Natural Area
CONSULTING MANAGEMENT SERVICES

City of Wanneroo

Flora & Vegetation Assessment
Mather Drive, Neerabup

[redacted]

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Executive Summary

Natural Area Consulting Management Services (Natural Area) was contracted by the City of Wanneroo to undertake a basic fauna and detailed flora and vegetation survey of Lot 9100, Lot 41 and Mather Road Reserve (totalling approx. 18 ha) off Mather Drive in the Neerabup Industrial Area. The City is proposing the development of Lot 9003 (85) and Lot 9100 (60) Mather Drive for industrial land development purposes. The Mather Drive Road Reserve runs partially through Lot 9003 and will be used for a vehicle access road once Lot 9003 is subdivided. The three sites included in the survey are listed below:

- Site 1: Mather Drive Road Reserve (1.17 ha)
- Site 2: Lot 9100 (60) Mather Drive (16.2702 ha)
- Site 3: Lot 41 (34) Mather Drive (0.5879 ha).

Outcomes of the survey will assist with future management of the sites with regards the City's obligations for the current clearing permit for Lot 9100 and for future environmental approvals for development in this area. The City also requires the clearing and expansion of the drainage reserve located at Lot 41 (34) Mather Drive, as this area is not subject to the City's current approved clearing permit this survey is required to inform the clearing permit approvals process.

The survey aimed to determine:

- flora species present
- the extent and boundaries of vegetation type and condition
- the location of declared rare or priority flora and/or ecological communities.

The detailed flora and vegetation survey within site confirmed:

- a total of 167 flora species present from 44 families
- a total of 36 (21.5%) weeds and 131 (78.5%) native flora species
- no priority or threatened flora species were found
- one vegetation type occurred throughout the three sites, namely *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland
- vegetation condition across the site ranged from Completely Degraded to Excellent across the three sites with Mather Drive Road Reserve in lower condition
- no threatened or priority ecological communities were found within the three survey sites of Mather Road.

Site 2, Lot 9100 contains more than 1 ha of good quality foraging habitat for black cockatoos; this triggers the referral guidelines in *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo* (EPA, 2012). The black cockatoo habitat survey undertaken by Ecoscape in 2019 also recorded 65 habitat trees Lot 9100, and six within Lot 41.

Contents

1.0 Introduction

Natural Area Consulting Management Services (Natural Area) was commissioned by the City of Wanneroo in July 2020 to undertake a detailed botanical survey of three sites on Mathers Drive in the Neerabup Industrial Area (NIA), Neerabup:

- Site 1: Mather Drive Road Reserve (1.17 ha)
- Site 2: Lot 9100 (60) Mather Drive (16.2702 ha)
- Site 3: Lot 41 (34) Mather Drive (0.5879 ha).

The City received approval under the *Environmental Protection and Biodiversity Conservation Act 1999* from the Department of Energy and Environment (EPBC 2007/3479). The approval, subject to conditional requirements, comprises of native vegetation clearing (CPS 6359/3) and resource extraction followed by the gradual creation of industrial lots, construction of roads and drainage infrastructure, and installation of services within Lot 9100 and Lot 9003 Mather Drive.

The City requires the clearing and expansion of the drainage reserve at Lot 41 and a proposed vehicle access road in Mather Road Reserve when the adjacent area (Lot 9003) is subdivided for industrial land development purposes. Flora and vegetation surveys were subsequently conducted as part of clearing permit procedures for both Lot 41 and the Mather Road Reserve sites.

A detailed and targeted flora and fauna assessment was undertaken of Lot 9100 in May 2013 but as this survey was conducted over 5 years ago, a new survey needs to be undertaken to reassess existing site conditions to inform all relevant stakeholders involved with the environmental planning procedures related with the subdivision and industrial development of the site.

1.1 Location

The Neerabup Industrial Area (NIA) is a general industrial estate within the suburb of Neerabup, located approximately 30 km north of the Perth Central Business District (Figure 1). The total survey area is approximately 18 hectares.

1.2 Scope

Specific tasks associated with the detailed botanical survey and associated reporting included:

- desktop assessment of previous reports and available data including:
  - *Ground Truthing of Environmental Values lot 4 Flynn Drive, Neerabup* (Eco Logical 2012).
  - *Black Cockatoo Habitat Survey (Neerabup Industrial Area) Offset Sites* (Ecoscape 2020a).
  - *Vegetation Assessment, Mather Reserve Neerabup and Lot 24 Mary Street Wanneroo* (Ecoscape 2019).
  - *Vegetation Assessment, Mather Reserve Neerabup and Lot 24 Mary Street Wanneroo* (Ecoscape 2020b).
  - *Level 2 Flora and Vegetation Assessment of Conservation Offset Areas* (Terratree 2016).
- field survey by experienced and qualified personnel

- all survey information being submitted in accordance with the requirements of the EPA's instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments
- a Flora and Vegetation Report (including maps)
- provision of electronic shapefiles (in GDA2020 and GDA1994) for all maps and survey data included in the report.
- A separate Environmental Impact Assessment report will be provided to the City in conjunction with this and the fauna report for Splendid Park, which will assess the impacts of the proposal against the ten Native Vegetation Clearing Principles, key diagnostic criteria for threatened ecological communities potentially occurring in the area, and significant impact criteria for threatened ecological communities.

1.3 Objectives

The City is proposing the development of Lot 9003 (85) and Lot 9100 (60) Mather Drive for industrial land development purposes. Lot 9100 is already included in the current approved clearing permit for the City, with the survey works providing updated biological survey outcomes to inform development approvals. The Mather Drive Road Reserve runs partially through Lot 9003 and will be used for a vehicle access road once Lot 9003 is subdivided.

The City also requires the clearing and expansion of the drainage reserve located at Lot 41 (34) Mather Drive. The road reserve and drainage reserve do not currently form part of the City's approved Clearing Permit CPS 6359 and thus this survey is required to enable lodgement of a new clearing permit application.

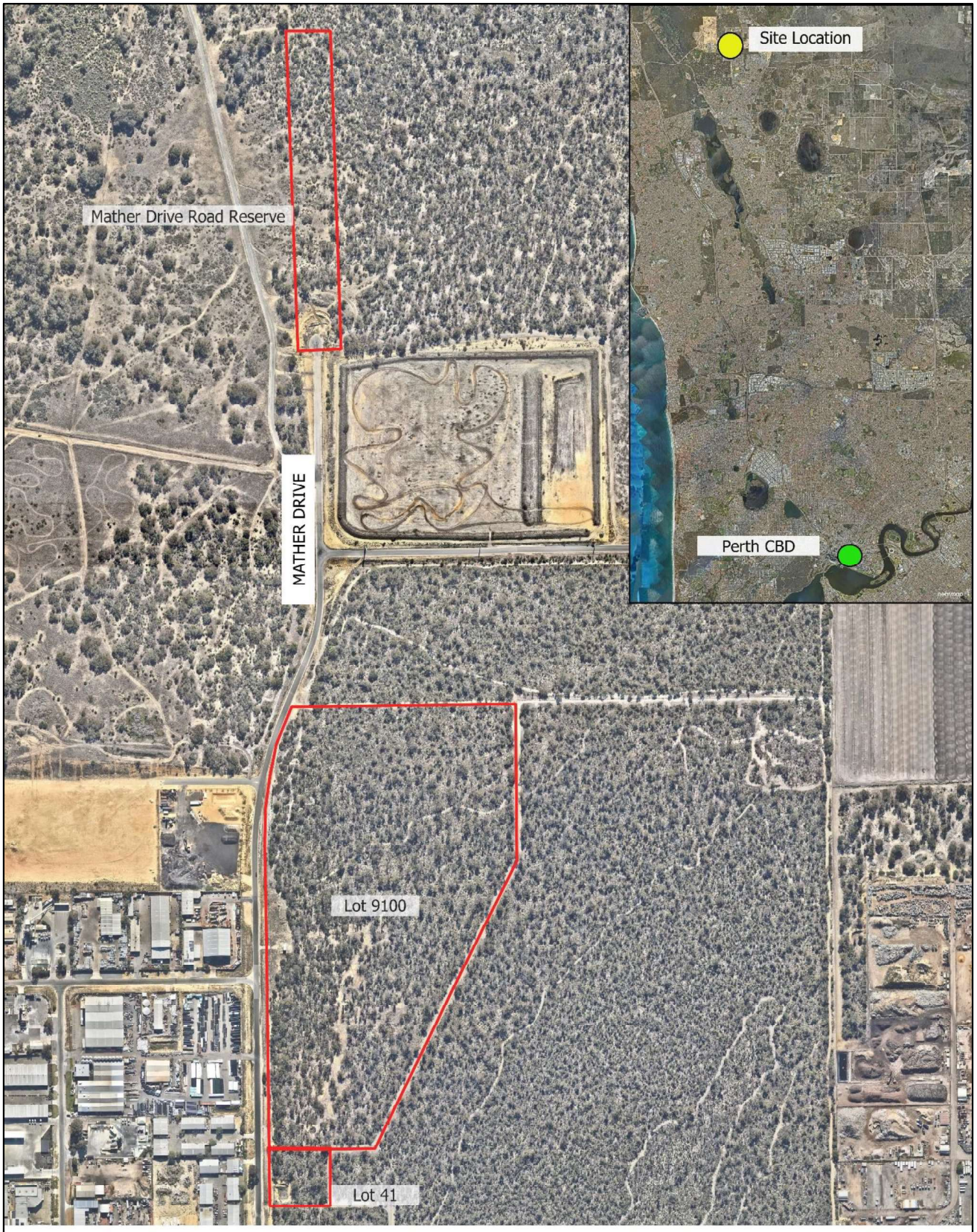


Figure 1:
Mather Drive Reserves
Neerabup, WA

2.0 Site Characteristics

Site characteristics have an influence on the flora, vegetation, and ecological communities present. Key characteristics of the Mather Drive assessment area are outlined in this section.

2.1 Regional Context

According to the Interim Biogeographical Regionalisation of Australia (IBRA) descriptions, the three Mather Drive sites are located within the Swan Coastal Plain (SWA 2 – Swan Coastal Plain subregion) (Department of Primary Industries and Regional Development, 2020). This area is described as a low-lying coastal plain with sands of colluvial and aeolian origin, as well as alluvial river flats and coastal limestone. The region is dominated by *Banksia* and/or Jarrah Woodland over sandy soils associated with the dune systems, with Paperbark (*Melaleuca*) in swampy/damp areas and Jarrah Woodland to the east where the Swan Coastal Plain rises (Mitchell, Williams & Desmond, 2002).

2.2 Previous Land Use and Tenure

A review of aerial imagery from Nearmap (2021) shows that there has been no land use changes to the three survey sites from December 2007 to the present, with all sites remaining in the vegetated state. Clearing to Mather Drive Road Reserve occurred between 1964 to 1975. The southern portion of Mather Drive was cleared with the road installed in 1985 this was extended to the southern boundary of the Mather Drive Road Reserve in 2003 (Landgate 2021). Both Lot 9100 and Lot 41 are zoned as Industrial Development with Mather Driver Road Reserve zoned as Industrial under the District Planning Scheme (DPS) Number 2.

2.3 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (Perth Airport, Station ID 009021, 2020):

- average rainfall is 762.1 mm pa, with the majority falling between May and August
- average maximum temperatures range from 18.0 °C in winter to 32.0 °C in summer, with the highest recorded maximum being 46.7 °C
- average minimum temperatures range from 8.0 °C in winter to 17.5 °C in summer, with the lowest recorded minimum being -1.3 °C
- predominant wind directions include morning easterlies and westerly sea breezes during summer months, with average windspeeds up to 22.7 km/h and gusts greater than 100km/h.

2.4 Topography and Soils

Topography across the site ranges from 56 to 80 m AHD with the lower elevations in the south rising to the north (Figure 2). Two soil types are present within the three sites, namely Karrakatta Sand Yellow Phase and the Karrakatta Sand Grey Phase, which were identified using the NRInfo Portal (Department of Primary Industries and Regional Development, 2020) (Table 1, Figure 2).

Table 1: Soil types descriptions

Name	Symbol	Description
Karrakatta Sand Yellow Phase	211Sp_Ky	Low hilly to gently undulating terrain with yellow sand over limestone at 1-2 m. *Banksia* spp. woodland with scattered emergent *Eucalyptus gomphocephala* and *Eucalyptus marginata* and a dense shrub layer.
Karrakatta Sand Grey Phase	211Sp_Kg	Low hilly to gently undulating terrain. Iron podzols. *Banksia* spp. woodland with *Eucalyptus todtiana* and depauperate *Eucalyptus marginata*; dense shrub layer.

Source: Department of Primary Industries and Regional Development, 2020

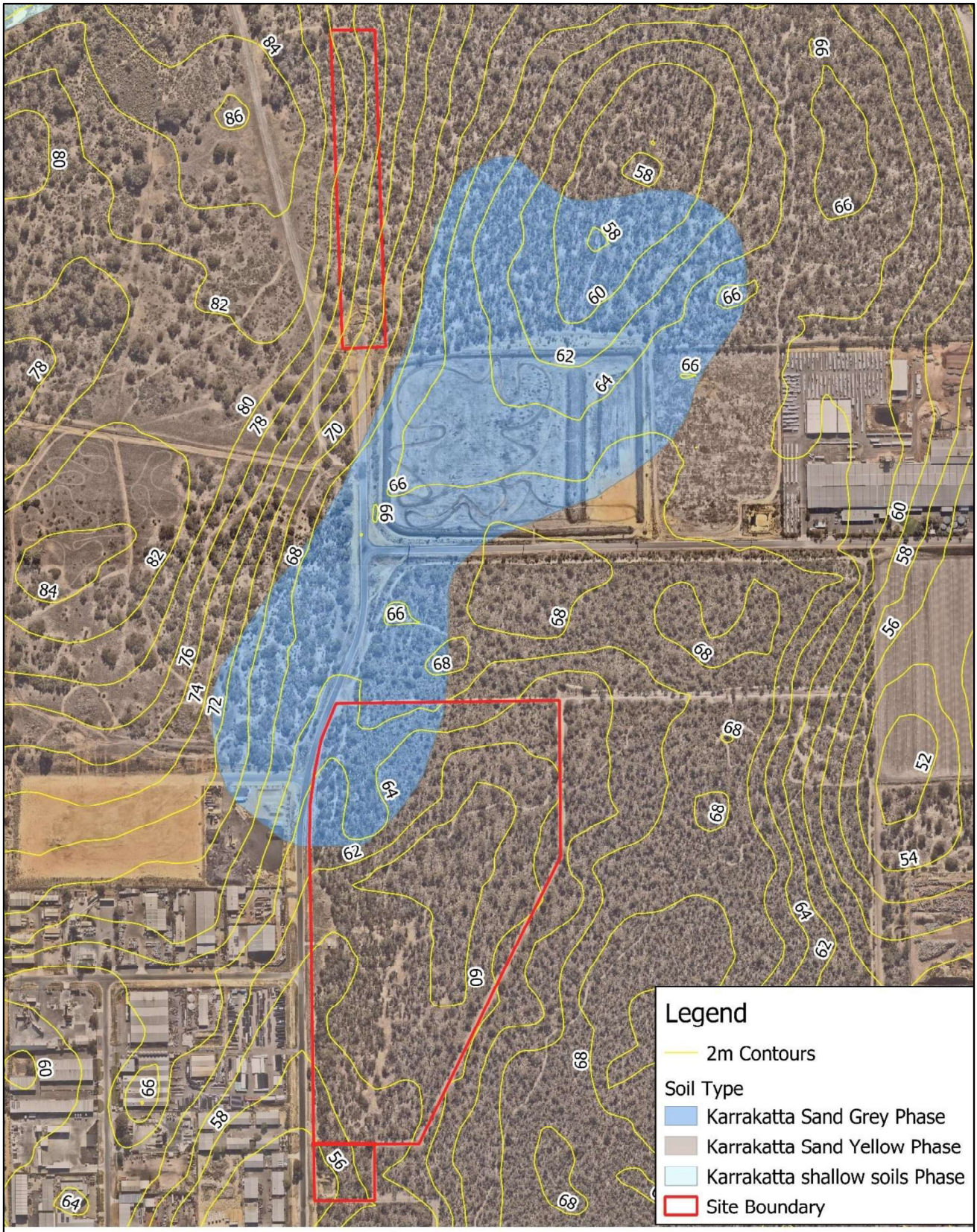


Figure 2:
Topography and Soils
Mather Drive Reserves
Neerabup, WA

2.5 Vegetation Complex

One vegetation complex occurs across all three of the survey sites, Cottesloe Complex – Central and South, as indicated by the Environmental Planning Tool (Western Australian Local Government Association, 2020). The Cottesloe Complex – Central and South consists of a range of heath vegetation on limestone outcrops, and Tuart woodlands and open Tuart-Jarrah-Marri forest with Tuart distinctively dominant in deeper sands (Heddle, Loneragan & Havel, 1980) (Figure 2).

The pre-European extent of this vegetation complex remaining is 15815.73 ha (35.22%) for the Swan Coastal Plain (Western Australian Local Government Association (WALGA) 2013). The Pre-European extent remaining for this complex within the City of Wanneroo local government area is 6122.77 ha (46%) (WALGA 2010).

2.6 Hydrology

No wetlands or water courses were identified within the study sites via a search of the City of Wanneroo's online IntraMaps tool. The three sites are approximately 9 km east of the ocean and approximately 4.5 km north of Lake Joondalup and Marginiup Lake.

3.0 Methodology

3.1 Desktop and Literature Review

Desktop surveys were undertaken to determine:

- likely native and non-native flora species present
- current extent of native vegetation
- general floristic community types
- likely presence of threatened or priority flora and fauna species
- likely presence of any threatened or priority ecological communities.

The following databases were accessed to obtain relevant information:

- NationalMap to review soil types, topography and vegetation complexes
- NatureMap (Department of Biodiversity, Conservation and Attractions, 2019c) (Appendix 1)
- Protected Matters Search Tool (Department of Agriculture, Water and the Environment, 2020b), (Appendix 2)
- FloraBase (Department of Biodiversity, Conservation and Attractions, 2020b)
- the Department of Biodiversity, Conservation and Attractions database which searches for flora, fauna and ecological communities previously recorded in the local area (DBCA, 2020d)

3.2 On-ground Flora Survey

The flora and vegetation surveys were carried out in accordance with *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016). Natural Area Ecologist Sharon Hynes and assistants Lachlan Crossley and Eva Karikis traversed the survey sites on September 3 and 4 and October 29 and 30, 2020. GPS data was recorded using Mappt software on a handheld Samsung tablet.

Nine 10 x 10 m quadrats (three per vegetation type) were set up and surveyed twice, first in September and then during October, to account for annual flora taxa presenting in the spring survey period. A photo was taken of each quadrat (Appendix 5) and the following data was collected using a modified recording sheet based on the NAIA templates developed for the Perth Biodiversity Project:

- vegetation type, which was determined using the structural classes described in Bush Forever Volume 2 (Government of Western Australia, 2000), which records dominant over, middle and understorey species. A tablet device equipped with GPS mapping software was used to mark the change in vegetation type across the site. A description of the various structural classes is provided in Table 2
- vegetation condition was assessed using the rating scale attributed to Keighery in Bush Forever Volume 2 (Government of Western Australia, 2000) (Table 3)
- aspect and slope of the site
- topography of the site
- soil type and colour
- gravel content and surface rock as a percentage of cover
- leaf litter and bare ground as a percentage of cover
- drainage of the site

- flora species present including percentage cover, height, habit and life form. Where species could not be identified in the field, samples were collected, or photographs taken for later identification. Additional species were recorded whilst the site was being traversed. Conservation significant species were targeted using the field reference guide compiled from the results of database searches.

Table 2: Vegetation structural classes

Life Form/Height Class	Canopy Percentage Cover			
	100 – 70%	**70 – 30%**	**30 – 10%**	**10 – 2 %**
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10 – 30 m	Closed forest	Open forest	Woodland	Open woodland
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland
Tree Mallee	Closed tree mallee	Tree mallee	Open tree mallee	Very open tree mallee
Shrub Mallee	Closed shrub mallee	Shrub mallee	Open shrub mallee	Very open shrub mallee
Shrubs over 2 m	Closed tall scrub	Tall open scrub	Tall shrubland	Tall open shrubland
Shrubs 1 – 2 m	Closed heath	Open heath	Shrubland	Open shrubland
Shrubs under 1 m	Closed low heath	Open low heath	Low shrubland	Low open shrubland
Grasses	Closed grassland	Grassland	Open grassland	Very open grassland
Herbs	Closed herbland	Herbland	Open herbland	Very open herbland
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland

(Source: Government of Western Australia, 2000)

Table 3: Vegetation condition ratings

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

Category	Description
	'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

(Source: Government of Western Australia, 2000)

3.3 Statistical Analysis

Statistical analysis using PRIMER was undertaken to determine the floristic community types present on site with comparison to the Gibson *et al*. dataset (1994) from *A Floristic Survey of the Southern Swan Coastal Plain*. The Gibson *et al*. (1994) study included surveys of the plant communities within the Swan Coastal Plain, with 509 sites (quadrats) established and floristic data used to define the major regional community types (Government of Western Australia, 2000). The community types assigned by this dataset are commonly used in literature to describe conservation significant communities. This was completed to determine if the vegetation communities on site matched the descriptions of any threatened ecological communities, namely FCTs associated with the threatened ecological community Banksia Woodlands of the Swan Coastal Plain.

Taxa names from Gibson *et al.* (1994) that were no longer current were updated to match current taxa names. Quadrat data collected in the field was converted to present/absence (PA) data and added to the Gibson *et al*. (1994) dataset. A PA matrix was created and inputted into the statistical analysis package PRIMER (version 7) and resemblance matrices created to determine the similarities in species composition between quadrats. A hierarchical cluster analysis was performed and dendrograms plotted to visually ascertain the similarities between quadrats. This analysis gives the similarity between quadrats species composition as a percentage. As this information does not take into account species abundance within community types, only species diversity, the five most similar quadrats are assessed, and the most suitable community type is determined using the descriptions of dominant species outlined in Gibson *et al.* (1994).

3.4 Limitations

Several limitations associated with both desktop and on-ground flora surveys exist, including:

- database searches provide an indication of what flora species may be present, with on ground surveys required to confirm those present
- the differing databases are reliant on information submitted via various reporting mechanisms, so all records of a particular species or ecological community within a specified area may not be complete
- information on flora species provided on some databases include out-of-date species names, meaning that names need to be checked for currency
- herbarium records are largely limited to vouchered specimens
- plant species flower at different times and are not always able to be identified
- not all species flower every year
- recent clearing 2019/2020 for salvaging of Grass trees and Macrozamia Palms may have reduced flora coverage and diversity on the site in certain areas.

Despite these limitations, Natural Area estimates that 80 – 90% of flora species within the survey area were identified.

Figure 3:
Flora Quadrats
Mather Drive Reserves
Neerabup, WA

4.0 Results

4.1 Desktop Survey

NatureMap identified a total of 96 flora species which could potentially occur within a 3 km radius of the site including:

- 66 dicotyledons
- one fungus
- 29 monocotyledons.

4.1.1 Significant Flora

NatureMap indicated five conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA), potentially occurring within 3 km of the site (Department of Biodiversity Conservation and Attractions (DBCA), 2020c). The Protected Matters Search Tool (PMST) indicated nine threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) (Cwlth) as potentially occurring within a 3 km radius of the site (Department of Agriculture, Water and the Environment, 2020).

A review of the DBCA threatened and priority flora database indicated 30 threatened or priority species that have been previously recorded within a 10 km buffer of the survey site (DBCA, 2020d). Of those identified, 8 species (3 threatened and 5 priority) were identified in the NatureMap and PMST reports (Table 4). The conservation code descriptions are provided in Appendix 3.

Of the conservation significant species indicated to potentially be found in the area, Natural Area considers that habitat to be suitable for nine species based on the soil type, drainage and location. These are highlighted green in Table 4.

Table 4: Potential threatened and priority species indicated by online databases

Species	Common Name	Cons. Code	NatureMap	PMST	DBCA
Acacia benthamii	Bentham's wattle	P2			X
Austrostipa mundula		P3			X
Andersonia gracilis	Slender Andersonia	T, EN		X	
Anigozanthos viridis subsp. terraspectans	Dwarf Green Kangaroo Paw	T, VU		X	
Baeckea sp. Limestone		P1			X
Caladenia huegelii	Grand Spider Orchid	T, EN		X	X
Calectasia elegans	Elegant Tinsel Lily	P2			X
Conostylis bracteata		P3			X
Cyathochaeta teretifolia		P3			X
Diuris micrantha	Dwarf Bee Orchid	T, VU		X	
Diuris purdiei	Purdie's Donkey Orchid	T, EN		X	
Drakaea elastica	Glossy-leaved Hammer Orchid	T, EN		X	

Species	Common Name	Cons. Code	NatureMap	PMST	DBCA
Drakaea micrantha	Dwarf Hammer Orchid	T, VU		X	
Drosera patens		P1	X		X
Drosera x *sidjamesii*		P1	X		X
Eucalyptus argutifolia	Wabling Hill Mallee	T, VU		X	X
Fabronia hampeana		P2			X
Grevillea sp. Ocean Reef		P1			X
Hibbertia leptotheca		P3			X
Jacksonia gracillima		P3			X
Jacksonia sericea	Waldjumi	P4	X		X
Lecania turicensis var. turicensis		P2			X
Leucopogon sp. Yanchep		P3			X
Marianthus paralius		T			X
Melaleuca sp. Wanneroo		T, EN		X	X
Pimelea calcicola		P3			X
Pithocarpa corymbulosa	Corymbose Pithocarpa	P3			X
Poranthera moorokatta		P2	X		X
Sarcozona bicarinata		P3			X
Stenanthemum sublineare		P2			X
Stylidium longitubum	Jumping Jacks	P4			X
Stylidium paludicola		P3			X
Stylidium maritimum		P3	X		
Styphelia filifolia		P3			X
Tetraria sp. Chandala		P2			X
Thelymitra variegata	Queen of Sheba	P2			X
Tripterococcus sp. Brachylobus		P4			X

4.1.2 Threatened Ecological Communities

The Protected Matters Search Tool (PMST) (Department of Agriculture, Water and the Environment, 2020) indicated that there is potential for two listed Threatened Ecological Communities to occur within the site (Table 5).

Table 5: Potential Threatened Ecological Communities indicated by online databases

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

4.1.3 Literature Review

A literature review of previous environmental surveys conducted within the Mather Drive bushland was undertaken during the preparation of this report, with the conservation significant information recorded as follows:

- *Ground Truthing of Environmental Values lot 4 Flynn Drive, Neerabup* (Eco Logical 2012) the survey identified:
  - 28 additional trees from the original 15 trees identified by ATA Environmental (2007). Due to survey limitations, Eco Logical recommended a thorough and systemic search of the entire site for all potential habitat trees to be identified.
  - No threatened or priority species.
  - The threatened ecological community (TEC) FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands was recorded in Lot 9000 approximately 110 m south-east of Lot 9100 survey site.
  - Site includes Lots 9100, 9003 and Mather Reserve (previously zoned as Lot 4).
  - Foraging and habitat trees were identified based on unpublished reports from ATA Environmental (2007) and RPS (2006) as well as in accordance with *Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris, Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii, Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso* (Department of Sustainability, Environment, Water, Population and Communities, 2011)
- *Black Cockatoo Habitat Survey (Neerabup Industrial Area) Offset Sites* (Ecoscape 2020a) the survey identified:
  - A total of 65 habitat trees within lot 9100.
  - Six habitat trees within Lot 41.
  - Foraging and habitat trees were identified based on Commonwealth guidance *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso* (Department of Sustainability, Environment, Water, Population and Communities, 2012), *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) Calyptorhynchus latirostris Baudin's Cockatoo (Vulnerable) Calyptorhynchus baudinii Forest Red-tailed Black Cockatoo (Vulnerable) Calyptorhynchus banksii naso* (Department of the Environment and Energy, 2017) with breeding trees classified based on the habitat value grading system developed by Bamford 2016.
- *Vegetation Assessment, Mather Reserve Neerabup and Lot 24 Mary Street Wanneroo* (Ecoscape 2019) the survey identified:
  - Confirmed the location of the TEC FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands
  - The priority species *Conostylis bracteata* (P3), However as it was not found within these same quadrats in 2016 or the 2019 (Ecoscape 2020b) and it is a perennial species this was likely a misidentification of another *Conostylis* species
- *Vegetation Assessment, Mather Reserve Neerabup and Lot 24 Mary Street Wanneroo* (Ecoscape 2020b) the survey identified:

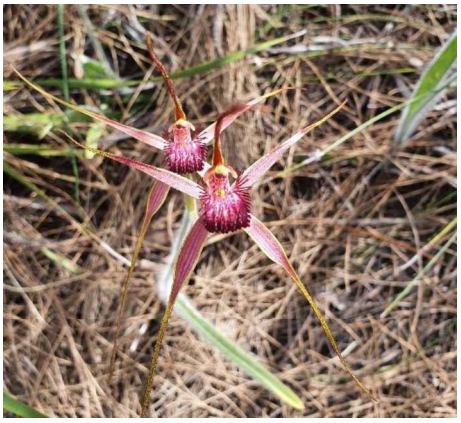
    - Confirmed the location of the TEC FCT SCP 20a – Banksia attenuata woodlands over species rich dense shrublands
- *Level 2 Flora and Vegetation Assessment of Conservation Offset Areas* (Terratree 2016) the survey identified:
    - Confirmed the location of the TEC FCT SCP 20a – Banksia attenuata woodlands over species rich dense shrublands in Lot 9000 to the east of Lot 41 and Lot 9100.
    - No threatened flora species recorded
    - Two Priority species including *Acacia benthamii* (P2) and *Stylidium maritimum* (P3) were recorded in Lot 9000 to the south-east of Lot 9100 with only one individual of each recorded.

Natural Area agrees with the previously determined vegetation type of *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland (EmBAf) found on site, and it is acknowledged that the TEC is only 110 m to the south east of Lot 9100 and Lot 41. There was no previous recording of threatened and priority flora within the three sites surveys for spring 2020.

4.2 Field Survey Results

4.2.1 Flora

A total of 167 flora species (taxa) were recorded from 44 families during the field survey, including 36 introduced species and 131 natives. Of these 167 species, 106 were dicotyledons and 61 were monocotyledons. There were 57 species recorded at the Mather Drive Road Reserve, 122 species recorded at Lot 9100 and 92 recorded at Lot 41. Mather Drive Road Reserve showed the lowest species diversity due to previous disturbance and a high abundance of weeds present on site. Lot 9100 and Lot 41 both had moderate native species diversity, with low abundance of weeds except at the periphery of the bushland. No threatened or priority species, or regionally significant flora were recorded. Examples of native flora species recorded are provided in Figure 4. The complete flora species list showing species recorded per site is provided in Appendix 4, quadrat data in Appendix 5.



Caladenia arenicola (Lot 9100)

Kennedia prostrata (Scarlet Runner) (Lot 9100)

Stirlingia latifolia (Blueboy) (Mather Dr RR)

Figure 4: Examples of native flora species recorded during the flora assessment

4.2.2 Introduced Flora

Of the total flora taxa recorded within the three sites 36 (21.5%) are introduced species, none of which were classified as declared pest or weeds of national significance (WoNS). Examples of non-native species are shown in in Figure 5

*Hottentot Fig (*Carpobrotus edulis)* (Lot 9100)

*Cape Weed (Mather Dr RR) (*Arctotheca calendula)*

**Osteospermum ecklonis* (Lot 41)

Figure 5: Examples of introduced flora species recorded during the flora assessment

The Department of Biodiversity, Conservation and Attractions (2020e) has developed a Weed Prioritisation Process for the Swan Region which is used as a tool to determine weed management priorities on their land and is a useful guide for others. Species are given an ecological impact rating of unknown (U), low (L), medium (M) or high (H). The weed species found in the three sites and their ecological impact ratings are listed in Table 6, weeds listed as high or medium should be the focus of future weed control planning for the site.

Table 6: Swan Region Ecological Impact Rating for Weeds at the three Mather Road Sites

Species	Common Name	Ecological Impact
**Acacia iteaphylla*	Flinders Range Wattle	H
**Aira cupaniana*		U
**Arctotheca calendula*	Cape Weed	H
**Avena barbata*	Bearded Oat	H
**Brassica tournefortii*	Mediterranean Turnip	H
**Briza maxima*	Blowfly Grass	U
*Carpobrotus edulis	Hottentot Fig	H
**Crassula glomerata*		U
**Ehrharta calycina*	Perennial Veldt Grass	H
*Eragrostis curvula	African Lovegrass	H
*Erodium botrys	Long Storksbill	U
**Euphorbia terracina*	Geraldton Carnation Weed	H
**Gladiolus caryophyllaceus*	Wild Gladiolus	H
**Hypochaeris glabra*	Smooth Catsear	H
**Lavandula sp.*	Lavender	U
*Leontodon rhagadioloides	Cretan Weed	L
**Lolium rigidulum*	Wimmera Ryegrass	H
**Lotus subbiflorus*		H
**Lupinus cosentinii*	Blue Lupin	H
**Lysimachia arvensis*	Pimpernel	U
**Monoculus monstrosus*	Stinking Roger	M
**Oenothera drummondii*	Beach evening Primrose	U
**Ornithopus compressus*	Yellow Serradella	M
**Osteospermum ecklonis*	Veldt Daisy	U
**Oxalis purpurea*	Largeflower Wood Sorrell	H
**Pelargonium capitatum*	Rose Pelargonium	H

Species	Common Name	Ecological Impact
**Phytolacca octandra*	Red Ink Plant	U
**Ricinus communis*	Castor Oil	M
**Sonchus oleraceus*	Common Sowthistle	U
**Trachyandra divaricata*	Onion weed	M
**Trifolium arvense*	Hare's-foot Clover	U
**Trifolium campestre*	Hop Clover	U
**Urospermum picroides*	False Hawkbit	M
**Ursinia anthemoides*	Ursinia	U
**Vulpia myuros*	Rat's Tail Fescue	H
**Wahlenbergia capensis*	Cape Bluebell	U

4.2.3 Vegetation Type

One vegetation type was recorded within the three survey sites on Mather Drive, namely *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland (Figure 6). This consisted of *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland over *Hibbertia hypericoides*, *Xanthorrhoea preissii* and mixed shrubland. Understory species comprised of *Mesomelaena pseudostygia*, mixed native herbs and sedges with weedy grasses present in more disturbed areas. This vegetation type relates to SCP 28 *Banksia attenuata* or *Banksia attenuata* – *Eucalyptus* Woodland. This vegetation community was consistent with what was recorded by Eco Logical in 2012 and confirmed in surveys undertaken by Ecoscape in 2019.

Figure 6: Vegetation in Excellent condition in Lot 9100 (left) and in Degraded condition in Mather Drive Road Reserve (right)

4.2.4 Ecological Communities Floristic Community Analysis

A comparison of the three sites flora quadrats to the Gibson *et al*. 1994 data found the highest similarity of 30-39.1% with quadrat KING2, which refers to floristic community type SCP 28 *Banksia attenuata* or *Banksia attenuata* – *Eucalyptus* Woodland. This species is a subgroup of the Banksia Woodlands of the Swan Coastal

Plain but does not have its own conservation ratings for Western Australia or the Commonwealth and is not considered a TEC or PEC.

Due to the large number of quadrats in the Gibson et al. (1994) dataset a comparison was undertaken to compare the similarity of the flora quadrats on site to the those related to the TEC Banksia Woodland of the Swan Coastal Plain. This comparison showed the highest similarity with community type 21a Central *Banksia attenuata – Eucalyptus marginata* Woodlands (Low04) (Figure 8, Table 7). Floristic community types are assigned to vegetation types based on quadrat similarity matrix results and assessment of vegetation structure and species present. As the similarity of the three site quadrats with the FCT 21a is low ranging from 10.8 – 30.7% and dominant species in this community type do not match what was found it is not considered to be this community.

Table 7: Mather Drive quadrat comparison with Banksia TEC quadrats from Gibson *et al.* (1994)

Mather Drive Quadrats	Similarity with SCP 21a (%)	Comments
Lot 41		
Q1	17.2	Average 19.3% similarity which is low and not considered significant and is not considered to be the SCP21a community
Q2	23.4	
Q3	19.2	
Lot 9100		
Q1	23.4	Average 25.3% similarity which is low and not considered significant and is not considered to be the SCP21a community
Q2	21.9	
Q3	30.7	
Mather Drive Road Reserve		
Q1	10.8	Average 10.6% similarity which is very low and not considered significant and is not considered to be the SCP21a community
Q2	6.45	
Q3	14.5	

Statistical Similarity Between Sites

Analysis of the similarity of each of the quadrats within the three survey sites showed that the quadrats at Mather Drive Road Reserve formed a distinct floristic group than those of the other two sites, with approximately 40% similarity to the other two sites (Figure 7). This result is expected due to Mather Drive Road Reserve being isolated from the other two sites and having vegetation in poorer condition than vegetation found at Lot 9100 and Lot 41. Lot 9100 and Lot 41 had a close similarity in terms of the floristic analysis to each other with 60% or higher, which is expected since the two lots are located adjacent to each other and contain vegetation in a similar condition. Although vegetation condition may have altered the statistical similarity of the site they are considered to be the same vegetation type as they have the same dominant species.

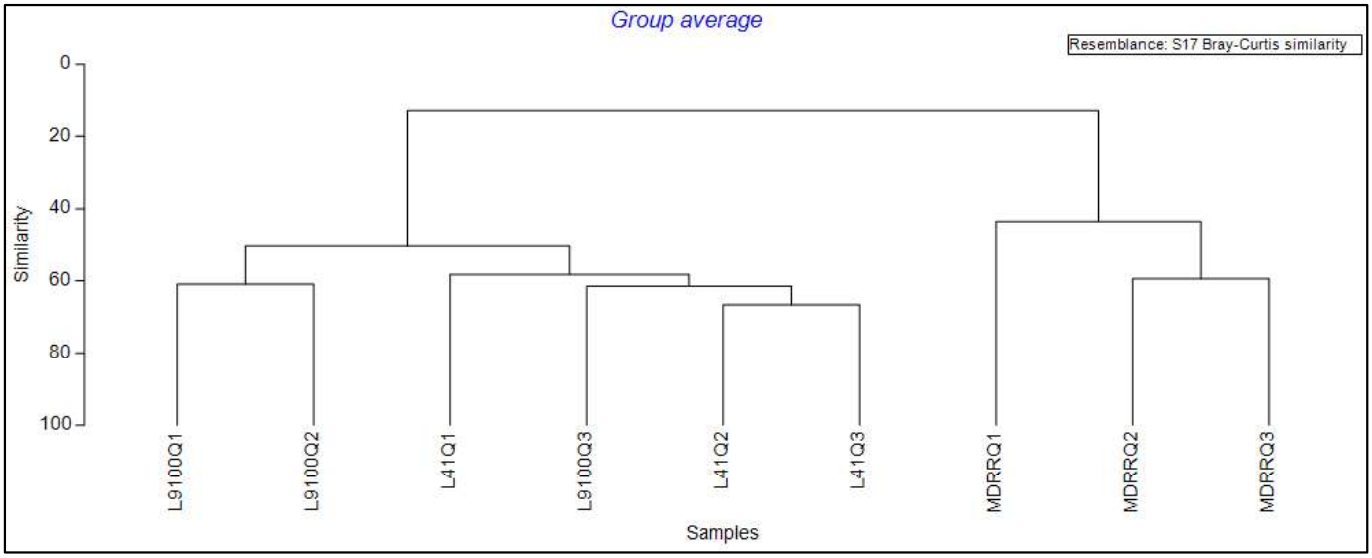


Figure 7: Floristic analysis dendrogram comparing similarity between quadrats at each of the three sites.

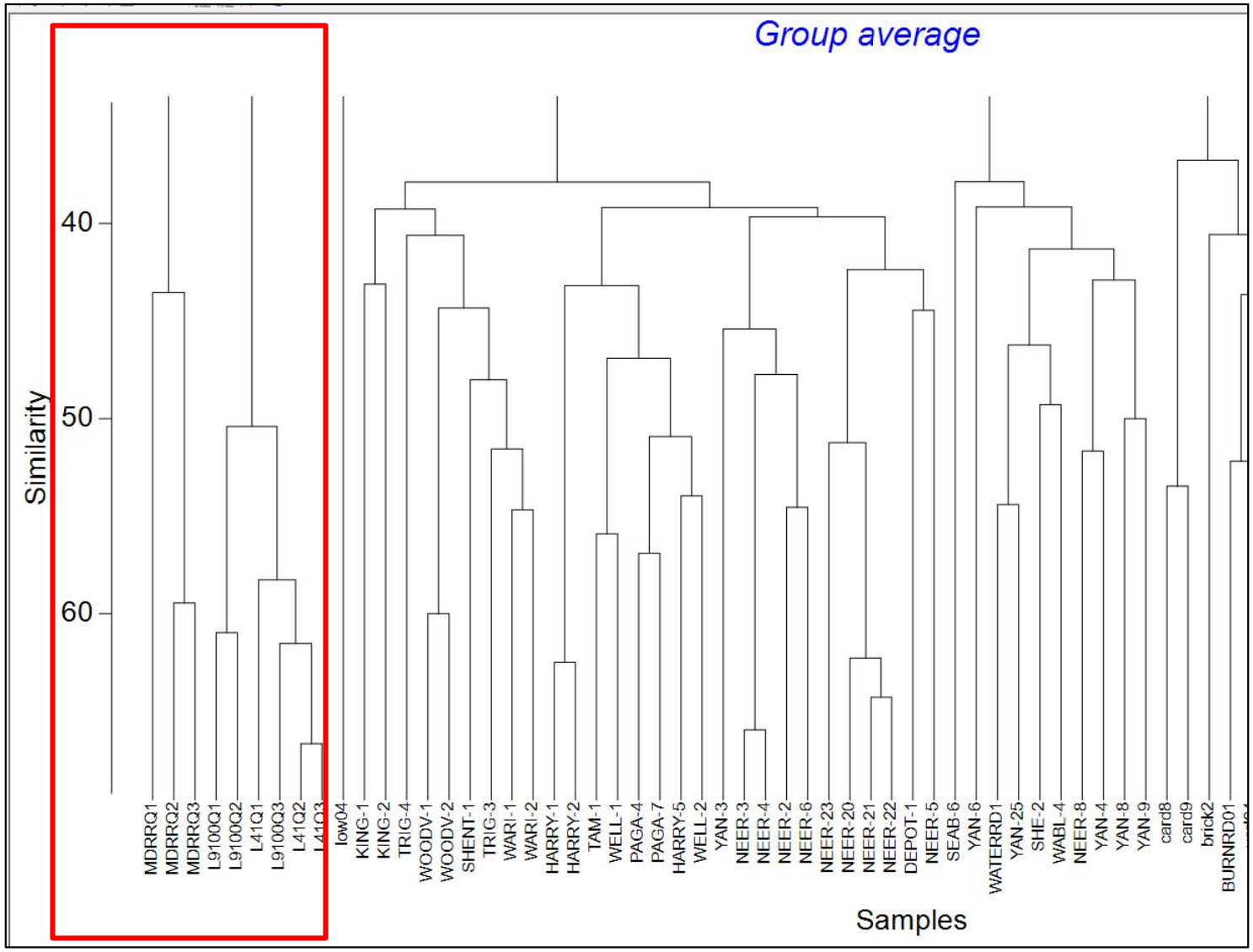


Figure 8: Close up of the Mather Drive Road reserve quadrat (shown in red box) comparison to the Gibson *et al.* (1994) dataset.

4.2.5 Vegetation Condition

Vegetation condition ranged from Completely Degraded to Very Good across the three Mather Drive survey sites (Table 8 - 10, Figure 9). The majority of the Mather Drive Road Reserve was in Completely Degraded condition with small remnant patches of Good vegetation due to previous disturbances and clearing from prior land uses (Table 8). There were also signs of unauthorised access and rubbish dumping which has decreased the vegetation condition of this area, whilst lesser rubbish dumping was noted in Lots 9100 and 41. Lot 9100 was mostly in Excellent condition, with lower condition areas occurring on the periphery of the vegetated site and where clearing occurred in 2019-2020 to salvage Grass Trees within the centre of the Lot (Table 9). The vegetated area of Lot 41 were mostly in Excellent condition with cleared areas around the periphery and areas within the drainage sump classed as completely degraded containing mostly weed species (Table 10).

Vegetation condition in Lot 9000 to the east of Lot 9100 and Lot 41 was mostly in excellent condition and is fairly consistent with what was present within these two Lots. The area adjacent Mather Drive Road Reserve had variable vegetation condition, with areas to the west similarly degraded due to previous clearing and disturbance. The areas east of this site were in better condition ranging form Good to Excellent with more intact vegetation present.

Table 8: Vegetation condition Mather Drive Road Reserve

Vegetation Condition	Excellent	Very Good	Good	Degraded	Completely Degraded	Totals
Area (ha)	0	0	0.3	1.8	0.5	2.6
Area (%)	0	0	11.6	69.2	19.2	100

Table 9: Vegetation condition Lot 9100 Mather Drive

Vegetation Condition	Excellent	Very Good	Good	Degraded	Completely Degraded	Totals
Area (ha)	8.8	5.2	0.3	0	2.3	16.6
Area (%)	53	31.3	1.8	0	13.9	100

Table 10: Vegetation condition Lot 41 Mather Drive

Vegetation Condition	Excellent	Very Good	Good	Degraded	Completely Degraded	Totals
Area (ha)	0.5	0	0	0	0.2	0.7
Area (%)	71.4	0	0	0	28.6	100

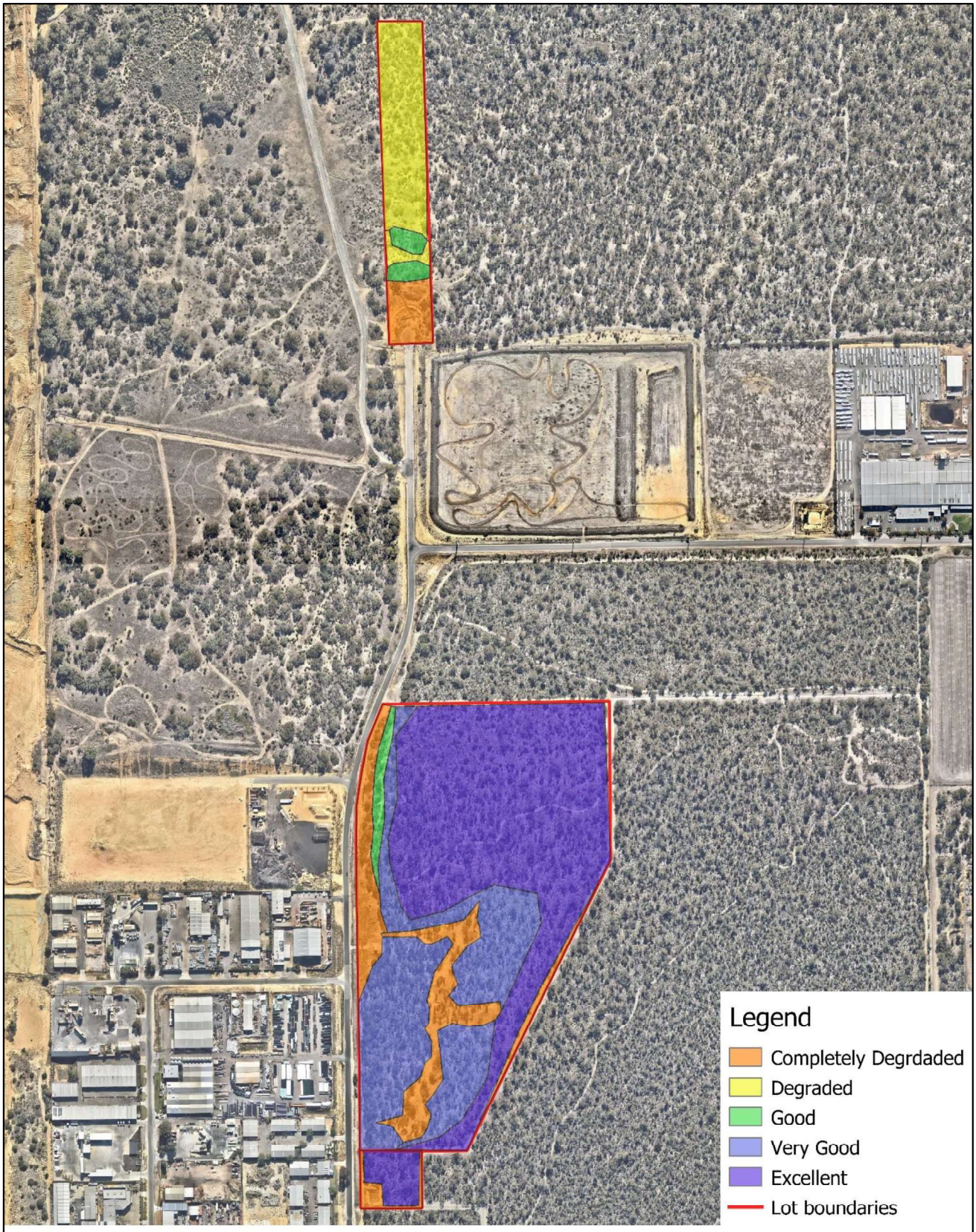


Figure 9:
Vegetation Condition
Mather Drive Reserves
Neerabup, WA

5.0 Implications of Results

5.1 Flora Species

All three of the Mather Drive survey sites are remnant Jarrah, Banksia and Allocasuarina Woodland areas, within the City of Wanneroo. The Mather Drive Road Reserve has a history of clearing and disturbance and is in relatively degraded condition. Lot 41 and 9100 remain largely intact with remnant vegetation lots and degraded areas persisting at the periphery of vegetation blocks and where salvaging for Grass Trees has occurred in Lot 9100.

Overall, the three sites do have a high level of flora diversity, with 167 flora species (taxa) recorded across the three sites, of which 131 (78.5%) are natives and 36 (21.5%) introduced species, which is common for jarrah and Banksia dominated vegetation throughout the Swan Coastal Plain. Lots 41 and 9100 have higher plant diversity than Mather Drive Road Reserve due to less degradation present, with 92, 123 and 57 species recorded, respectively. Lot 9100 contained the highest diversity due the large size of the lot in relation to the other two sites. No threatened or priority flora species were recorded within the three sites.

5.2 Threatened Ecological Communities

No threatened or priority communities listed under the Envi*ronment Protection and Biodiversity Conservation Act 1999* (Cwlth) were determined to be within any of the three Mather Road survey sites. With the closest threatened ecological community Banksia Woodlands of the Swan Coastal Plain – SCP21a Central *Banksia attenuata – Eucalyptus marginata* Woodlands only sharing 10.6% - 25.3% similarity to the vegetation community assessed on site, which is a low similarity and not considered statistically significant.

The TEC FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands was recorded in Lot 9000 approximately 110 m south-east of Lot 9100 survey site by Eco Logical in 2012. The ecological community SCP 28 *Banksia attenuata* or *Banksia attenuata – Eucalyptus* Woodland was assigned to all three of the survey sites and this community does not have a conservation status listed for the state or commonwealth.

5.3 Introduced Flora Species

Of the total flora species recorded 36 (21.5%) were introduced species, all of which are common bushland weed species around the Perth Metro region. No weeds of national significance listed by the Australian Government or declared pests listed under the *Biosecurity and Agriculture Management Act 2007* (WA) were recorded within any of the three sites. The most common weed species recorded were from the Asteraceae (daisies) and Poaceae (grasses) families.

5.4 Conclusion

Overall, all three sites have a high level of flora diversity which is consistent for the Jarrah, Banksia and Allocasuarina Woodland vegetation type on the Swan Coastal Plain. No threatened or priority flora or ecological communities were recorded within the three sites. No regionally significant flora species were recorded in the area. Surveys were undertaken in accordance with the *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016). No additional surveys for flora are recommended for these sites.

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Appendix 1: NatureMap Report

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 31/08/2020

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115° 47' 26" E,31° 40' 42" S
Buffer	3km
Group By	Species Group

Species Group	Species	Records
Amphibian	3	11
Bird	74	480
Dicotyledon	64	79
Fungus	1	3
Invertebrate	18	30
Mammal	6	9
Monocotyledon	29	37
Reptile	18	49
TOTAL	**213**	**698**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25410	*Heleioporus eyrei (Moaning Frog)*			
2.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
3.	25420	*Myobatrachus gouldii (Turtle Frog)*			
Bird					
4.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
5.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
6.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
7.	24262	*Acanthiza inornata (Western Thornbill)*			
8.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
9.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
10.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
11.	24561	*Anthochaera carunculata (Red Wattlebird)*			
12.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
13.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
14.	41324	*Ardea modesta (great egret, white egret)*			
15.		*Barnardius zonarius*			
16.	25715	*Cacatua roseicapilla (Galah)*			
17.	25716	*Cacatua sanguinea (Little Corella)*			
18.	24727	*Cacatua sanguinea subsp. westralensis (Little Corella)*			
19.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
20.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
21.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
22.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
23.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
24.	24613	*Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)*			
25.	24399	*Columba livia (Domestic Pigeon)*	Y		
26.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
27.	25592	*Corvus coronoides (Australian Raven)*			
28.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
29.	25595	*Cracticus tibicen (Australian Magpie)*			
30.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
31.	25596	*Cracticus torquatus (Grey Butcherbird)*			
32.	24424	*Cracticus torquatus subsp. torquatus (Grey Butcherbird)*			
33.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
34.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
35.		*Eolophus roseicapillus*			
36.	24368	*Eurostopodus argus (Spotted Nightjar)*			
37.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
38.	25623	*Falco longipennis (Australian Hobby)*			
39.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
40.	25530	*Gerygone fusca (Western Gerygone)*			
41.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
42.	24443	*Grallina cyanoleuca (Magpie-lark)*			
43.	24295	*Haliastur sphenurus (Whistling Kite)*			
44.	47965	*Hieraaetus morphnoides (Little Eagle)*			
45.	24491	*Hirundo neoxena (Welcome Swallow)*			
46.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
47.	25661	*Lichmera indistincta (Brown Honeyeater)*			
48.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
49.	25654	*Malurus splendens (Splendid Fairy-wren)*			
50.	24552	*Malurus splendens subsp. splendens (Splendid Fairy-wren)*			
51.	24583	*Manorina flavigula (Yellow-throated Miner)*			
52.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
53.	24598	*Merops ornatus (Rainbow Bee-eater)*			
54.	25693	*Microeca fascinans (Jacky Winter)*			
55.	24738	*Neophema elegans (Elegant Parrot)*			
56.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
57.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
58.	24624	*Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)*			
59.	25682	*Pardalotus striatus (Striated Pardalote)*			
60.	48061	*Petrochelidon nigricans (Tree Martin)*			
61.	48066	*Petroica boodang (Scarlet Robin)*			
62.	24409	*Phaps chalcoptera (Common Bronzewing)*			
63.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
64.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
65.	25720	*Platycercus icterotis (Western Rosella)*			
66.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
67.		*Purpureicephalus spurius*			
68.	48096	*Rhipidura albiscapa (Grey Fantail)*			
69.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
70.	30948	*Smicrornis brevirostris (Weebill)*			
71.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
72.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
73.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
74.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
75.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
76.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
77.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
Dicotyledon					
78.	3409	*Acacia lasiocarpa (Panjang)*			
79.	30032	*Acacia saligna subsp. saligna*			
80.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
81.	6311	*Andersonia heterophylla*			
82.	20283	*Astartea scoparia (Common Astartea)*			
83.	6331	*Astroloma microcalyx (Native Cranberry)*			
84.	7046	*Bellardia trixago (Bellardia)*	Y		
85.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
86.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
87.	2957	*Cassytha racemosa (Dodder Laurel)*			
88.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
89.	4552	*Comesperma confertum*			
90.	15511	*Conospermum boreale*			
91.	1876	*Conospermum incurvum (Plume Smokebush)*			
92.	1885	*Conospermum triplinervium (Tree Smokebush)*			
93.	17104	*Corymbia calophylla (Marri)*			
94.	6218	*Daucus glochidiatus (Australian Carrot)*			
95.	4746	*Diplopeltis huegelii*			
96.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
97.	48710	*Drosera micrantha*			
98.	3118	*Drosera pallida (Pale Rainbow)*			
99.	31233	*Drosera patens*		P1	
100.	30712	*Drosera x sidjamesii*		P1	
101.	5615	*Eucalyptus decipiens (Limestone Marlock, Moit)*			
102.	13541	*Eucalyptus petrensis*			
103.	7323	*Galium murale (Small Goosegrass)*	Y		
104.	6143	*Glischrocaryon aureum (Common Popflower)*			
105.	2175	*Hakea lissocarpha (Honey Bush)*			
106.	2214	*Hakea trifurcata (Two-leaf Hakea)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
107.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
108.	3016	*Heliophila pusilla*	Y		
109.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
110.	45534	*Hibbertia hypericoides subsp. hypericoides*			
111.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
112.	6222	*Homalosciadium homalocarpum*			
113.	12859	*Hovea trisperma var. trisperma*			
114.	6232	*Hydrocotyle hispidula*			
115.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
116.	4027	*Jacksonia sericea (Waldjumi)*		P4	
117.	4044	*Kennedia prostrata (Scarlet Runner)*			
118.	5850	*Leptospermum laevigatum (Coast Teatree)*	Y		
119.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
120.	6456	*Lysinema ciliatum (Curry Flower)*			
121.	5920	*Melaleuca huegelii (Chenille Honeymyrtle)*			
122.	18598	*Melaleuca systena*			
123.	8106	*Millotia tenuifolia (Soft Millotia)*			
124.	2309	*Petrophile serruriae*			
125.	4675	*Phyllanthus calycinus (False Boronia)*			
126.	5243	*Pimelea ferruginea*			
127.	8177	*Podolepis lessonii*			
128.	42022	*Poranthera moorokatta*		P2	
129.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
130.	4207	*Sphaerolobium medium*			
131.	4713	*Stachystemon axillaris (Leafy Stachystemon)*			
132.	4733	*Stackhousia monogyna*			
133.	2918	*Stellaria media (Chickweed)*	Y		
134.	25831	*Stylidium araeophyllum (Stilt Walker)*			
135.	7745	*Stylidium junceum (Reed Triggerplant)*			
136.	13127	*Stylidium maritimum*		P3	
137.	4256	*Templetonia retusa (Cockies Tongues)*			
138.	6280	*Trachymene pilosa (Native Parsnip)*			
139.	4292	*Trifolium campestre (Hop Clover)*	Y		
140.	8254	*Urospermum picroides (False Hawkbit)*	Y		
141.	8255	*Ursinia anthemoides (Ursinia)*	Y		
Fungus					
142.		*Phytophthora cinnamomi*			
Invertebrate					
143.		*Aname mainae*			
144.		*Araneus senicaudatus*			
145.		*Austracantha minax*			
146.		*Australomimetus ovidi*			
147.		*Eriophora biapicata*			
148.	33977	*Hylaeus globuliferus (woolybush bee)*		P3	
149.		*Isopeda leishmanni*			
150.		*Lampona cylindrata*			
151.		*Latrodectus hasseltii*			
152.		*Maratus pavonis*			
153.		*Nephila edulis*			
154.		*Oecobius navus*			
155.		*Ommatoiulus moreletii*			
156.		*Oratemnus curtus*			
157.		*Pholcus phalangioides*			
158.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
159.		*Venator immansueta*			
160.		*Venatrix pullastra*			
Mammal					
161.	24041	*Felis catus (Cat)*	Y		
162.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
163.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
164.	24223	*Mus musculus (House Mouse)*	Y		
165.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
166.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
Monocotyledon					
167.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
168.	231	*Avellinia michelii*	Y		
169.	244	*Briza maxima (Blowfly Grass)*	Y		
170.	11038	*Caladenia bicalliata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
171.	1595	*Caladenia hirta (Sugar Candy Orchid)*			
172.	1162	*Cartonema philydroides*			
173.	1134	*Centrolepis polygyna (Wiry Centrolepis)*			
174.	1418	*Conostylis aculeata (Prickly Conostylis)*			
175.	11826	*Conostylis aculeata subsp. aculeata*			
176.	10916	*Cyrtostylis huegelii*			
177.	1646	*Eriochilus dilatatus (White Bunny Orchid)*			
178.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
179.	467	*Lagurus ovatus (Hare's Tail Grass)*	Y		
180.	925	*Lepidosperma angustatum*			
181.	945	*Lepidosperma squamatum*			
182.	1228	*Lomandra hermaphrodita*			
183.	1231	*Lomandra maritima*			
184.		*Pterostylis aff. nana*			
185.	17267	*Pterostylis brevisepala*			
186.	12217	*Pterostylis sanguinea*			
187.	1556	*Romulea rosea (Guildford Grass)*	Y		
188.	982	*Schoenus clandestinus*			
189.	992	*Schoenus grandiflorus (Large Flowered Bogrush)*			
190.	1018	*Schoenus subfascicularis*			
191.	1036	*Tetraria octandra*			
192.	1338	*Thysanotus manglesianus (Fringed Lily)*			
193.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
194.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
195.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			

Reptile

196.	24980	*Christinus marmoratus (Marbled Gecko)*			
197.	24918	*Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)*			
198.	30893	*Cryptoblepharus buchananii*			
199.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
200.	25027	*Ctenotus australis*			
201.	25039	*Ctenotus fallens*			
202.	24999	*Delma grayii*			
203.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
204.	25119	*Hemiergis quadrilineata*			
205.	25133	*Lerista elegans*			
206.	25165	*Lerista praepedita*			
207.	25005	*Lialis burtonis*			
208.	25184	*Menetia greyii*			
209.	25192	*Morethia obscura*			
210.	25511	*Pseudonaja affinis (Dugite)*			
211.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
212.	24943	*Strophurus spinigerus subsp. inornatus*			
213.	25207	*Tiliqua rugosa subsp. rugosa*			

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

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

Appendix 2: Protected Matter Search Tool 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: 04/08/20 13:04:36

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 3.0Km

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	19
Listed Migratory Species:	10

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:	15
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:	None
Regional Forest Agreements:	None
Invasive Species:	34
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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

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

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely 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 within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Insects		
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Mammals		

Name	Status	Type of Presence
Dasyurus geoffroii Chuditch, Western Quoll [330]	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
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat may occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may 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 may occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat known to occur within area
Melaleuca sp. Wanneroo (G.J. Keighery 16705) [89456]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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 known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to 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 known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to 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

Name	Threatened	Type of Presence within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

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 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

Name	Status	Type of Presence
Sturnus vulgaris Common Starling [389]		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
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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
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 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		Species or species habitat likely to occur

Name	Status	Type of Presence
Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur 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
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
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species 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

-31.684492 115.789122,-31.679379 115.789208,-31.676786 115.790496,-31.676823 115.792556,-31.680256 115.792641,-31.683908 115.790624,-31.683908 115.789981,-31.684638 115.789981,-31.684638 115.789122,-31.684492 115.789122

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 3: Conservation Codes

Western Australia

Conservation Code	Name	Description
T	Threatened	Flora or fauna that is rare or likely to become extinct, ranked according to their level of threat using IUCN Red List criteria (Schedules 1-3 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice)
CR	Critically endangered	Species considered to be facing an extremely high risk of extinction within the wild in the immediate future
EN	Endangered	Species considered to be facing a very high risk of extinction in the wild in the near future
VU	Vulnerable	Species considered to be facing a high risk of extinction in the wild in the medium-term future
EX	Extinct Species	Species where 'there is no reasonable doubt that the last member of the species has died (Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice)
EW	Extinct in the Wild	Species that are known to only survive in cultivation, in captivity, or as a naturalised population well outside its past range; and it has not been recorded in its known or expected habitat at appropriate seasons anywhere in its past range, despite surveys over a timeframe appropriate to its life cycle and form
MI	Migratory Species	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth (Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice)
CD	Conservation Dependent	Species of special conservation interest (conservation dependent fauna), being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened (Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice)
OS	Specially Protected	Fauna otherwise in need of special protection to ensure their conservation (Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice)
P	Priority Species	Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of

Conservation Code	Name	Description
		conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.
P1	Priority One	Poorly known species – Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either very small or on lands not managed for conservation, such as road verges, urban areas, farmland, active mineral lease and under threat of habitat destruction or degradation.
2	Priority Two	Poorly known species – Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, such as national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves and similar.
3	Priority Three	Poorly known species – Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat
4	Priority Four	Rare or near threatened and other species in need of monitoring.

(Source: Department of Biodiversity, Conservation and Attractions, 2020a)

Commonwealth

Category	Description
Critically Endangered	Species facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Species facing a very high risk of extinction in the wild in the near future
Vulnerable	Species facing a high risk of extinction in the wild in the medium term

(Source: Department of the Environment and Energy, 2020a)

Appendix 4: Flora Species List

A complete flora list is provided in the table below. *Denotes introduced species (weeds). Species are listed in alphabetical order by species name with weeds listed then native species. Note: x is an indication of presence of species in each site location.

Family	Species Name (taxon)	Lot 41	Lot 9100	Mather Dr Rd Res
Fabaceae	**Acacia iteaphylla*			x
Poaceae	**Aira cupaniana*			x
Asteraceae	**Arctotheca calendula*	x	x	x
Poaceae	**Avena barbata*	x		
Brassicaceae	**Brassica tournefortii*		x	x
Poaceae	**Briza maxima*	x	x	x
Aizoaceae	**Carpobrotus edulis*	x	x	x
Crassulaceae	**Crassula glomerata*			x
Poaceae	**Ehrharta calycina*	x	x	x
Poaceae	**Eragrostis curvula*		x	
Geraniaceae	**Erodium botrys*		x	x
Euphorbiaceae	**Euphorbia terracina*	x	x	
Iridaceae	**Gladiolus caryophyllaceus*	x	x	x
Asteraceae	**Hypochaeris glabra*	x	x	x
Lamiaceae	**Lavandula* sp.		x	
Asteraceae	**Leontodon rhagadioloides*		x	
Poaceae	**Lolium rigidulum*			x
Fabaceae	**Lotus subbiflorus*			x
Fabaceae	**Lupinus cosentinii*		x	
Primulaceae	**Lysimachia arvensis*			x
Asteraceae	**Monoculus monstrosus*			x
Onagraceae	**Oenothera drummondii*		x	
Fabaceae	**Ornithopus compressus*			x
Asteraceae	**Osteospermum ecklonis*	x		
Oxalidaceae	**Oxalis purpurea*			x
Geraniaceae	**Pelargonium capitatum*		x	x
Phytolaccaceae	**Phytolacca octandra*			x
Euphorbiaceae	**Ricinus communis*		x	
Asteraceae	**Sonchus oleraceus*	x		x
Asphodelaceae	**Trachyandra divaricata*		x	
Fabaceae	**Trifolium arvense*			x
Fabaceae	**Trifolium campestre*		x	x
Asteraceae	**Urospermum picroides*			x
Asteraceae	**Ursinia anthemoides*	x	x	x
Poaceae	**Vulpia myuros*			x
Campanulaceae	**Wahlenbergia capensis*			x

Family	Species Name (taxon)	Lot 41	Lot 9100	Mather Dr Rd Res
Fabaceae	*Acacia applanata*	x	x	
Fabaceae	*Acacia cochlearis*		x	
Fabaceae	*Acacia huegelii*	x		
Fabaceae	*Acacia pulchella*	x	x	x
Fabaceae	*Acacia saligna*		x	x
Fabaceae	*Acacia sessilis*	x		
Fabaceae	*Acacia pulchella* var. *pulchella*	x		
Proteaceae	*Adenanthos cygnorum*		x	
Restionaceae	*Alexgeorgea nitens*	x	x	
Casuarinaceae	*Allocasuarina fraseriana*	x	x	x
Haemodoraceae	*Anigozanthos humilis*		x	
Haemodoraceae	*Anigozanthos manglesii*		x	
Poaceae	*Austrostipa flavescens*	x		
Poaceae	*Austrostipa flavescens*		x	
Proteaceae	*Banksia attenuata*	x	x	x
Proteaceae	*Banksia dallanneyi*		x	x
Proteaceae	*Banksia grandis*	x	x	
Proteaceae	*Banksia menziesii*		x	x
Proteaceae	*Banksia sessilis*		x	
Pittosporaceae	*Billardiera fraseri*		x	
Fabaceae	*Bossiaea eriocarpa*	x	x	x
Fabaceae	*Bossiaea ornata*		x	
Ericaceae	*Brachyloma preissii*	x	x	
Colchicaceae	*Burchardia congesta*	x	x	
Orchidaceae	*Caladenia arenicola*	x	x	
Orchidaceae	*Caladenia flava*	x	x	
Montiaceae	*Calandrinia corrigioloides*		x	
Dasypogonaceae	*Calectasia narragara*	x		
Myrtaceae	*Calytrix flavescens*		x	
Aizoaceae	*Carpobrotus virescens*		x	
Myrtaceae	*Chamelaucium uncinatum*		x	
Polygalaceae	*Comesperma calymega*		x	
Ericaceae	*Conostephium pendulum*	x		
Haemodoraceae	*Conostylis aculeata*	x	x	x
Haemodoraceae	*Conostylis juncea*		x	
Haemodoraceae	*Conostylis setigera*	x	x	
Hemerocallidaceae	*Corynotheca micrantha*		x	x
Goodeniaceae	*Dampiera linearis*		x	
Fabaceae	*Daviesia nudiflora*	x	x	
Fabaceae	*Daviesia physodes*		x	
Fabaceae	*Daviesia triflora*		x	
Restionaceae	*Desmocladus flexuosus*	x	x	x
Hemerocallidaceae	*Dianella revoluta*		x	x

Family	Species Name (taxon)	Lot 41	Lot 9100	Mather Dr Rd Res
Orchidaceae	*Diuris corymbosa*	x	x	
Orchidaceae	*Drakaea glyptodon*		x	
Droseraceae	*Drosera erythrorhiza*	x	x	
Droseraceae	*Drosera menziesii*	x	x	
Droseraceae	*Drosera pallida*	x		
Droseraceae	*Drosera pulchella*		x	
Orchidaceae	*Elythranthera brunonis*		x	
Myrtaceae	*Eremaea pauciflora*	x	x	
Orchidaceae	*Eriochilus dilatatus*	x	x	
Myrtaceae	*Eucalyptus marginata*	x	x	x
Fabaceae	*Gastrolobium capitatum*	x	x	
Fabaceae	*Gompholobium tomentosum*	x	x	
Haemodoraceae	*Haemodorum laxum*	x	x	x
Haemodoraceae	*Haemodorum paniculatum*			x
Haemodoraceae	*Haemodorum spicatum*	x		x
Proteaceae	*Hakea lissocarpha*	x		x
Proteaceae	*Hakea prostrata*		x	x
Proteaceae	*Hakea trifurcata*	x	x	
Fabaceae	*Hardenbergia comptoniana*	x	x	x
Dilleniaceae	*Hibbertia huegelii*	x	x	
Dilleniaceae	*Hibbertia hypericoides*	x	x	x
Dilleniaceae	*Hibbertia racemosa*		x	
Fabaceae	*Hovea trisperma*	x	x	
Violaceae	*Hybanthus calycinus*	x		
Myrtaceae	*Hypocalymma robustum*	x	x	
Restionaceae	*Hypolaena exsulca*		x	
Fabaceae	*Isotropis cuneifolia*	x	x	
Fabaceae	*Jacksonia furcellata*			x
Fabaceae	*Jacksonia sternbergiana*	x	x	x
Fabaceae	*Kennedia prostrata*	x	x	
Asteraceae	*Lagenophora huegelii*	x	x	
Restionaceae	*Lepidobolus preissianus*		x	
Cyperaceae	*Lepidosperma scabrum*	x	x	
Cyperaceae	*Lepidosperma* sp.	x		
Orchidaceae	*Leporella fimbriata*		x	
Campanulaceae	*Lobelia tenuior*	x		
Asparagaceae	*Lomandra caespitosa*		x	x
Asparagaceae	*Lomandra hermaphrodita*	x	x	
Asparagaceae	*Lomandra micrantha*			x
Asparagaceae	*Lomandra nigricans*	x		
Asparagaceae	*Lomandra preissii*	x	x	
Asparagaceae	*Lomandra sericea*	x	x	
Asparagaceae	*Lomandra suaveolens*		x	

Family	Species Name (taxon)	Lot 41	Lot 9100	Mather Dr Rd Res
Restionaceae	*Lyginia imberbis*		x	
Cyperaceae	*Mesomelaena pseudostygia*	x	x	
Asteraceae	*Olearia axillaris*	x	x	
Rubiaceae	*Opercularia vaginata*	x	x	
Iridaceae	*Orthrosanthus laxus*		x	
Iridaceae	*Patersonia occidentalis*	x	x	
Proteaceae	*Persoonia saccata*	x		
Proteaceae	*Petrophile linearis*	x	x	
Proteaceae	*Petrophile macrostachya*	x	x	
Myrtaceae	*Philotheca spicata*	x	x	
Haemodoraceae	*Phlebocarya ciliata*		x	
Phyllanthaceae	*Phyllanthus calycinus*			x
Thymelaeaceae	*Pimelea sulphurea*	x	x	
Asteraceae	*Podotheca gnaphalioides*	x	x	
Phyllanthaceae	*Poranthera microphylla*		x	
Orchidaceae	*Pterostylis recurva*	x		
Orchidaceae	*Pterostylis* sp.	x	x	
Amaranthaceae	*Ptilotus manglesii*	x	x	
Amaranthaceae	*Ptilotus polystachyus*		x	x
Orchidaceae	*Pyrorchis nigricans*	x	x	
Goodeniaceae	*Scaevola canescens*	x		
Goodeniaceae	*Scaevola repens*	x		x
Cyperaceae	*Schoenus clandestinus*			x
Cyperaceae	*Schoenus curvifolius*	x	x	
Solanaceae	*Solanum symonii*			x
Asparagaceae	*Sowerbaea laxiflora*	x	x	
Proteaceae	*Stirlingia latifolia*	x	x	
Stylidiaceae	*Stylidium adpressum*		x	
Stylidiaceae	*Stylidium androsaceum*		x	
Stylidiaceae	*Stylidium carnosum*		X	
Stylidiaceae	*Stylidium ciliatum*	x	x	
Stylidiaceae	*Stylidium neurophyllum*	x		
Ericaceae	*Styphelia xerophylla*			x
Cyperaceae	*Tetraria octandra*	x	x	
Orchidaceae	*Thelymitra crinita*	x		
Asparagaceae	*Thysanotus manglesianus*		x	
Asparagaceae	*Thysanotus multiflorus*		x	
Asparagaceae	*Thysanotus thyrsoideus*	x		
Araliaceae	*Trachymene pilosa*	x	x	
Hemerocallidaceae	*Tricoryne tenella*	x		
Campanulaceae	*Wahlenbergia preissii*		x	
Asteraceae	*Waitzia suaveolens*	x	x	
Xanthorrhoeaceae	*Xanthorrhoea brunonis*	x	x	x

Family	Species Name (taxon)	Lot 41	Lot 9100	Mather Dr Rd Res
Xanthorrhoeaceae	*Xanthorrhoea preissii*	x	x	x
Apiaceae	*Xanthosia huegelii*	x	x	

Appendix 5: Quadrat Data

*Denotes introduced species (weeds). Species are listed in alphabetical order by species name.

Quadrat No.: MDRRQ1 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385300
Northing: 6495451
Location: Mather Road Reserve
Topography: Mid-slope
Aspect: South East
Slope: 1-3%
Soil: Sand
Rock: Nil
Leaf Litter: 30%
Bare Ground: 3%
Drainage: Well
Condition: Very Good
Disturbances: Previous clearing, fire >10 yrs

Note: *Eucalyptus marginata, Banksia menziesii* and *Banksia attenuata* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Aira cupaniana*	0	0	0.5	0.2
**Arctotheca calendula*	1	0.1	0	0.1
**Briza maxima*	0.1	0.1	1	0.1
**Crassula glomerata*	0.1	0.1	0	0.1
**Ehrharta calycina*	70	0.1	0	0.1
**Erodium botrys*	0.1	0.1	0	0.1
**Gladiolus caryophyllaceus*	0.1	0.5	0	0.5
**Hypochaeris glabra*	0.5	0.1	0.1	0.1
**Lotus subbiflorus*	0.1	0.1	0	0.1
**Lysimachia arvensis*	0.1	0.1	0	0.1
**Ornithopus compressus*	0.1	0.1	0	0.1
**Oxalis purpurea*	0.1	0.1	0	0.1
**Pelargonium capitatum*	0.1	0.1	0.1	0.1
**Sonchus oleraceus*	0.1	0.1	0.1	0.1
**Urospermum picroides*	0.1	0.1	0	0.1
**Ursinia anthemoides*	3	0.1	0	0.1

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Vulpia myuros*	0.5	0.1	0	0.1
**Wahlenbergia marginata*	0	0	0.1	0.2
Banksia attenuata	5	5	5	5
Banksia menziesii	10	5	10	5
Bossiaea eriocarpa	0.1	0.3	0.1	0.3
Eucalyptus marginata	50	15	50	15
Hakea prostrata	10	3	10	3
Hibbertia hypericoides	10	0.5	10	0.5
Jacksonia sternbergiana	2	2	2	2
Lomandra caespitosa	0.1	0.1	0.1	0.1
Lomandra micrantha	0.5	0.5	0.5	0.5

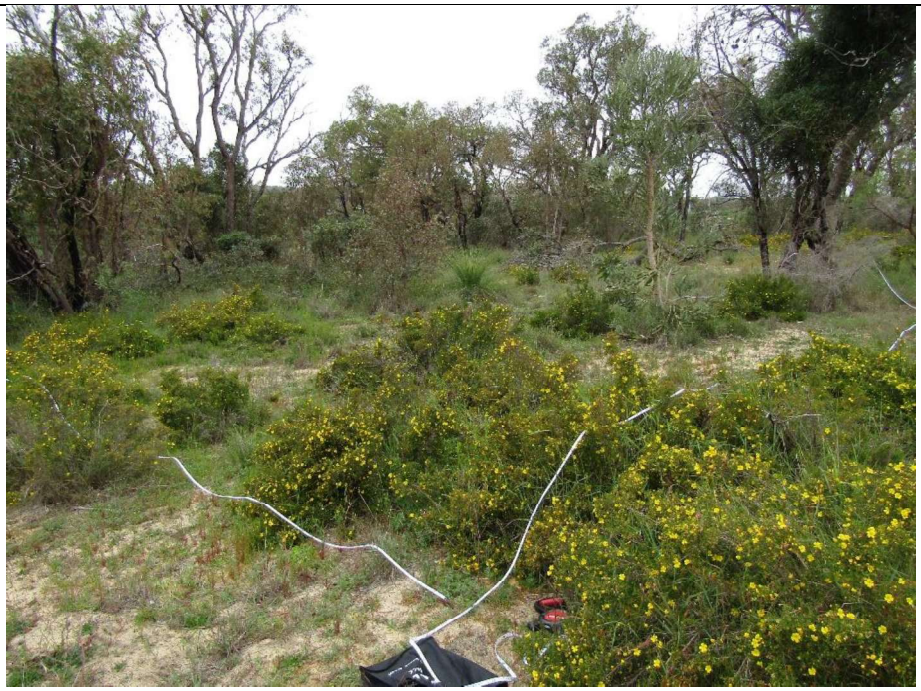
Quadrat No.: MDRRQ2 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385288
Northing: 6495262
Location: Mather Road Reserve
Topography: Mid-slope
Aspect: East
Slope: 1-3%
Soil: Sand
Rock: Nil
Leaf Litter: Nil
Bare Ground: 10%
Drainage: Well
Condition: Very Good
Disturbances: Previous clearing, fire >10 yrs

Note: *Banksia menziesii* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Arctotheca calendula*	0.5	0.1	0.2	0.1
**Brassica tournefortii*	0.5	0.5	0	0.5
**Crassula glomerata*	0.5	0.1	0	0.1
**Ehrharta calycina*	25	0.2	25	0.2
**Erodium botrys*	2	0.1	0	0.1
**Hypochaeris glabra*	0.1	0.1	0.1	0.1
**Lolium rigidulum*	0.1	0.1	0	0.1
**Ornithopus compressus*	0.1	0.1	0	0.1
**Trifolium arvense*	0.1	0.1	0	0.1
**Ursinia anthemoides*	0.1	0.1	0	0.1
**Vulpia myuros*	0.1	0.1	0	0.1
**Wahlenbergia marginata*	0	0	0.1	0.2
Banksia menziesii	1	3	1	3
Desmocladus flexuosus	2.5	0.1	2.5	0.1
Eucalyptus marginata	3	3	3	3
Haemodorum spicatum	0.1	0.3	0.1	0.3
Hardenbergia comptoniana	1	3	1	3

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Hibbertia hypericoides	20	1	20	1
Lomandra micrantha	2	0.3	2	0.3
Ptilotus polystachyus	0.1	0.5	0.1	0.5
Solanum symonii	0.5	1	0.5	1
Xanthorrhoea brunonis	0.5	1	0.5	1
Xanthorrhoea preissii	2	1.5	2	1.5

Quadrat No.: MDRRQ3 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385298
Northing: 6495188
Location: Mather Road Reserve
Topography: Mid-slope
Aspect: South East
Slope: 3-5%
Soil: Sand
Rock: Nil
Leaf Litter: Nil
Bare Ground: 7%
Drainage: Well
Condition: Very Good
Disturbances: Previous clearing, fire >10 yrs



Note: *Banksia menziesii* and *Eucalyptus marginata* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Arctotheca calendula*	0.5	0.1	0.2	0.1
**Brassica tournefortii*	0.5	0.5	0	0.5
**Crassula glomerata*	0.5	0.1	0	0.1
**Ehrharta calycina*	25	0.2	25	0.2
**Erodium botrys*	2	0.1	0	0.1
**Hypochaeris glabra*	0.1	0.1	0.1	0.1
**Lolium rigidulum*	0.1	0.1	0	0.1
**Ornithopus compressus*	0.1	0.1	0	0.1
**Trifolium arvense*	0.1	0.1	0	0.1
**Ursinia anthemoides*	0.1	0.1	0	0.1
**Vulpia myuros*	0.1	0.1	0	0.1
**Wahlenbergia marginata*	0	0	0.1	0.2
Banksia menziesii	1	3	1	3
Desmocladus flexuosus	2.5	0.1	2.5	0.1
Eucalyptus marginata	3	3	3	3
Haemodorum spicatum	0.1	0.3	0.1	0.3

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Hardenbergia comptoniana	1	3	1	3
Hibbertia hypericoides	20	1	20	1
Lomandra micrantha	2	0.3	2	0.3
Ptilotus polystachyus	0.1	0.5	0.1	0.5
Solanum symonii	0.5	1	0.5	1
Xanthorrhoea brunonis	0.5	1	0.5	1
Xanthorrhoea preissii	2	1.5	2	1.5

Quadrat No.: L9100Q1 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385262
Northing: 6494088
Location: Lot 9100
Topography: Plain
Aspect: Flat
Slope: 0%
Soil: Sand
Rock: Nil
Leaf Litter: 5%
Bare Ground: Nil
Drainage: Well
Condition: Very Good
Disturbances: Areas cleared for salvaging 2019/2020

Note: *Eucalyptus marginata, Banksia attenuata* and *Allocasuarina fraseriana* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Briza maxima*	0.1	0.1	0.1	0.1
**Carpobrotus edulis*	0	0	1	0.1
**Ehrharta calycina*	0.2	0.1	0	0.1
**Gladiolus caryophyllaceus*	0.1	0.5	0.1	0.5
**Ursinia anthemoides*	1	0.1	0	0.1
Acacia applanata	0.1	0.2	0.1	0.2
Allocasuarina fraseriana	35	9	35	9
Banksia attenuata	7	6	7	6
Bossiaea eriocarpa	0.1	0.1	0.1	0.1
Bossiaea ornata	0.5	0.3	0.5	0.3
Brachyloma preissii	0.5	0.5	0.5	0.5
Burchardia congesta	0.1	0.5	0.1	0.5
Caladenia arenicola	0.1	0.1	0	0.1
Caladenia flava	0.1	0.1	0	0.1
Conostylis aculeata	0.1	0.2	0.1	0.2
Conostylis setigera	0.1	0.1	0.1	0.1
Daviesia decurrens	0.1	0.2	0.1	0.2

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Daviesia nudiflora	0.5	0.5	0.5	0.5
Desmocladus flexuosus	1	0.1	1	0.1
Dianella revoluta	0.1	0.3	0.1	0.3
Diuris corymbosa	0.1	0.1	0	0.1
Drosera erythrorhiza	0.1	0.1	0	0.1
Eriochilus sp.	0.1	0.1	0	0.1
Eucalyptus marginata	10	20	10	20
Gompholobium tomentosum	0.5	0.3	0.5	0.3
Haemodorum laxum	0.1	0.3	0.1	0.3
Hardenbergia comptoniana	0.1	1	0.1	1
Hibbertia hypericoides	7	0.5	7	0.5
Hypocalymma robustum	1	0.5	1	0.5
Lagenophora huegelii	2	0.1	2	0.1
Lepidobolus preissianus	1	0.5	1	0.5
Lomandra preissii	0.1	0.3	0.1	0.3
Lomandra sericea	0.5	0.3	0.5	0.3
Mesomelaena pseudostygia	5	1	5	1
Opercularia vaginata	0.5	0.2	0.5	0.2
Orthrosanthus laxus	3	0.5	3	0.5
Petrophile macrostachya	0.5	0.2	0.5	0.2
Philotheca spicata	0.1	0.3	0.1	0.3
Pterostylis sp.	0.1	0.2	0	0.2
Ptilotus manglesii	0.1	0.1	0.1	0.1
Ptilotus polystachyus	0.5	0.5	0	0.5
Sowerbaea laxiflora	0.5	0.5	0	0.5
Stirlingia latifolia	0.1	0.3	0.1	0.3
Tetraria octandra	1	0.5	1	0.5
Trachymene pilosa	0.5	0.1	0	0.1
Waitzia suaveolens	0	0	0.1	0.1
Xanthorrhoea preissii	25	1.5	0.1	1.5

Quadrat No.: L9100Q2 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385408
Northing: 6494268
Location: Lot 9100
Topography: Plain
Aspect: Flat
Slope: 0%
Soil: Sand
Rock: Nil
Leaf Litter: 25%
Bare Ground: 20%
Drainage: Well
Condition: Very Good
Disturbances: Areas cleared for salvaging 2019/2020

Note: *Eucalyptus marginata* and *Allocasuarina fraseriana* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Gladiolus caryophyllaceus*	1	0.3	1	0.3
**Hypochaeris glabra*	0.2	0.1	0	0.1
**Ursinia anthemoides*	0.1	0.1	0	0.1
Acacia pulchella	0.5	1	0.5	1
Alexgeorgea nitens	0.1	0.1	0.1	0.1
Allocasuarina fraseriana	30	6	30	6
Bossiaea eriocarpa	0	0	0.5	0.2
Brachyloma preissii	0.5	0.5	0.5	0.5
Caladenia arenicola	0.1	0.1	0	0.1
Caladenia flava	0.1	0.1	0	0.1
Desmocladus flexuosus	0.5	0.1	0.5	0.1
Eriochilus sp.	0.1	0.1	0	0.1
Eucalyptus marginata	4	3	4	3
Gastrolobium capitatum	0.1	0.2	0.1	0.2
Haemodorum laxum	0.1	0.1	0.1	0.1
Hakea lissocarpha	1	1	1	1
Hibbertia hypericoides	5	0.5	5	0.5

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Hypocalymma robustum	0.5	0.5	0.5	0.5
Kennedia prostrata	0.1	0.1	0.1	0.1
Lagenophora huegelii	0.1	0.1	0.1	0.1
Lepidosperma scabrum	0.1	0.5	0.1	0.5
Lomandra caespitosa	0.1	0.1	0.1	0.1
Lomandra preissii	3	0.5	3	0.5
Lomandra sericea	0.5	0.3	0.5	0.3
Lomandra suaveolens	0.1	0.1	0.1	0.1
Mesomelaena pseudostygia	1	0.5	1	0.5
Opercularia vaginata	0.1	0.1	0.1	0.1
Patersonia occidentalis	0.5	0.3	0.5	0.3
Pterostylis sp.	0.2	0.1	0	0.1
Ptilotus manglesii	0	0	0.1	0.1
Sowerbaea laxiflora	1	0.2	0	0.2
Stirlingia latifolia	0.5	0.5	0.5	0.5
Tetraria octandra	1	0.3	1	0.3
Trachymene pilosa	3	0.1	0.1	0.1
Waitzia suaveolens			0.1	0.1
Xanthorrhoea preissii	5	1.5	5	1.5

Quadrat No.: L9100Q3 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385512
Northing: 6494477
Location: Lot 9100
Topography: Plain
Aspect: Flat
Slope: 0%
Soil: Sand
Rock: Nil
Leaf Litter: 5%
Bare Ground: 4%
Drainage: Well
Condition: Very Good
Disturbances: Fire >10yrs

Note: *Eucalyptus marginata, Banksia attenuata, Allocasuarina fraseriana* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Gladiolus caryophyllaceus*	0.1	0.5	0.1	0.5
**Hypochaeris glabra*	0.1	0.1	0	0.1
**Ursinia anthemoides*	0.1	0.1	0	0.1
Allocasuarina fraseriana	1	3	1	3
Anigozanthos humilis	0.1	0.1	0.1	0.1
Austrostipa flavescens	0.1	0.1	0	0.1
Banksia attenuata	6	8	6	8
Bossiaea eriocarpa	0.1	0.2	0.1	0.2
Brachyloma preissii	0.5	0.4	0.5	0.4
Caladenia flava	0.1	0.1	0	0.1
Calectasia narragara	0.1	0.1	0.1	0.1
Calytrix flavescens	0.5	0.3	0.5	0.3
Conostylis setigera	0.5	0.1	0.5	0.1
Desmocladus flexuosus	1	0.1	1	0.1
Drakaea glyptodon	0.1	0.1	0	0.1
Drosera erythrorhiza	0.5	0.1	0	0.1
Drosera menziesii	0.5	0.3	0	0.3
Drosera pulchella	0.1	0.1	0	0.1
Eriochilus sp.	0.1	0.1	0	0.1

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Eucalyptus marginata	6	8	6	8
Gastrolobium capitatum	0.5	0.3	0.5	0.3
Gompholobium tomentosum	1	0.2	1	0.2
Haemodorum laxum	1	0.3	0.5	0.3
Hibbertia huegelii	0.5	0.3	0.5	0.3
Hibbertia hypericoides	25	0.5	25	0.5
Hovea trisperma	0.5	0.1	0.5	0.1
Hypocalymma robustum	0.5	0.4	0.5	0.4
Kennedia prostrata	0.1	0.3	0.1	0.3
Lepidosperma scabrum	0.1	0.3	0.1	0.5
Leporella fimbriata	0.1	0.1	0.1	0.1
Lomandra hermaphrodita	0.1	0.1	0.1	0.1
Lomandra preissii	0	0	0.1	0.1
Lomandra sericea	0.5	0.3	0.1	0.3
Mesomelaena pseudostygia	4	0.5	4	0.5
Opercularia vaginata	2	0.1	2	0.1
Patersonia occidentalis	0.6	0.5	0.6	0.5
Petrophile linearis	0.5	0.5	0.5	0.5
Philotheca spicata	0.1	0.3	0.1	0.3
Pimelea sulfurea	0	0	0.1	0.2
Podotheca gnaphalioides	0.1	0.1	0	0.1
Pterostylis	0.1	0.1	0	0.1
Ptilotus manglesii	0.1	0.1	0.5	0.1
Schoenus curvifolius	0.1	0.2	0.1	0.2
Stirlingia latifolia	1	1	1	1
Stylidium androsaceum	0	0	0.1	0.1
Stylidium ciliatum	0.5	0.1	0.1	0.1
Tetraria octandra	0.5	0.3	0	0.3
Thysanotus manglesianus	0.1	0.4	0	0.4
Waitzia suaveolens	0.1	0.1	0	0.1
Xanthorrhoea preissii	6	1.5	6	1.5

Quadrat No.: L41Q1 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385283
Northing: 6493933
Location: Lot 41
Topography: Mid-slope
Aspect: Flat
Slope: 0%
Soil: Sand
Rock: Nil
Leaf Litter: 5%
Bare Ground: 2%
Drainage: Well
Condition: Very Good
Disturbances:

Note: *Eucalyptus marginata, Banksia attenuata, Allocasuarina fraseriana* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Briza maxima*	0.1	0.1	0	0.1
**Gladiolus caryophyllaceus*	0.5	0.5	0.5	0.5
**Ursinia anthemoides*	0.1	0.1	0	0.1
Acacia applanata	0.1	0.1	0.1	0.1
Acacia pulchella	0	0	0.5	1
Alexgeorgea nitens	0.1	0.1	0.1	0.1
Allocasuarina fraseriana	5	0.5	5	0.5
Austrostipa flavescens	0.1	0.1	0	0.1
Banksia attenuata	6	0.1	6	0.1
Bossiaea eriocarpa	0.1	0.1	0.1	0.1
Brachyloma preissii	1	0.5	1	0.5
Burchardia congesta	0.1	0.1	0	0.1
Caladenia arenicola	0.2	0.1	0	0.1
Caladenia flava	0.1	0.1	0	0.1
Conostylis setigera	0.1	0.5	0.1	0.5
Desmocladus flexuosus	1	0.1	0.1	0.1
Diuris corymbosa	0.1	0.1	0	0.1
Drosera erythrorhiza	0.1	0.1	0	0.1
Drosera menziesii	0.1	0.5	0	0.5

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Drosera pallida	0.1	0.3	0	0.3
Eremaea pauciflora	3	0.5	3	0.5
Eucalyptus marginata	20	15	20	15
Gastrolobium capitatum	0.1	0.3	0.1	0.3
Hakea lissocarpha	1	1	1	1
Hardenbergia comptoniana	1	1	1	1
Hibbertia hypericoides	25	0.5	25	0.5
Hovea trisperma	0.1	0.3	0.1	0.3
Hypocalymma robustum	2	0.3	2	0.3
Kennedia prostrata	0.1	0.1	0.1	0.1
Lagenophora huegelii	0.5	0.1	0.1	0.1
Lepidosperma scabrum	0.5	0.5	0.5	0.5
Lobelia tenuior	0	0	0.1	0.1
Lomandra hermaphrodita	0.1	0.1	0.1	0.1
Lomandra sericea	0.5	0.5	0.5	0.5
Lomandra preissii	0.1	0.5	0.1	0.5
Mesomelaena pseudostygia	10	0.5	10	0.5
Olearia axillaris	0	0	0.1	0.5
Opercularia vaginata	6	0.1	6	0.1
Petrophile linearis	0.1	0.3	0.1	0.3
Petrophile macrostachya	1	0.5	1	0.5
Philotheca spicata	0.1	0.2	0.1	0.2
Pimelea sulphurea	0.5	0.5	0.5	0.5
Podotheca gnaphalioides	0.1	0.1	0	0.1
Ptilotus manglesii	0.1	0.1	1	0.1
Tetraria octandra	0.1	0.3	0.1	0.3
Thelymitra crinita	0.1	0.1	0	0.1
Trachymene pilosa	3	0.1	0	0.1
Waitzia suaveolens	0	0	0.1	0.1
Xanthorrhoea preissii	10	1	10	1
Xanthosia huegelii	0.1	0.1	0.1	0.1

Quadrat No.: L41Q2 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385302
Northing: 6493953
Location: Lot 41
Topography: Plain
Aspect: Flat
Slope: 0%
Soil: Sand
Rock: Nil
Leaf Litter: 10%
Bare Ground: 0%
Drainage: Well
Condition: Very Good
Disturbances: Areas cleared for firebreak

Note: *Banksia attenuata* and *Allocasuarina fraseriana* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Ehrharta calycina*	0.1	0.1	0.2	0.1
**Gladiolus caryophyllaceus*	1	0.1	1	0.1
**Ursinia anthemoides*	0.5	0.1	0	0.1
Acacia huegelii	0.5	0.2	0.5	0.2
Acacia sessilis	0.1	0.3	0.1	0.3
Acacia pulchella var. pulchella	0.5	1	0.5	1
Allocasuarina fraseriana	10	6	10	6
Anigozanthos humulis	0	0	0.2	0.1
Banksia attenuata	10	2	10	2
Bossiaea eriocarpa	0.5	0.5	0.5	0.5
Briza maxima	0.5	0.1	0.5	0.1
Burchardia congesta	0.1	0.5	0	0.5
Caesia occidentalis	0	0	0.1	1
Caladenia arenicola	0.1	0.3	0	0.3
Caladenia flava	0.1	0.1	0	0.1
Conostephium pendulum	0.5	0.5	0.5	0.5
Conostylis aculeata	0.1	0.1	0.1	0.1
Conostylis setigera	0.1	0.1	0.1	0.1

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Desmocladus flexuosus	0.1	0.1	0.1	0.1
Drosera erythrorhiza	0.5	0.1	0	0.1
Drosera menziesii	0.1	0.1	0	0.1
Eriochilus sp.	0.1	0.1	0	0.1
Gastrolobium capitatum	0.5	0.5	0.5	0.5
Gompholobium tomentosum	0.1	0.3	0.5	0.3
Haemodorum laxum	1	0.5	1	0.5
Hibbertia hypericoides	20	1	20	1
Hovea trisperma	0.5	0.5	0.5	0.5
Hybanthus calycinus	0.5	0.5	0.5	0.5
Hypocalymma robustum	0.5	0.5	0.5	0.5
Kennedia prostrata	0.5	0.1	0.1	0.1
Lagenophora huegelii	0.1	0.1	0	0.1
Lepidosperma scabrum	0.1	0.5	0.1	0.5
Lomandra sericea	0.5	0.5	0.5	0.5
Lomandra preissii	0.1	0.5	0.2	0.5
Mesomelaena pseudostygia	40	0.5	40	0.5
Opercularia vaginata	1	0.3	1	0.3
Philotheca spicata	0.1	0.1	0.1	0.1
Pterostylis recurva	0.1	0.1	0	0.1
Ptilotus manglesii	0.1	0.1	0.1	0.1
Sowerbaea laxiflora	0.5	0.5	0	0.5
Stirlingia latifolia	0.5	0.5	0.5	0.5
Stylidium ciliatum	0.5	0.1	0.5	0.1
Tetraria octandra	0.1	0.1	0.1	0.1
Trachymene pilosa	0.1	0.1	0	0.1
Tricoryne sp.	0	0	0.1	0.3
Xanthorrhoea preissii	8	1.2	8	1.2

Quadrat No.: L41Q3 (10 x 10 m)
Survey Date: 04/09/2020
Personnel: Lachlan Crossley, Sharon Hynes
Easting: 385300
Northing: 6493893
Location: Lot 41
Topography: Plain
Aspect: Flat
Slope: 0%
Soil: Sand
Rock: Nil
Leaf Litter: 15%
Bare Ground: 1%
Drainage: Well
Condition: Very Good
Disturbances: Fire <5yrs

Note: *Eucalyptus marginata, Banksia attenuata, Allocasuarina fraseriana* Woodlands

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
**Carpobrotus edulis*	0.1	0.1	0.1	0.1
**Ehrharta calycina*	0.1	0.1	0	0.1
**Gladiolus caryophyllaceus*	0.1	0.3	0.1	0.3
**Hypochaeris glabra*	0.1	0.1	0	0.1
**Sonchus oleraceus*	0.1	0.1	0	0.1
Acacia applanata	0.1	0.3	0.1	0.3
Acacia pulchella	0.5	1	0.5	1
Alexgeorgea nitens	0.1	0.1	0.1	0.1
Allocasuarina fraseriana	4	5	4	5
Banksia attenuata	5	8	5	8
Bossiaea eriocarpa	1	0.5	1	0.5
Burchardia congesta	0.1	0.5	0	0.5
Caladenia flava	0.1	0.1	0	0.1
Calectasia grandiflorus	0	0	0.1	0.3
Comesperma calymega	0	0	0.1	0
Conostephium pendulum	0.5	0.3	0.5	0.3
Conostylis aculeata	0.1	0.1	0.1	0.1
Conostylis setigera	0.5	0.1	0.5	0.1
Daviesia triflora	0	0	0.5	0.3

Species	September 2020		October 2020	
	Cover (%)	Height (m)	Cover (%)	Height (m)
Desmocladus flexuosus	1	0.1	1	0.1
Diuris corymbosa	0.1	0.3	0.1	0.3
Drosera erythrorhiza	0.5	0.1	0	0.1
Drosera pallida	0.5	0.5	0	0.5
Eremaea pauciflora	0.5	0.5	0.5	0.5
Eriochilus sp.	0.1	0.1	0	0.1
Eucalyptus marginata	25	15	25	15
Gastrolobium capitatum	0.5	0.5	0.5	0.5
Haemodorum spicatum	0.1	1	0.1	1
Hardenbergia comptoniana	3	0.5	3	0.5
Hibbertia huegelii	0	0	0.1	0.3
Hibbertia hypericoides	10	0.5	10	0.5
Hovea trisperma	0.1	0.3	0.1	0.3
Hypocalymma robustum	0.5	0.2	0.5	0.2
Isotropis cuneifolia	0	0	0.1	0.1
Kennedia prostrata	0.1	0.1	0.1	0.1
Lomandra sericea	0.5	0.5	0.5	0.5
Lomandra preissii	0.1	0.1	0.1	0.1
Mesomelaena pseudostygia	10	0.5	10	0.5
Opercularia vaginata	2	0.3	0.1	0.3
Petrophile linearis	0.1	0.3	0.1	0.3
Philotheca spicata	0.1	0.1	0.1	0.1
Pimelea sulphurea	0.1	0.5	0.1	0.5
Pterostylis sp.	0.1	0.1	0	0.1
Ptilotus manglesii	0.1	0.1	0.1	0.1
Schoenus curvifolius	0.1	0.1	0.1	0.1
Sowerbaea laxiflora	0.5	0.3	0	0.3
Stirlingia latifolia	2	1	2	1
Stylidium ciliatum	0.1	0.1	0	0.1
Tetraria octandra	1	0.5	1	0.5
Trachymene pilosa	3	0.1	0	0.1
Xanthorrhoea brunonis	1	1	1	1
Xanthorrhoea preissii	10	1.5	10	1.5

Appendix 6: Flora Species Matrix Per Quadrat

Below is the matrix of flora species found within the quadrats for the three survey sites Lot 41 (L41), Lot 9100 (L9100) and Mather Drive Road Reserve (MDRR). Note 1 indicates presence of the species in that quadrat.

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
**Aira cupaniana*							1		
**Arctotheca calendula*							1	1	1
**Brassica tournefortii*								1	1
**Briza maxima*				1			1		
**Carpobrotus edulis*				1					
**Crassula glomerata*							1		1
**Ehrharta calycina*				1			1	1	1
**Erodium botrys*							1	1	1
**Gladiolus caryophyllaceus*				1	1		1		
**Hypochaeris glabra*					1		1	1	1
**Lolium rigidulum*									1
**Lotus subbiflorus*							1		
**Lysimachia arvensis*							1		
**Ornithopus compressus*							1	1	1
**Oxalis purpurea*							1		

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
**Pelargonium capitatum*							1		
**Phytolacca octandra*								1	
**Sonchus oleraceus*							1		
**Trifolium arvense*								1	1
**Urospermum picroides*							1		
**Ursinia anthemoides*				1	1		1	1	1
**Vulpia myuros*							1		1
**Wahlenbergia capensis*								1	
**Wahlenbergia marginata*							1		
Acacia applanata				1					
Acacia pulchella					1				
Alexgeorgea nitens					1				
Allocasuarina fraseriana				1	1				
Anigozanthos humilis						1			
Astroloma xerophyllum								1	
Austrostipa flavescens						1			
Banksia attenuata				1		1	1		
Banksia menziesii							1	1	1
Bossiaea eriocarpa				1	1	1	1		

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
Bossiaea ornata				1					
Brachyloma preissii				1	1	1			
Burchardia congesta				1					
Caladenia arenicola				1	1				
Caladenia flava				1	1	1			
Calectasia grandiflora						1			
Conostylis aculeata		1	1	1				1	
Conostylis setigera		1	1	1		1			
Daviesia decurrens				1					
Daviesia nudiflora				1					
Daviesia triflora			1						
Desmocladus flexuosus		1	1	1	1	1			1
Dianella revoluta				1					
Diuris corymbosa	1		1	1					
Drakaea glyptodon						1			
Drosera erythrorhiza	1	1	1	1		1			
Drosera menziesii	1	1				1			
Drosera pallida	1		1						
Drosera pulchella						1			

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
Eremaea pauciflora	1		1						
Eriochilus sp.		1	1	1		1			
Eucalyptus marginata	1		1	1	1	1	1		1
Gastrolobium capitatum	1	1	1		1	1			
Gompholobium tomentosum		1		1		1			
Haemodorum laxum		1		1	1	1			
Haemodorum spicatum			1						1
Hakea lissocarpha	1				1				
Hakea prostrata							1		
Hardenbergia comptoniana	1		1	1					1
Hibbertia huegelii			1			1			
Hibbertia hypericoides	1	1	1	1	1	1	1	1	1
Hovea trisperma	1	1	1			1			
Hybanthus calycinus		1							
Hypocalymma robustum	1	1	1	1	1	1			
Isotropis cuneifolia			1						
Jacksonia sternbergiana							1		
Kennedia prostrata	1	1	1		1	1			
Lagenophora huegelii	1	1		1	1				

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
Lepidobolus preissii				1					
Lepidosperma (round stem)					1				
Lepidosperma scabrum	1	1				1			
Leporella fimbriata						1			
Lobelia tenuior	1								
Lomandra caespitosa					1		1		
Lomandra hermaphrodita	1					1			
Lomandra micrantha							1		1
Lomandra preissii	1	1	1	1	1	1			
Lomandra sericea	1	1	1	1	1	1			
Lomandra suaveolens					1				
Mesomelaena pseudostygia	1	1	1	1	1	1			
Olearia axillaris	1								
Opercularia vaginata	1	1	1	1	1	1			
Orthrosanthus laxus				1					
Patersonia occidentalis					1	1			
Petrophile linearis	1		1			1			
Petrophile macrostachya	1			1					
Philotheca spicata	1	1	1	1		1			

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
Pimelea sulphurea	1		1			1			
Podotheca gnaphalioides	1					1			
Pterostylis recurva		1							
Pterostylis sp.			1	1	1	1			
Ptilotus manglesii	1	1	1	1	1	1			
Ptilotus polystachyus				1				1	1
Schoenus curvifolius			1			1			
Solanum symonii									1
Sowerbaea laxiflora		1	1	1	1				
Stirlingia latifolia		1	1	1	1	1			
Stylidium androsaceum						1			
Stylidium ciliatum		1	1			1			
Tetraria octandra	1	1	1	1	1	1			
Thelymitra crinita	1								
Thysanotus manglesianus						1			
Trachymene pilosa	1	1	1	1	1				
Tricoryne tenella		1							
Waitzia suaveolens	1			1	1	1			
Xanthorrhoea brunonis			1						1

Species Name	Flora Quadrat								
	L41Q1	L41Q2	L41Q3	L9100Q1	L9100Q2	L9100Q3	MDRRQ1	MDRRQ2	MDRRQ3
Xanthorrhoea preissii	1	1	1	1	1	1			1
Xanthosia huegelii	1								