> Low Open Woodland over <i>Hakea trifurcata</i> , <i>Kingia australis</i> and <i>Xanthorrhoea preissii</i> Tall Open Shrubland over <i>Cyatochaeta avenacea</i> and <i>Mesomelaena tetragrona</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Loamy clay
Litter	30%
Bare Ground	1%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Weeds, rubbish



Phase 1



Phase 2

Species	Height (m)	% Cover
<i>Corymbia calophylla</i>	9	6
<i>Hakea trifurcata</i>	2	8
<i>Xanthorrhoea preissii</i>	2	5
* <i>Watsonia meriana</i>	0.6	25
* <i>Briza maxima</i>	0.1	2
<i>Acacia drewiana</i>		+
<i>Acacia pulchella</i>		+
* <i>Briza minor</i>		+
<i>Caesia occidentalis</i>		+
<i>Cyathochaeta avenacea</i>		+
<i>Dampiera lindleyi</i>		+
<i>Drosera erythrorhiza</i>		+
<i>Drosera glanduligera</i>		+
* <i>Ehrharta calycina</i>		+
* <i>Freesia alba</i> x <i>leichtlinii</i>		+
* <i>Hypochaeris glabra</i>		+
<i>Hypolaena exsulca</i>		+
* <i>Ixia maculata</i>		+
<i>Laxmannia squarrosa</i>		+
<i>Lepidosperma tenue</i>		+
<i>Levenhookia pusilla</i>		+
<i>Mesomelaena tetragona</i>		+
<i>Neurachne alopecuroidea</i>		+
* <i>Oxalis pes-caprae</i>		+
* <i>Pentameris airoides</i>		+
<i>Sowerbaea laxiflora</i>		+
* <i>Sparaxis bulbifera</i>		+
<i>Stylidium ?rhipidium</i>		+
<i>Synaphea gracillima</i>		+
<i>Tricostularia neesii</i>		+
* <i>Ursinia anthemoides</i>		+
<i>Xanthosia atkinsoniana</i>		+
<i>Kingia australis</i>		Associated
<i>Lechenaultia biloba</i>		Associated

Site BD03

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	406242mN 6433512mE
Vegetation Unit	CcHtKaXp - <i>Corymbia calophylla</i> Low Open Woodland over <i>Hakea trifurcata</i> , <i>Kingia australis</i> and <i>Xanthorrhoea preissii</i> Tall Open Shrubland over <i>Cyatochaeta avenacea</i> and <i>Mesomelaena tetragrona</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Loamy clay
Litter	20%
Bare Ground	4%
Fire Age	>10 Years
Vegetation Condition	Good
Disturbances/Impacts	Weeds, dumping



Phase 1

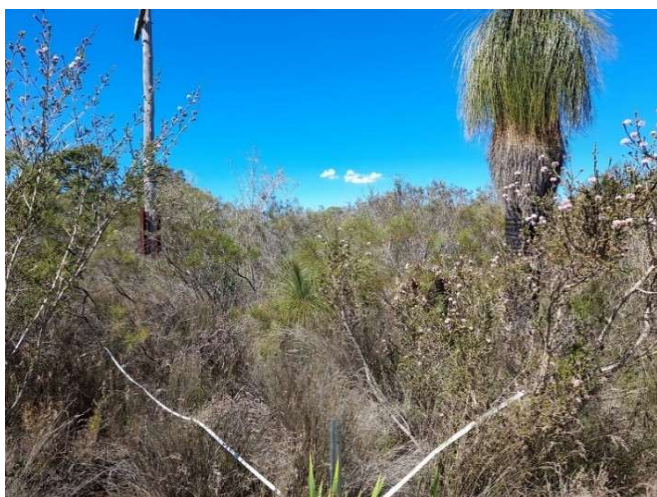


Phase 2

Species	Height (m)	% Cover
<i>Corymbia calophylla</i>	5	3
<i>Kingia australis</i>	3	8
<i>Nuytsia floribunda</i>	3	2
<i>Hakea trifurcata</i>	2	4
<i>Xanthorrhoea preissii</i>	2	3
<i>Pericalymma ellipticum</i>	1.5	2
<i>Conostylis aculeata</i>	0.2	3
<i>Acacia lateriticola</i>		+
<i>Anigozanthos viridis</i> subsp. <i>viridis</i>		+
<i>Borya scirpoidea</i>		+
* <i>Briza maxima</i>		+
<i>Caesia occidentalis</i>		+
<i>Chamaescilla corymbosa</i>		+
<i>Cyathochaeta avenacea</i>		+
<i>Dampiera linearis</i>		+
<i>Drosera erythrorhiza</i>		+
<i>Drosera glanduligera</i>		+
<i>Drosera macrantha</i>		+
* <i>Ehrharta calycina</i>		+
<i>Haemodorum spicatum</i>		+
* <i>Hypochaeris glabra</i>		+
<i>Hypolaena exsulca</i>		+
<i>Lomandra preissii</i>		+
<i>Mesomelaena tetragona</i>		+
<i>Neurachne alopecuroidea</i>		+
* <i>Oxalis pes-caprae</i>		+
<i>Quinetia urvillei</i>		+
* <i>Romulea rosea</i>		+
<i>Siloxerus humifusus</i>		+
<i>Stylidium ?rhipidium</i>		+
<i>Stylidium pulchellum</i>		+
<i>Tribonanthes australis</i>		+
* <i>Ursinia anthemoides</i>		+
<i>Utricularia violacea</i>		+
* <i>Watsonia meriana</i>		+
<i>Kunzea recurva</i>		Associated

Site BD04

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	406234mN 6433489mE
Vegetation Unit	KaHtKr - <i>Kingia australis</i> , <i>Hakea trifurcata</i> and <i>Kunzea recurva</i> Tall Open Shrubland over <i>Hypolaena exsulca</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Loamy clay
Litter	10%
Bare Ground	10%
Fire Age	> 10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Weeds



Phase 1



Phase 2

Species	Height (m)	% Cover
<i>Kingia australis</i>	4	3
<i>Hakea trifurcata</i>	2	12
<i>Kunzea recurva</i>	2	10
<i>Hypolaena exsulca</i>	1	10
<i>Acacia lateriticola</i>		+
* <i>Briza maxima</i>		+
<i>Caesia occidentalis</i>		+
<i>Chamaescilla corymbosa</i>		+
<i>Conostylis aculeata</i>		+
<i>Cyathochaeta avenacea</i>		+
<i>Desmocladius fasciculatus</i>		+
<i>Drosera erythrorhiza</i>		+
* <i>Ehrharta calycina</i>		+
* <i>Ehrharta longiflora</i>		+
* <i>Hypochaeris glabra</i>		+
<i>Hypolaena exsulca</i>		+
<i>Laxmannia squarrosa</i>		+
<i>Mesomelaena tetragona</i>		+
<i>Patersonia occidentalis</i>		+
* <i>Pentameris airoides</i>		+
<i>Pericalymma ellipticum</i>		+
* <i>Romulea rosea</i>		+
* <i>Sonchus oleraceus</i>		+
<i>Sowerbaea laxiflora</i>		+
<i>Stylidium ?rhipidium</i>		+
<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>		+
<i>Thelymitra antennifera</i>		+
* <i>Watsonia meriana</i>		+
<i>Xanthosia atkinsoniana</i>		+

Site BD05r

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	Releve
NW Corner Coordinates	406155mN 6433222mE
Vegetation Unit	CcHtKaXp - <i>Corymbia calophylla</i> Low Open Woodland over <i>Hakea trifurcata</i> , <i>Kingia australis</i> and <i>Xanthorrhoea preissii</i> Tall Open Shrubland over <i>Cyatochaeta avenacea</i> and <i>Mesomelaena tetragrona</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Loamy clay
Litter	20%
Bare Ground	1%
Fire Age	>10 Years
Vegetation Condition	Degraded-Good
Disturbances/Impacts	Weeds



Phase 1

Species	Height (m)	% Cover
<i>Viminaria juncea</i>	5	2
<i>Kingia australis</i>	3	2
<i>Xanthorrhoea preissii</i>	2	5
<i>Hakea trifurcata</i>	1.5	2
<i>*Watsonia meriana</i>	0.8	5
<i>Mesomelaena tetragona</i>	0.8	4
<i>Cyathochaeta avenacea</i>		+
<i>Hakea varia</i>		+
<i>Schoenus grammatophyllus</i>		+
<i>Stirlingia latifolia</i>		+

Site BD06

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	405992mN 6432548mE
Vegetation Unit	CcXp - <i>Corymbia calophylla</i> Woodland over <i>Xanthorrhoea preissii</i> Sparse Shrubland over <i>Morelotia octandra</i> and <i>Mesomelaena tetragrona</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Loamy clay
Litter	50%
Bare Ground	1%
Fire Age	>10 Years
Vegetation Condition	Good-Very Good
Disturbances/Impacts	Weeds, adjacent road and access track



Phase 1

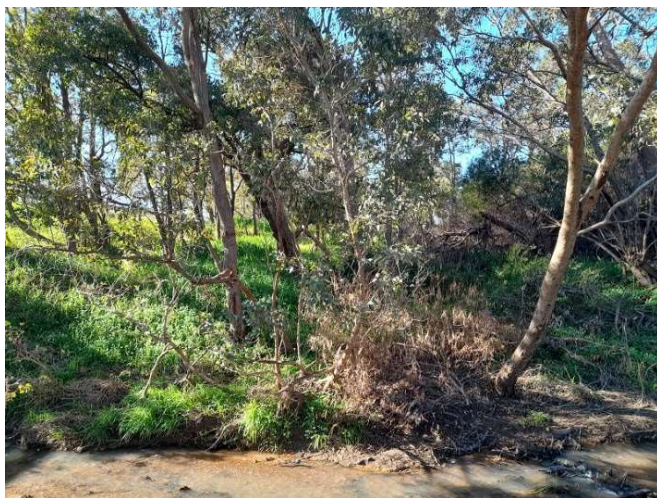


Phase 2

Species	Height (m)	% Cover
<i>Corymbia calophylla</i>	12	10
<i>Xanthorrhoea preissii</i>	1.5	8
<i>Morelotia octandra</i>	0.8	2
<i>Mesomelaena tetragona</i>	0.6	2
<i>*Ixia maculata</i>	0.1	1
<i>*Briza maxima</i>		+
<i>*Briza minor</i>		+
<i>Burchardia congesta</i>		+
<i>Caesia occidentalis</i>		+
<i>Darwinia citriodora</i>		+
<i>*Disa bracteata</i>		+
<i>*Ehrharta calycina</i>		+
<i>*Eragrostis curvula</i>		+
<i>Gompholobium knightianum</i>		+
<i>Kennedia prostrata</i>		+
<i>Kennedia prostrata</i>		+
<i>Kingia australis</i>		+
<i>Lomandra hermaphrodita</i>		+
<i>*Oxalis purpurea</i>		+
<i>Prasophyllum</i> sp.		+
<i>Thelymitra antennifera</i>		+
<i>Tricoryne elatior</i>		+
<i>*Trifolium angustifolium</i> var. <i>angustifolium</i>		+
<i>*Trifolium campestre</i>		+
<i>*Trifolium</i> sp.		+
<i>*Ursinia anthemoides</i>		+
<i>*Watsonia meriana</i>		+

Site BD07r

Date	14 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	405978mN 6432443mE
Vegetation Unit	ErCc - <i>Eucalyptus rudis</i> and <i>Corymbia Calophylla</i> Open Forest over <i>*Watsonia meriana</i> and <i>*Oxalis pes-caprae</i> Low Forbland
Slope	Steep
Landform	Medium drainage line
Soil Colour	Brown
Soil Type	Clay
Litter	10%
Bare Ground	1%
Fire Age	> 10 Years
Vegetation Condition	Completely Degraded-Degraded
Disturbances/Impacts	Weeds, erosion



Phase 1

Species	Height (m)	% Cover
<i>Corymbia calophylla</i>	12	30
<i>Eucalyptus rudis</i>	12	30
* <i>Watsonia meriana</i>	0.8	50
* <i>Oxalis pes-caprae</i>	0.5	80
* <i>Fumaria capreolata</i>		+
<i>Nothoscordum gracile</i>		+
* <i>Zantedeschia aethiopica</i>		+

Site BD08r

Date	9/14/2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	406260mN 6433215mE
Vegetation Unit	CoMvv - <i>Casuarina obesa</i> Low Open Woodland over <i>Melaleuca viminea</i> subsp. <i>viminea</i> Tall Sparse Shrubland over <i>Mesomelaena tetragona</i> and <i>Cyathochaeta avenacea</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Pale brown
Soil Type	Sandy clay
Litter	10%
Bare Ground	30%
Fire Age	3-5 Years
Vegetation Condition	Degraded-Good
Disturbances/Impacts	Weeds, dumped fill and rubble



Phase 1

Species	Height (m)	% Cover
<i>Casuarina obesa</i>	6	6
<i>Melaleuca viminea</i> subsp. <i>viminea</i>	3	5
<i>Mesomelaena tetragona</i>	0.8	10
<i>Cyathochaeta avenacea</i>	0.2	1
<i>Acacia pulchella</i>		+
<i>Cyathochaeta avenacea</i>		+
<i>Dampiera lindleyi</i>		+
<i>Drosera macrantha</i>		+
<i>Hakea marginata</i>		+
<i>Lepidosperma tenue</i>		+
<i>Neurachne alopecuroidea</i>		+
<i>Stylidium recurvum</i>		+
* <i>Watsonia meriana</i>		+
<i>Xanthosia atkinsoniana</i>		+

Site BD09

Date	15 September 2021
Botanist	Kellie Bauer Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	406224mN 6433306mE
Vegetation Unit	CcHtKaXp - <i>Corymbia calophylla</i> Low Open Woodland over <i>Hakea trifurcata</i> , <i>Kingia australis</i> and <i>Xanthorrhoea preissii</i> Tall Open Shrubland over <i>Cyatochaeta avenacea</i> and <i>Mesomelaena tetragrona</i> Sparse Sedgeland
Slope	Flat
Landform	Lower slope/ foothills
Soil Colour	Grey
Soil Type	Sand
Litter	70%
Bare Ground	0%
Fire Age	>10 Years
Vegetation Condition	Very Good
Disturbances/Impacts	Weeds



Phase 1



Phase 2

Species	Height (m)	% Cover
<i>Corymbia calophylla</i>	5	5
<i>Hakea trifurcata</i>	3	25
<i>Xanthorrhoea preissii</i>	1.5	5
<i>Netrostylis</i> sp.	1	2
<i>Banksia dallanneyi</i>		+
* <i>Briza maxima</i>		+
<i>Bromus arenarius</i>		+
<i>Caesia micrantha</i>		+
<i>Calectasia narragara</i>		+
<i>Cassytha racemosa</i>		+
<i>Chamaescilla corymbosa</i>		+
<i>Comesperma calymega</i>		+
<i>Conostylis setigera</i>		+
<i>Cyathochaeta avenacea</i>		+
<i>Dampiera lindleyi</i>		+
<i>Dasypogon bromeliifolius</i>		+
<i>Desmocladius fasciculatus</i>		+
<i>Drosera glanduligera</i>		+
<i>Drosera macrantha</i>		+
<i>Gompholobium capitatum</i>		+
<i>Hakea lissocarpha</i>		+
<i>Hibbertia</i> sp.		+
<i>Hovea trisperma</i> var. <i>grandiflora</i>		+
* <i>Hypochaeris glabra</i>		+
<i>Hypolaena exsulca</i>		+
<i>Kingia australis</i>		+
<i>Labichea punctata</i>		+
<i>Lambertia multiflora</i> var. <i>darlingensis</i>		+
<i>Lechenaultia biloba</i>		+
<i>Lepidosperma squamatum</i> (narrow form)		+
<i>Lepidosperma tenue</i>		+
<i>Lomandra hermaphrodita</i>		+
<i>Lomandra sonderi</i>		+
<i>Mesomelaena tetragona</i>		+
<i>Morelotia octandra</i>		+
<i>Neurachne alopecuroidea</i>		+
<i>Opercularia vaginata</i>		+
* <i>Oxalis purpurea</i>		+
<i>Patersonia pygmaea</i>		+
* <i>Pentameris airoides</i>		+
<i>Petrophile striata</i>		+
<i>Pyrorchis nigricans</i>		+
<i>Stylidium ?brunonianum</i>		+
<i>Stylidium bulbiferum</i>		+
* <i>Trifolium</i> sp.		+

Species	Height (m)	% Cover
<i>*Watsonia meriana</i>		+
<i>Xanthorrhoea gracilis</i>		+
<i>Xanthosia atkinsoniana</i>		+

Site BD10r

Date	15 September 2021
Botanist	Kellie Bauer-Simpson
Quadrat Size	10 x 10 m
NW Corner Coordinates	406301mN 6433298mE
Vegetation Unit	Rehab - Rehabilitation with planted endemic, non-endemic species and weeds
Slope	Gentle
Landform	Lower slope/ foothills
Soil Colour	Brown
Soil Type	Clay
Litter	50%
Bare Ground	5%
Fire Age	> 10 Years
Vegetation Condition	Degraded-Good
Disturbances/Impacts	Historically cleared

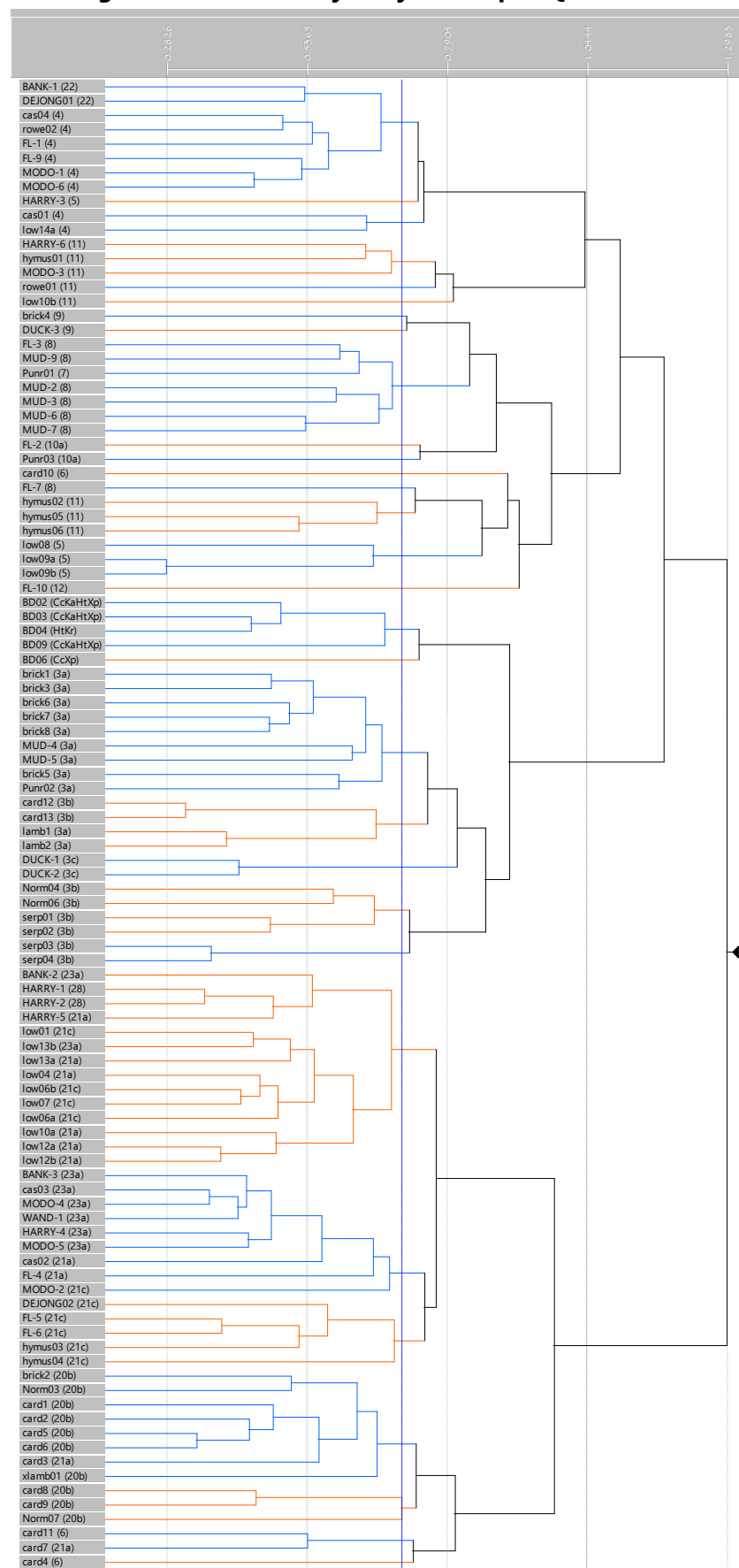


Phase 1

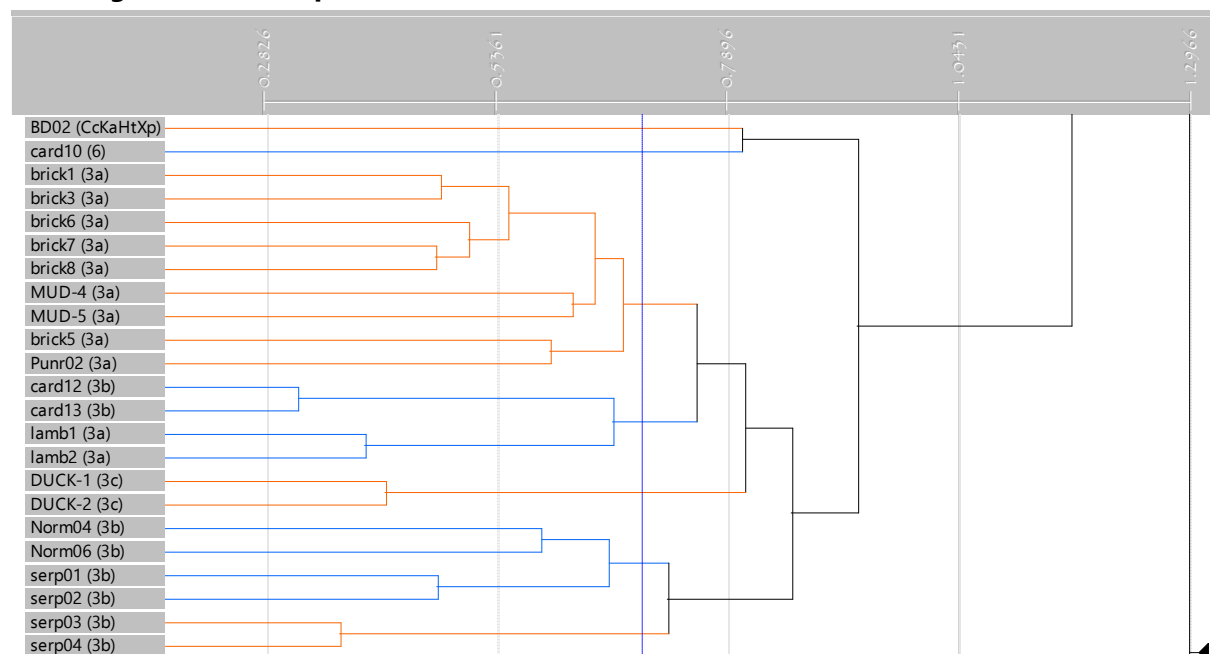
Species	Height (m)	% Cover
<i>*Eucalyptus</i> sp.	12	5
<i>Calothamnus</i> sp.	4	25
<i>*Eragrostis curvula</i>	1	5
<i>*Acacia iteaphylla</i>		+
<i>*Acacia podalyriifolia</i>		+
<i>Acacia pulchella</i>		+
<i>*Acacia pycnantha</i>		+
<i>Acacia saligna</i>		+
<i>*Brassica tournefortii</i>		+
<i>Conostylis aculeata</i>		+
<i>Hakea lissocarpa</i>		+
<i>Hakea undulata</i>		+
<i>Thelymitra</i> sp.		+
<i>Thysanotus patersonii</i>		+
<i>Viminaria juncea</i>		+
<i>*Watsonia meriana</i>		+

APPENDIX E – FLORISTIC ANALYSIS RESULTS (DENDROGRAMS)

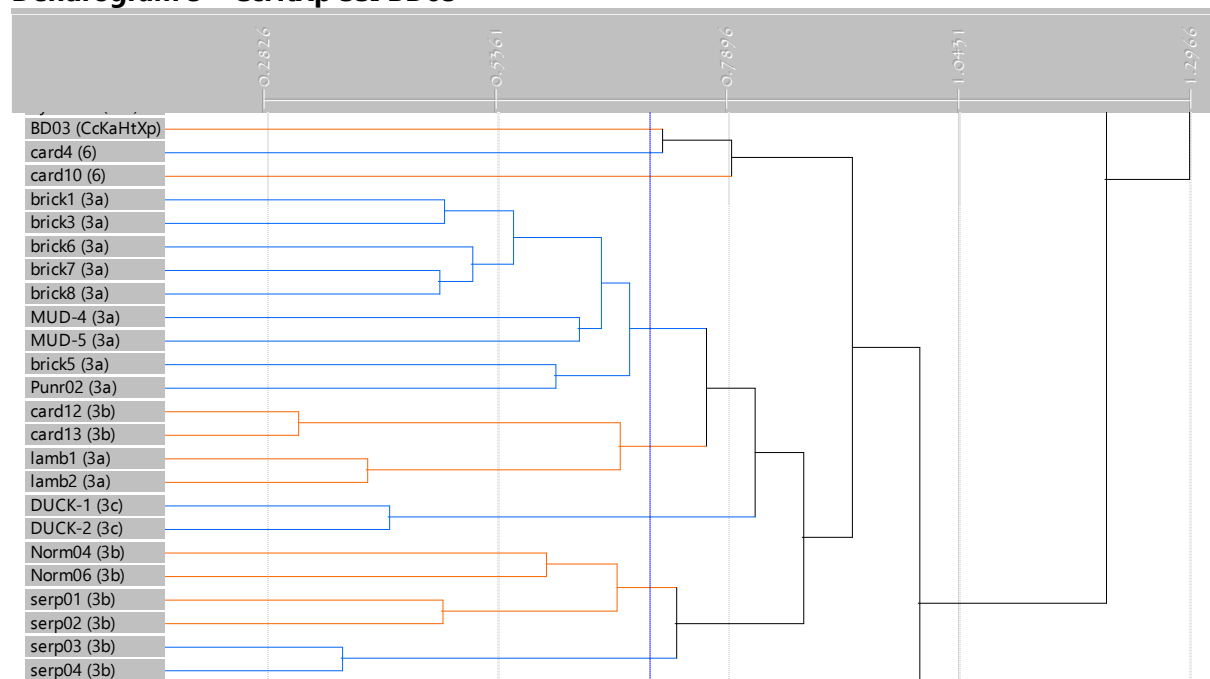
Dendrogram 1 – Batch Analysis Byford Depot Quadrats



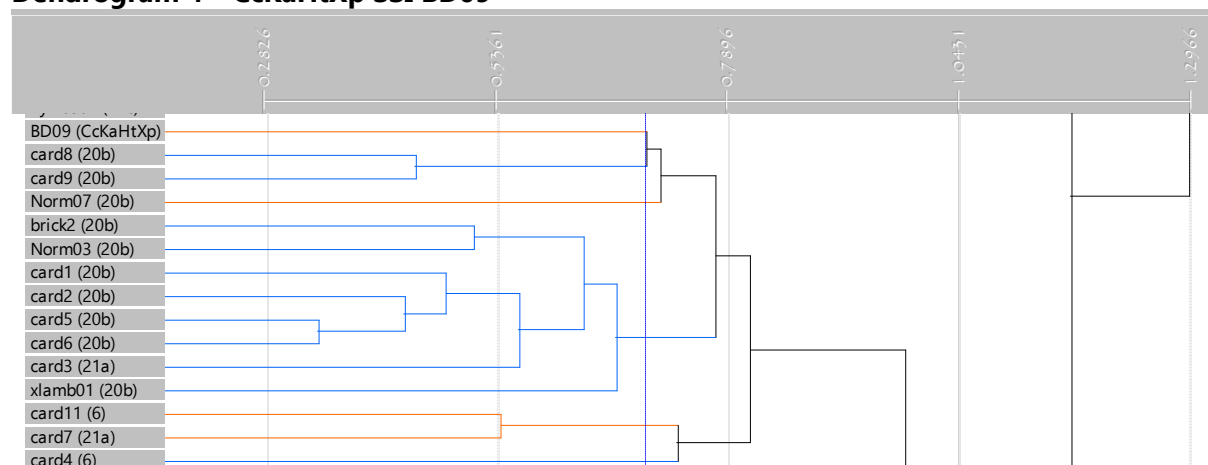
Dendrogram 2 – CcHtXp SSI BD02



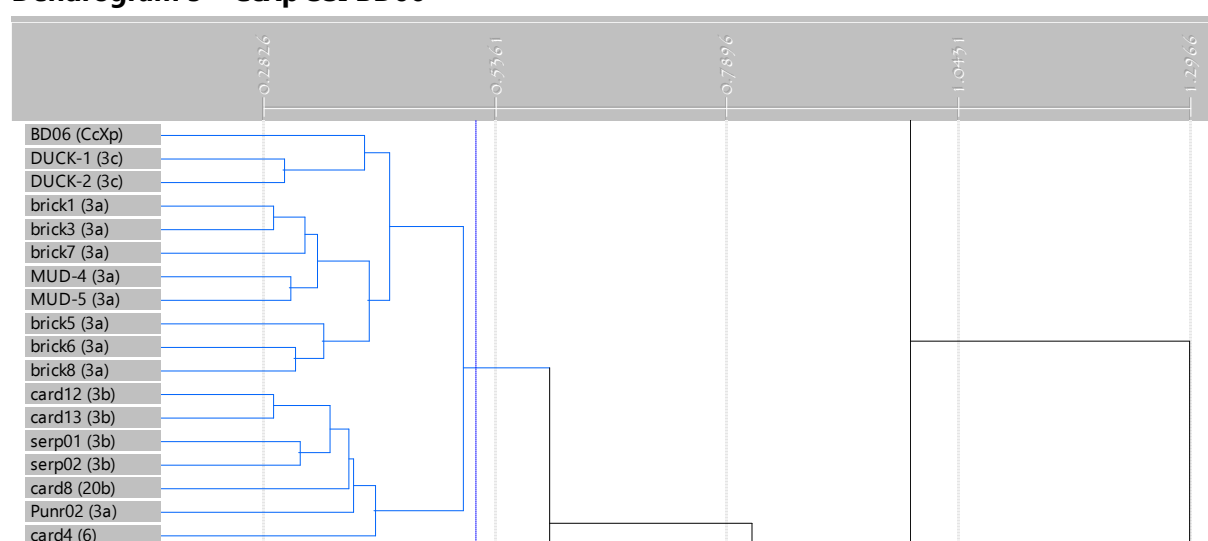
Dendrogram 3 – CcHtXp SSI BD03



Dendrogram 4 – CcKaHtXp SSI BD09



Dendrogram 5 – CcXp SSI BD06



Dendrogram 6 – HtKr SSI BD04

