FLORA AND VEGETATION REVIEW
LOT 9103 WARTON ROAD, PIARA WATERS

COTERRA ENVIRONMENT

MAY 2020

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EXECUTIVE SUMMARY

Coterra Environment (Coterra) is assisting a client with the proposed development of Lot 9103 Warton Road, Piara Waters. The site is proposed to be developed as a school and a native vegetation clearing permit (NVCP) will be required.

To facilitate the NVCP application, Focused Vision Consulting Pty Ltd (FVC) was commissioned to undertake an overview site inspection for flora and vegetation values of the study area and report on the outcomes, as a supplement to a previous study completed by Bennett Environmental Consulting Pty Ltd (Bennett) (2011).

The scope of study was to:

- request and review a revised Department of Biodiversity, Conservation and Attractions (DBCA) database search, to determine Threatened and Priority flora potentially supported by the site
- review the previous study report by Bennett (2011) as pertinent to the study area
- undertake an overview site inspection, aimed at verifying the vegetation type and condition mapping of Bennett (2011), with a focus on Banksia woodland, in an effort to provide conclusions as to the likely existence, condition and extent of the Banksia Woodlands of the Swan Coastal Plain ecological community (Banksia Woodlands Threatened Ecological Community (TEC)) at the site, plus verification of habitats potentially provided for Threatened flora (focused on *Austrostipa jacobsiana, Caladenia huegelii, Drakaea elastica* and *Diuris purdiei*)
- prepare a report, to supplement the Bennett (2011) report and accompany the NVCP application that includes:
    - revised (as applicable) vegetation unit mapping
    - revised (as applicable) vegetation condition mapping
    - commentary and preliminary conclusions regarding the existence, condition and extent of the Banksia woodland TEC at the site
    - commentary and preliminary conclusions regarding the provision of suitable habitat for and likelihood of occurrence of conservation significant flora, particularly *Austrostipa jacobsiana, Caladenia huegelii, Drakaea elastica* and *Diuris purdiei*
    - recommendations for further in-fill survey work that may be carried out in spring 2020.

The key findings arising from the flora and vegetation review of the study area were as follows:

- No Threatened flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Biodiversity Conservation Act 2016* (BC Act) were recorded.
- One possible Priority flora species, *Jacksonia* ?*gracillima* (P3), was recorded within vegetation unit EmBaLW.
- The survey timing (late March) was not optimal for the identification of flowering flora, annual and ephemeral species and therefore, it is unlikely all species relevant to the study area were recorded.
- The timing of the field assessment could have also limited the accuracy of vegetation unit and condition mapping, since not all flora species naturally occurring during spring would have been observable. However, given the degraded nature of the majority of the study area, this is unlikely to have represented a major limitation.
- Of the four Threatened flora species given particular focus; *Austrostipa jacobsiana*, *Caladenia huegelii, Diuris purdiei* and *Drakaea elastica*, it is considered that all could possibly occur. However, specific habitat suitability for all species besides *Caladenia huegelii* is low to negligible. *Caladenia huegelii* could occur within vegetation units EmBaLW or BaEtLW.

- It is also considered possible for a fifth Threatened flora species, *Drakaea micrantha,* to occur, however, specific micro-habitats (bare sand lenses) were not observed within the study area and therefore, the actual likelihood if this species occurrence is also considered unlikely.
- Six vegetation units, plus 'planted' and 'cleared' areas were recorded within the study area, with two of the recorded units representing remnant vegetation with areas in 'Good' or better condition.
- Of the recorded vegetation units, two represent Banksia woodland, which both meet diagnostic criteria to be considered representative of the Banksia Woodlands TEC. However, the size of the areas of these woodlands do not meet minimum condition thresholds, even when considered in the context of regional adjacent Banksia woodland vegetation and therefore are not eligible for inclusion as a Matter of National Environmental Significance (MNES) protectable under the EPBC Act

Based on the findings of the study, it is recommended that suitably timed targeted flora surveys be carried out, focused on *Caladenia huegelii* and *Jacksonia gracillima,* and also addressing other relevant species arising from the desktop assessment.

It is not considered that any follow-up survey work for the characterisation of vegetation types, condition or conservation significance is required, based on the combined results of the Bennett (2011) and current studies.

1 INTRODUCTION

1.1 BACKGROUND

Coterra Environment (Coterra) is assisting a client with the proposed development of Lot 9103 Warton Road (the study area), Piara Waters. The study area is proposed to be developed as a school and the project is currently driven by an urgent timeline. A native vegetation clearing permit (NVCP) will need to be obtained from the Department of Water and Environmental Regulation (DWER). To expediate the application process, Coterra aims to lodge an application for a NVCP as soon as possible, based on reviews of a previous study and an initial field assessment undertaken in summer. To meet regulatory requirements, a follow-up targeted survey is likely to be undertaken in spring.

In October 2011, Bennett Environmental Consulting Pty Ltd (Bennett) undertook a vegetation and flora assessment of selected lots along Warton Road, which included Lot 9103 (the study area) (**Appendix A**). As part of the NVCP application, this current study reviewed previous vegetation mapping by Bennett (2011), to verify the presence of the Banksia Woodlands of the Swan Coastal Plain ecological community (Banksia Woodlands Threatened Ecological Community (TEC)) within the study area. Furthermore, the current study aimed to identify the presence of habitat suitable for conservation flora (identified from desktop studies) to determine the need to target any such flora during future spring surveys.

1.2 LOCATION

The study area is located approximately 20 kilometres (km) south of Perth in the suburb of Piara Waters (**Figure 1**). The study area occupies approximately 12.7 ha.

1.3 SCOPE OF WORK

The scope of work included undertaking an overview site inspection for flora and vegetation values of the study area and reporting the outcomes.

The agreed approach for the study was to address the following:

- request and review a revised Department of Biodiversity, Conservation and Attractions (DBCA) database search, to determine Threatened and Priority flora potentially supported by the site
- review the previous study report by Bennett (2011) as pertinent to the study area (**Appendix A**)
- undertake an overview site inspection, aimed at verifying the vegetation type and condition mapping of Bennett (2011), with a focus on Banksia woodland, in an effort to provide conclusions as to the likely existence, condition and extent of the Banksia Woodlands TEC at the site, plus verification of habitats potentially provided for Threatened flora (focused on *Austrostipa jacobsiana, Caladenia huegelii, Drakaea elastica* and *Diuris purdiei*)
- preparation of a report, to supplement the Bennett (2011) report and accompany the NVCP application that includes:
    - revised (as applicable) vegetation unit mapping
    - revised (as applicable) vegetation condition mapping
    - commentary and preliminary conclusions regarding the existence, condition and extent of the Banksia woodland TEC at the site
    - commentary and preliminary conclusions regarding the provision of suitable habitat for and likelihood of occurrence of conservation significant flora, particularly *Austrostipa jacobsiana, Caladenia huegelii, Drakaea elastica* and *Diuris purdiei*
    - recommendations for further in-fill survey work that may be carried out in spring 2020.

1.4 PREVIOUS BIOLOGICAL ASSESSMENT

The vegetation and flora assessment conducted by Bennett Environmental Consulting (Bennett) during October 2011 (**Appendix A**), encompassed an area in Piara Waters along the eastern side of Warton Road between Erade Drive to the north and Armadale Road to the south (assessment area).

A total of 244 flora species from 58 families were recorded including 74 introduced (weed) species. Two Declared Pest plants (weeds), (**Rubus laudatus* and **Zantedeschia aethiopica*) were recorded. Thirty-three of the weeds recorded were listed as having a high ecological impact on the environment. Furthermore, 47 of the weeds recorded were listed as having a rapid rate of dispersal (Bennett 2011).

Within the assessment area, Bennett (2011) reported large areas as cleared and only small pockets of remnant vegetation remaining. A total of 14 vegetation units were described , broadly classified into uplands (three units), wetlands (nine units) and herblands/sedgelands/grasslands (two units) (Bennett 2011).

Within the current study area, the majority was defined by Bennett (2011) as *cleared areas, homes and surrounds or planted non-endemic trees.* Three vegetation units were recorded within the study area (Bennett 2011) which were defined as:

- **Bm** - Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus marginata* subsp*. marginata* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata and *Ehrharta calycina* in grey sand
- **Bt** - Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata* in grey sand
- **MK** - Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* in grey sand.

Bennett (2011) concluded that no TECs or Priority Ecological Communities (PECs) occurred within the assessment area. However, at the time of the assessment, the Banksia Woodlands TEC was not yet listed and there was no targeted survey of Banksia woodland communities in this regard.

The Banksia Woodlands TEC was approved for inclusion as Endangered under the EPBC Act on 16 September 2016 which is discussed in further detail in **Section 2.5**.

No Threatened or Priority flora were recorded by within the assessment area (Bennett 2011). The timing of the assessment was considered optimal for recording and identifying flora on the Swan Coastal Plain. Therefore, it is likely that if Threatened and Priority flora were present, they would have been observed.

0 25 50 75 100 m

GDA 94 / MGA Zone 50

Figure 1 - Study Area

Legend

Study Area

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2 EXISTING ENVIRONMENT

2.1 CLIMATE

The study area occurs on the Swan Coastal Plain, which has a warm Mediterranean climate, is characterised by hot dry summers and cool to mild wet winters (Mitchell *et al.* 2002). The Bureau of Meteorology (BoM) Jandakot Aero weather station (Site 009172) is the closest to the study area, operating since 1972. Average annual long-term rainfall recorded at the station is 819.6 mm. Annual mean maximum temperatures range from 18.0°C in winter to 31.6°C in summer (BoM 2020). In 2020, monthly rainfall in January was very low compared to the long-term average, while in February rainfall increased but was only half the long-term average (**Figure 2**).

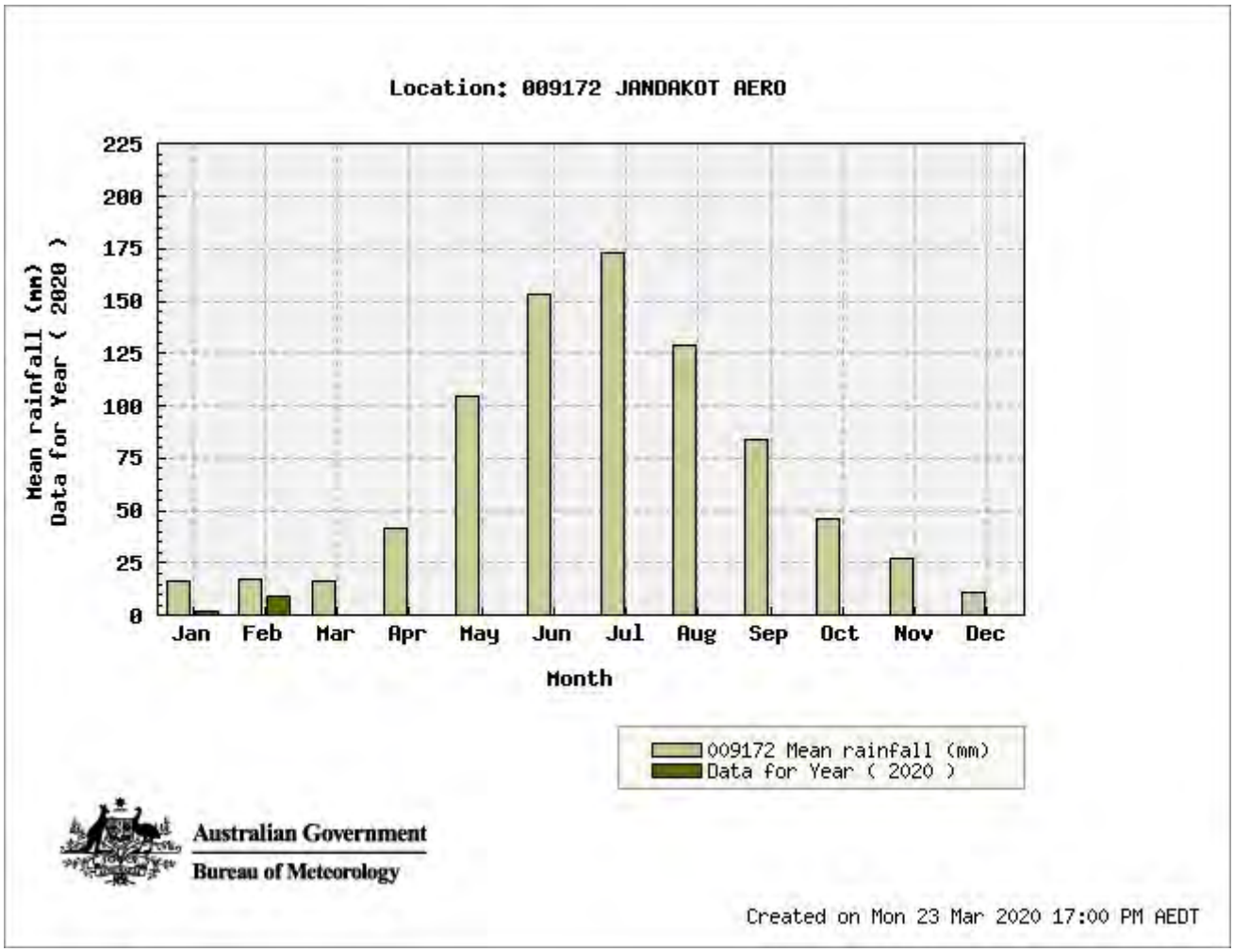

Figure 2 - Climate Data for Jandakot Aero (BoM 2020)

2.2 IBRA REGION

There are 89 recognised Interim Biogeographic Regionalisation for Australia (IBRA) regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (Department of Agriculture, Water and the Environment (DAWE) 2020a). The study area lies within the Swan Coastal Plain (SWA) IBRA region, and at a finer scale, within the Perth subregion (SWA2; Mitchell *et al.* 2002).

The Swan Coastal Plain bioregion is a low lying coastal plain, mainly covered with Banksia and Tuart woodlands on sandy soils. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone, as well as heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials (Mitchell *et al.* 2002).

2.3 GEOLOGY AND SOILS

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

The Bassendean Dunes System consists of sand dunes and sandplains with deep pale sand, semi-wet and wet soil.

2.4 VEGETATION

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

One vegetation association, 1001, occurs within the study area. This vegetation association only occurs on the Swan Coastal Plain. It is described as a medium very sparse woodland of jarrah, with low woodland of banksia and casuarina (Beard 1990). The remaining extent of the 1001 vegetation association on the Swan Coastal Plain and in the City of Armadale are presented in **Table 1**.

Table 1 – Pre-European Vegetation (1001 Vegetation Association) of the Study Area

Extent Context	Pre–European Extent (ha)	Current Extent (ha)	% Pre-European Extent Remaining	% Current Extent Protected (IUCN I –IV)
Swan Coastal Plain	57,410.23	12,704.45	22.13	2.80
City of Armadale	3,332.90	1,110.02	33.30	2.62

Vegetation of the Swan Coastal Plain has also been defined by Heddle *et al.* (1980) into complexes based on vegetation in association with landforms and underlying geology. The study area is situated on one vegetation complex, the 'Southern River Complex'. This vegetation complex is described as an open woodland of marri - jarrah - Banksia species with fringing woodland of *Eucalyptus rudis* (flooded gum) - *Melaleuca rhaphiophylla* (swamp paperbark) along creek beds. The remaining extent on the Swan Coastal Plain and in the City of Armadale are presented in **Table 2**.

Table 2 – Extent of Southern River Vegetation Complex within the Study Area

Extent Context	Pre–European Extent (ha)	Current Extent (ha)	% Pre-European Extent Remaining
Swan Coastal Plain	58,781.48	10,828.04	18.42
City of Armadale	4,107.89	1,024.58	24.94

2.5 THREATENED ECOLOGICAL COMMUNITIES

TECs are naturally occurring biological assemblages that occur in a particular habitat type and are subject to processes that threaten to destroy or significantly modify the assemblage across its range (DAWE 2020b). Vegetation communities in Western Australia may be considered threatened once they have been identified as such by the Western Australian Threatened Ecological Communities Scientific Advisory Committee.

With regards to Commonwealth significance, some TECs or PECs of State (WA) significance are listed under the EPBC Act. Under the Act, a person must not take an action that has or will have significant impact on a listed TEC without approval from the Commonwealth Minister for the Environment, unless those actions are not prohibited under the Act. One Commonwealth listed TEC, the Banksia woodlands TEC potentially occurs within the study area.

The Banksia Woodlands TEC is woodland associated with some soils of the Swan Coastal Plain with a prominent tree layer of Banksia with scattered Eucalypts and other tree species among or emerging above the canopy. The understorey is comprised of a species rich mix of sclerophyllous shrubs, graminoids and forbs (Threatened Species Scientific Committee (TSSC) 2016).

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

Twenty-one Floristic Community Types (FCTs) described by Gibson *et al.* (1994) best correspond to the Banksia Woodlands TEC (TSSC 2016) and these are summarised in **Table 3**.

Table 3 - Floristic Community Types Corresponding to the Banksia Woodlands TEC

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

3 METHODOLOGY

3.1 DESKTOP REVIEW

A desktop assessment for Threatened and Priority flora potentially occurring within the study area was undertaken prior to the field studies. The desktop assessment consisted of database searches using NatureMap (DBCA 2020a) (**Appendix B**), DBCA database (DBCA 2020b) and the Commonwealth Protected Matters Search Tool (PMST) for Matters of National Environmental Significance (MNES) (DAWE 2020b) (**Appendix C**). All search tools were based on the approximate centre of the study area, being -32.1252 latitude, 115.9076 longitude with a 10 km buffer (radius).

3.2 FIELD ASSESSMENT

An overview site inspection (reconnaissance survey) was undertaken by Kellie Bauer-Simpson (Principal Ecologist) and Adrian Barrett (Botanist/Ecologist) on 25 March 2020. The purpose of the survey was to verify the vegetation types and condition mapping of Bennett (2011), with particular focus on Banksia woodlands which may represent the Banksia woodlands TEC.

The survey was also intended to identify any potentially suitable habitats for Threatened and Priority flora, with particular focus on the following Threatened flora; *Austrostipa jacobsiana*, *Caladenia huegelii, Diuris purdiei* and *Drakaea elastica*.

Relevé sites were used to verify and determine vegetation types and condition. In total five relevés (sites) were assessed within the study area (**Figure 3**). Sites were selected using aerial imagery, during initial field planning conducted at a desktop level, plus added in the field where appropriate, such as where different vegetation units and condition were identified. Sites were selected to provide representative and replicate samples of each vegetation unit, with particular focus on Banksia woodland. Field data were collected using an electronic tablet with customised data forms and mobile spatial mapping capability, within the software program, Mappt™.

The following data were collected from each site:

- observer
- date
- site
- GPS location (GDA94; zone 50)
- representative photograph
- soil type and colour
- topography
- flora species observed, including average height and projected foliage cover of dominant species within each stratum
- vegetation condition, assessed against the currently accepted condition scale of Keighery (1994).

The field assessment also included a targeted search for Threatened and Priority flora identified from the desktop search. Where suspected Threatened or Priority flora were observed, the following data were to be recorded:

- GPS location of each individual plant allowing an inventory of the plants/population size
- vegetation type and condition at the recorded location
- condition of plants
- reproductive status.

0 25 50 75 100 m

GDA 94 / MGA Zone 50

Figure 3 - Relevé Locations

Legend

Study Area

Relevé

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4 RESULTS AND DISCUSSION

4.1 DESKTOP REVIEW

4.1.1 Threatened and Priority Flora

The desktop assessment identified 65 Threatened and Priority flora species previously recorded within 10 km of the study area (**Table 4** and **Figure 4**). Of the 65 species identified in the desktop search, 21 are Threatened species listed under the EPBC Act and *Biodiversity Conservation Act* (BC Act), five are Priority 1 flora, six are Priority 2, 20 are Priority 3 and 13 are Priority 4. None of the 65 species were considered 'likely' to occur. Seventeen were considered as 'possibly' occurring within the study area, consisting of four Threatened species, one Priority 1 species, three Priority 2 species, four Priority 3 species and five Priority 4 species. The remaining 48 species were considered 'unlikely' to occur (**Table 4**).

Table 4 - Threatened and Priority Flora with the Potential to Occur within the Study Area

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Austrostipa jacobsiana	Critically Endangered	Critically Endangered	Clumping, rhizomatous perennial grass growing to 1.2 m high (incl. flower spike) with leaves to 0.5 m long. Produces green flowers from October to November.	Grey clay, sandy clay, sandy loam soils. Flats and damplands, fringing winter wet depressions.	Possible – suitable habitat may be present. Closest record approx. 6 km east.
Grevillea thelemanniana	Critically Endangered	Critically Endangered	Spreading, lignotuberous shrub growing between 0.3-1.5 m high. Produces red-pink flowers from May to November.	Sand, sandy clay soils. Winter wet low lying flats.	Unlikely – unlikely suitable habitat present. Closest record >10 km north east.
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	Critically Endangered	Critically Endangered	Dense, clumped shrub growing to 0.3-0.6 m high and 0.4-0.8 m wide. Produces yellow flowers on erect spikes 0.07-0.24 m long from September to October.	Grey clayey sand soil with lateritic pebbles. Near winter wet flats, low woodlands with weedy grasses.	Unlikely – unlikely suitable habitat present. Closest record >5 km north.
Synaphea sp. Serpentine (G.R. Brand 103)	Critically Endangered	Critically Endangered	Erect, compact shrub to 0.3 m high. Produces yellow flowers from September to October.	Grey, yellow or brown sandy clay-loam soils. Edge of wetlands, slopes and flats.	Unlikely – closest record >10 km south.
Andersonia gracilis	Endangered	Vulnerable	Slender, erect or open straggly shrub growing to 0.1-0.5 m high. Produces pink to pale mauve flowers in ovoid oblong groups of 4-14 on terminal heads from September to November.	White-grey sand, sandy clay, gravelly loam soils. Winter wet areas, near swamps.	Unlikely – unlikely suitable habitat present. Closest record >10 km north.
Caladenia huegelii	Endangered	Critically Endangered	Tuberous, perennial herb growing to 0.25-0.6 m high with a single pale green, hairy leaf. Produces 1-2 (rarely 3) distinctive flowers with red and green-cream parts from September to October.	Grey, white or brown sand, clay loam soils. Margins of swamps, low depressions and flats. Mixed jarrah and Banksia woodlands.	Possible – suitable habitat present. Closest record approx. 1 km south-east.
Calytrix breviseta subsp. *breviseta*	Endangered	Critically Endangered	Shrub growing to 0.4-0.6 m high. Produces purple or pink or mauve flowers from October to November.	Grey-brown sand, sandy loam soils. Swampy flats, slopes.	Unlikely – closest record >10 km north-east.
Diuris purdiei	Endangered	Endangered	Tuberous, perennial orchid growing to 0.15-0.45 m high. Produces distinct flattened yellow flowers with brown blotches on their underside from September to October.	Grey-black sand, sandy clay moist soils. Winter wet swamps.	Unlikely – unlikely suitable habitat present.
Drakaea elastica	Endangered	Critically Endangered	Tuberous, perennial herb growing to 0.1-0.3 m high with a single bright green, glossy, prostrate heart-shaped leaf. Produces distinctive flower with red and green-yellow parts from October to November.	Bare patches of white or grey sandy soils. Low lying situations adjoining winter wet swamps.	Possible – suitable habitat present. Closest record approx. 9 km south.

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Eremophila glabra subsp. *chlorella*	Endangered	Endangered	Sprawling shrub growing between 0.2-1 m high and 1.5 m wide. Produces green-yellow flowers from July to November.	Grey sand, clayey soil. Winter wet depressions, low rises and valleys.	Unlikely – unlikely suitable habitat present. Closest records >10 km north-east.
Eucalyptus ×balanites	Endangered	Critically Endangered	Mallee with rough flaky grey bark growing to 5-8 m high and 15 m wide. Produces white flowers from October to December or from January to February.	White-grey sand, brown sandy loam soils with lateritic gravel. Slopes.	Unlikely – unlikely suitable habitat. Closest record >10 km south-east.
Goodenia arthrotricha	Endangered	Endangered	Erect perennial herb growing to 0.4 m high. Produces blue flowers from October to November.	Brown sandy loam soils with laterite or granite. Hilltops, slopes and flats, scattered low forest over mixed scrub.	Unlikely – unlikely suitable habitat. Closest record >10 km east.
Grevillea curviloba subsp. *incurva*	Endangered	Endangered	Variable, prostrate to erect shrub growing between 0.1-2.5 m high and 2.5 m wide with greyish-green leaves. Produces creamy-white flowers from August to October.	Sand and sandy loam soils. Winter-wet areas, heath.	Unlikely – unlikely suitable habitat. Closest record >10 km north.
Lepidosperma rostratum	Endangered	Endangered	Rhizomatous, tufted perennial grass-like sedge growing to 0.5 m high. Produces brown flowers in narrow, spike-like inflorescence and fruits in June to August.	Peaty sand, sand, clayey soils. Winter wet swamps.	Unlikely – wetland areas degraded, closest record >10 km north-east.
Macarthuria keigheryi	Endangered	Endangered	Small, erect shrub growing to 0.4 m high with bright yellow to green stems. Leaves mainly at the base of stems and on young growth. Produces flowers with white and green parts from September to December and February to March.	Open patches of white or grey sandy soil. Winter wet depressions, jarrah and banksia woodlands.	Unlikely – wetland areas degraded, closest record >10 km north.
Thelymitra dedmaniarum	Endangered	Critically Endangered	Tuberous, perennial herb growing to 0.8 m high with a single broad-ovate leaf to 0.15 m long. Produces up to 10 yellow-orange flowers, with distinct cinnamon scent, from October to December.	Red-brown sandy-loam soil associated with granite and dolerite. Wandoo and jarrah woodlands.	Unlikely – unlikely suitable habitat. Closest record >10 km north-east.
Thelymitra stellata	Endangered	Endangered	Tuberous perennial herb growing to 0.25 m high with a single lily-like leaf to 0.9 m long. Produces up to 6 golden-brown or yellow with orange striped flowers from September to November.	Sandy loam soils with lateritic gravel. Ridges, slopes and gullies in wandoo and jarrah woodland.	Unlikely – unlikely suitable habitat. Closest record >10 km north-east.
Conospermum undulatum	Vulnerable	Vulnerable	Erect, compact shrub growing to 1.5-2 m high with distinctive fibrous, longitudinally fissured stems and hairless, wavy leaves to 0.12 m long. Produces white flowers held above the leaves from May to October.	Grey or yellow-orange clayey sand soils. Flats and slopes often over laterite and occasionally in slightly swampy areas.	Unlikely – unlikely suitable habitat. Closest record >10 km north-east.

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Diuris drummondii	Vulnerable	Vulnerable	Tuberous, perennial tall orchid growing to 0.5-1 m high. Produces 3-8 pale yellow flowers from November to January.	Brown sandy clay, moist peat soils. Low lying depressions, swamps.	Unlikely – unlikely suitable habitat. Closest record >6 km north-east.
Drakaea micrantha	Vulnerable	Endangered	Tuberous, perennial herb growing to 0.15-0.3 m high with a single silvery-grey, prostrate heart-shaped leaf. Produces distinct flower with red and yellow parts from September to October.	Bare patches of white-grey sandy soils. Winter wet swamps, disturbed areas.	Possible –suitable habitat may be present. Closest record approx. 3.5 km south-east.
Eleocharis keigheryi	Vulnerable	Vulnerable	Tufted, clumping grass like sedge growing to 0.2-0.4 m high and 0.4 m wide with smooth, erect stems and leaves reduced to straw coloured sheaths. Produces pale green flowers in a narrow, cylindrical flower spike from August to November (December in favourable conditions).	Clay, sandy loam soils. Emergent in freshwater creeks, claypans and wetlands.	Unlikely – no standing water for habitat. Closest records >10 km north-east.
Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)	-	Priority 1	Spinescent shrub growing between 0.4-1.5 m high. Produces yellow flowers in globular heads from May or August.	Grey or black sand over clay soils. Swampy areas, winter wet lowlands.	Unlikely – unlikely suitable habitat.
Calytrix simplex subsp. *simplex*	-	Priority 1	Shrub growing between 0.2-1 m high. Produces purple flowers in January (likely longer period).	Grey clayey loam, red-brown gravelly loam soils. Swamps, slopes and flats.	Unlikely – unlikely gravelly or loamy soils present.
Hydrocotyle striata	-	Priority 1	Annual herb growing to 0.1-0.3 m high. Produces cream flowers from December (likely longer period).	Sandy peaty soil. Winter wet drainage lines and depressions.	Unlikely – unlikely suitable habitat.
Levenhookia preissii	-	Priority 1	Erect, compact, annual herb growing to 0.1 m high. Produces pink flowers from October to December.	Grey-brown sandy soil. Winter wet areas, undulating plains.	Possible – suitable habitat may be present. Closest record approx. 5.5 km north-west.
Ptilotus sericostachyus subsp. *roseus*	-	Priority 1	Prostrate to ascending perennial herb. Produces pink with white flowers from September to December.	Unknown.	Unknown. Closest records 10 km north and east.
Acacia benthamii	-	Priority 2	Erect, spinose shrub growing to 1 m high. Produces golden-yellow flowers in globular heads on short stalks in leaf axils from August to September.	Brown, yellow, grey sandy soils. Flats and slopes, sometimes with limestone and wetlands.	Possible – suitable habitat may be present. Closest record approx. 5 km north.
Johnsonia pubescens subsp. *cygnorum*	-	Priority 2	Tufted, perennial, grass like herb (lily) growing to 0.25 m high. Produces greenish cream flowers from September to October.	Grey or yellow sand, sandy clayey soils. Gentle slopes and flats.	Possible – suitable habitat may be present. Closest record approx. 8 km east.

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Poranthera moorokatta	-	Priority 2	Small, annual herb growing to 0.05 m high. Produces white flowers from October to November.	Clay, sandy soils. Winter wet depressions, dunes and flats.	Unlikely – limited (if any) suitable flat, sandy habitat present but closest record >10 km north.
Stenanthemum sublineare	-	Priority 2	Minute shrub growing to 0.1 m high with underground stems. Produces small white flowers from October to November.	Sand, sandy loam soils. Ridges, slopes and flats.	Possible – suitable habitat may be present. Closest record approx. 6 km north-east.
Thelymitra variegata	-	Priority 2	Tuberous, perennial herb growing to 0.1-0.35 m high. Produces conspicuous purple-red flowers with dark purple blotches and yellow parts from June to September.	Sandy clay or sandy soils. Associated with laterite	Unlikely – unlikely lateritic soils present.
Thysanotus sp. Badgingarra (E.A. Griffin 2511)	-	Priority 2	Tuberous, perennial herb growing to 0.4 m high. Produces purple flowers in December (likely longer period).	Sand, sandy loam, sandy clay soils with lateritic gravel. Slopes and occasionally granite outcropping.	Unlikely – unlikely suitable habitat present.
Acacia horridula	-	Priority 3	Harsh, slender, pungent, single-stemmed shrub growing to 0.3-0.6(-1) m high. Produces yellow flowers in globular heads from May to August.	Dark brown sandy loam gravelly soils over granite. Rocky hillsides.	Unlikely – unlikely suitable habitat present.
Asteridea gracilis	-	Priority 3	Annual herb growing to 0.15-0.35 m high. Produces white-pink flowers from September to December.	Sand, clay, gravelly soils. Slopes and flats.	Unlikely – unlikely suitable habitat present. Closest records >10 km east. Species generally occurs at base of, or on, Darling Scarp.
Byblis gigantea	-	Priority 3	Small, branched perennial herb (or sub-shrub) growing to 0.45 m high. Produces purple flowers from September to December or January.	Grey sandy clay, brown-white sand, loamy soils. Seasonally wet areas, swamps and flats.	Possible – suitable habitat may be present but likely disturbed. Closest record approx. 2.5 km east.
Cyathochaeta teretifolia	-	Priority 3	Rhizomatous, clumped, perennial sedge growing to 2 m high and 1.0 m wide. Produces brown-straw flowers from September to January.	Grey sand, sandy clay soil. Lowlands, swamps, creek edges and drainage lines.	Unlikely – unlikely suitable habitat present.
Dampiera triloba	-	Priority 3	Erect perennial, herb or shrub growing to 0.5 m high. Produces blue flowers from August to December.	Dark brown/black peaty, dry grey loamy soils. Wetlands, swamps, slopes and flats.	Unlikely – unlikely peaty, loamy soils present and closest record approx. 8.5 km north-west.
Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)	-	Priority 3	Tuberous, perennial herb growing to 0.4 m high. Produces blue-pale blue flowers from September to November.	Sand, sandy loam, clay soils. Winter wet depression, claypans and flats.	Unlikely – suitable habitat may be present but degraded. Closest record >10 km north.

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Halgania corymbosa	-	Priority 3	Erect shrub growing between 0.35-1 m high. Produces blue-purple flowers from August to November.	Sand, brown loam, clay, laterite gravelly soils. Slopes.	Unlikely – unlikely suitable habitat present.
Jacksonia gracillima	-	Priority 3	Prostrate, spreading or scrambling spindly shrub growing to 0.5-1 m high and 1 m wide. Produces flowers with yellow, red and orange parts from October and November.	Sand and loam soils. Wetlands, winter wet flats, slopes and flats.	Possible – suitable habitat likely present. Closest record approx. 1.8 km south-east.
Lasiopetalum glutinosum subsp. *glutinosum*	-	Priority 3	Multi stemmed shrub growing to 0.5 to 1 m high. Produces dark pink-purple flowers from September to December.	Brown clay gravel, sandy loam. Outcrops on Darling Scarp, rocky hillsides and slopes.	Unlikely – unlikely suitable habitat present.
Meionectes tenuifolia	-	Priority 3	Semi aquatic annual herb growing to 0.3 m high. Produces orange or red flowers with green from September to December.	Clay, loam soils. Swamps, seasonally wet areas and valleys.	Unlikely – unlikely suitable habitat present.
Phlebocarya pilosissima subsp. *pilosissima*	-	Priority 3	Compactly tufted, rhizomatous perennial grass-like shrub growing to 0.15-0.4 m high. Produces cream-white flowers from August to October.	White or grey sandy soil, sometimes with lateritic gravel. Slopes.	Possible – suitable habitat may be present. Closest record approx. 5.5 km west.
Pimelea calcicola	-	Priority 3	Erect to spreading shrub growing to 0.2 to 1 m high. Produces white flowers with some pink from September to November.	Brown sandy loam, white/grey sandy soil associated with limestone. Coastal limestone ridges.	Unlikely – unlikely suitable habitat present.
Pithocarpa corymbulosa	-	Priority 3	Erect to scrambling, perennial herb growing between 0.5-1 m high. Produces white flowers from January to April.	Sandy loam, loamy clay soils with lateritic gravel. Granite outcrops, ridges and slopes.	Unlikely – unlikely suitable habitat present.
Schoenus benthamii	-	Priority 3	Tufted perennial sedge growing to 0.15-0.45 m high. Produces brown flowers from October to November.	White, grey sand, sandy clay soils. Winter-wet flats and swamps.	Unlikely – unlikely suitable habitat present.
Schoenus capillifolius	-	Priority 3	Semi-aquatic, tufted annual sedge growing to 0.05 m high. Produces green flowers from October to November.	Brown sand, clay. Claypans and seasonally wet depressions.	Unlikely – unlikely suitable habitat present.
Schoenus pennisetis	-	Priority 3	Tufted annual sedge growing to 0.1-0.4 m high. Produces purple-black flowers from August to October.	Grey or brown peaty sand, sandy clay soils. Swamps, winter-wet depressions and flats.	Unlikely – unlikely peaty, clayey soils present.

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Stylidium aceratum	-	Priority 3	Fibrous rooted annual herb growing to 0.1 m high with spathulate leaves. Produces pink-white flowers from October to November.	Black-grey sand and clayey soils. Swamp heathland and low lying depressions.	Unlikely – unlikely suitable habitat present.
Stylidium paludicola	-	Priority 3	Reed-like perennial herb growing to 0.35-1 m high. Produces pink flowers from October to December.	Peaty sand over clay soils. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Unlikely – unlikely suitable habitat present.
Styphelia filifolia	-	Priority 3	Erect, spreading shrub growing to 0.4 to 0.9 m high. Produces white flowers from March to June.	Grey, yellow-brown sandy soils. Flats and slopes.	Possible – suitable habitat may be present. Closest record approx. 6 km north-east.
Thysanotus anceps	-	Priority 3	Rhizomatous, leafless perennial herb growing to 0.4 m high. Produces purple flowers from October to December.	White or grey sand, brown loam, lateritic gravelly soils. Ridges, slopes and sandstone breakaways.	Unlikely – unlikely suitable habitat present.
Acacia oncinophylla subsp. *patulifolia*	-	Priority 4	Shrub growing between 0.5-2.5 m high with 'minni-ritchi' bark and phyllodes 4-9 cm long, 3-6 mm wide. Produces yellow flowers in cylindrical heads from August to December.	Brown sandy loam soils over granite, occasionally on laterite. Granite outcrops on the Darling scarp.	Unlikely – unlikely suitable habitat present.
Aponogeton hexatepalus	-	Priority 4	Rhizomatous or cormous, aquatic perennial herb with floating leaves. Produces green-white flowers from May to November.	Clay soil. Freshwater ponds, rivers, claypans and wetlands.	Unlikely – no standing water present.
Boronia tenuis	-	Priority 4	Procumbent or erect and slender shrub growing between 0.1-0.5 m high. Produces white or mauve or light blue flowers from August to November.	Pale orange sandy gravel, brown loam, clayey soils, associated with laterite and granite. Outcrops, slopes and winter-wet areas.	Unlikely – unlikely suitable habitat present.
Dodonaea hackettiana	-	Priority 4	Erect shrub or tree growing to 1-5 m high. Produces yellow flowers with green and red parts mainly between July to October.	Sandy soils often associated with limestone outcropping. Limestone ridges, slopes and dunes.	Possible – suitable habitat may be present. Closest records approx. 7 km west.
Drosera occidentalis	-	Priority 4	Fibrous-rooted, small red rosetted perennial herb growing to 0.02 m high. Produces white flowers from October to December.	White-yellow sand, clayey soils. Swamps, seasonally wet depressions and slopes.	Possible – suitable habitat may be present. Closest record approx. 3.5 km east.
Jacksonia sericea	-	Priority 4	Low spreading shrub growing to 0.6 m high. Produces flowers with yellow and red and orange parts usually from December to February.	Grey-white, yellow-brown sandy loam soils often associated with limestone. Limestone ridges, slopes and flats.	Possible – suitable habitat may be present. Closest records approx. 3 km east.

Species	EPBC Conservation Status	WA Conservation Status	Description	Habitat Preference	Likelihood of Occurrence
Kennedia beckxiana	-	Priority 4	Prostrate or twining shrub or climber. Produces red flowers from September to December.	Sand, loamy soils. Granite hills and outcrops.	Unlikely – Perth record likely planted. Species occurs east of Esperance.
Microtis quadrata	-	Priority 4	Erect herb growing to 0.4 m high. Produces cream-white flowers from October to December.	Sand, clay, loam soils. Winter wet flats, near wetlands, drainage lines, slopes.	Unlikely – unlikely suitable habitat present.
Ornduffia submersa	-	Priority 4	Aquatic floating herb with submerged leaves growing to 0.3 m high. Produces white-cream flowers from August to November.	Black-grey sandy clay. Permanent and seasonally inundated wetlands, swamps and claypans.	Unlikely – unlikely suitable habitat present.
Stylidium longitubum	-	Priority 4	Erect annual (ephemeral) herb growing to 0.05-0.12 m high. Produces pink flowers with white markings from October to December.	Sandy clay, clay soils. Seasonal wetlands.	Unlikely – unlikely suitable habitat present.
Thysanotus glaucus	-	Priority 4	Erect, tuberous perennial herb growing to 0.2 m high. Produces purple flowers from October to January.	Sandy soils. Undulating terrain.	Possible – suitable habitat likely present. Closest record approx. 5.5 km east but recorded in 1960.
Tripterococcus sp. Brachylobus (A.S. George 14234)	-	Priority 4	Slender, erect, multi-stemmed perennial herb to 0.6 m high. Produces orange-yellow flowers from October to February.	Grey-white sand, peaty sand over clay soils. Winter wet flats, shallow depressions, dry flats and slopes.	Possible – suitable habitat likely present. Closest record approx. 3 km north.
Verticordia lindleyi subsp. *lindleyi*	-	Priority 4	Erect shrub growing to 0.2 to 0.75 m high. Produces pink flowers with white fringes from November to January (also known from May).	Sand, sandy clay soils. Winter-wet depressions.	Unlikely – unlikely suitable habitat present.

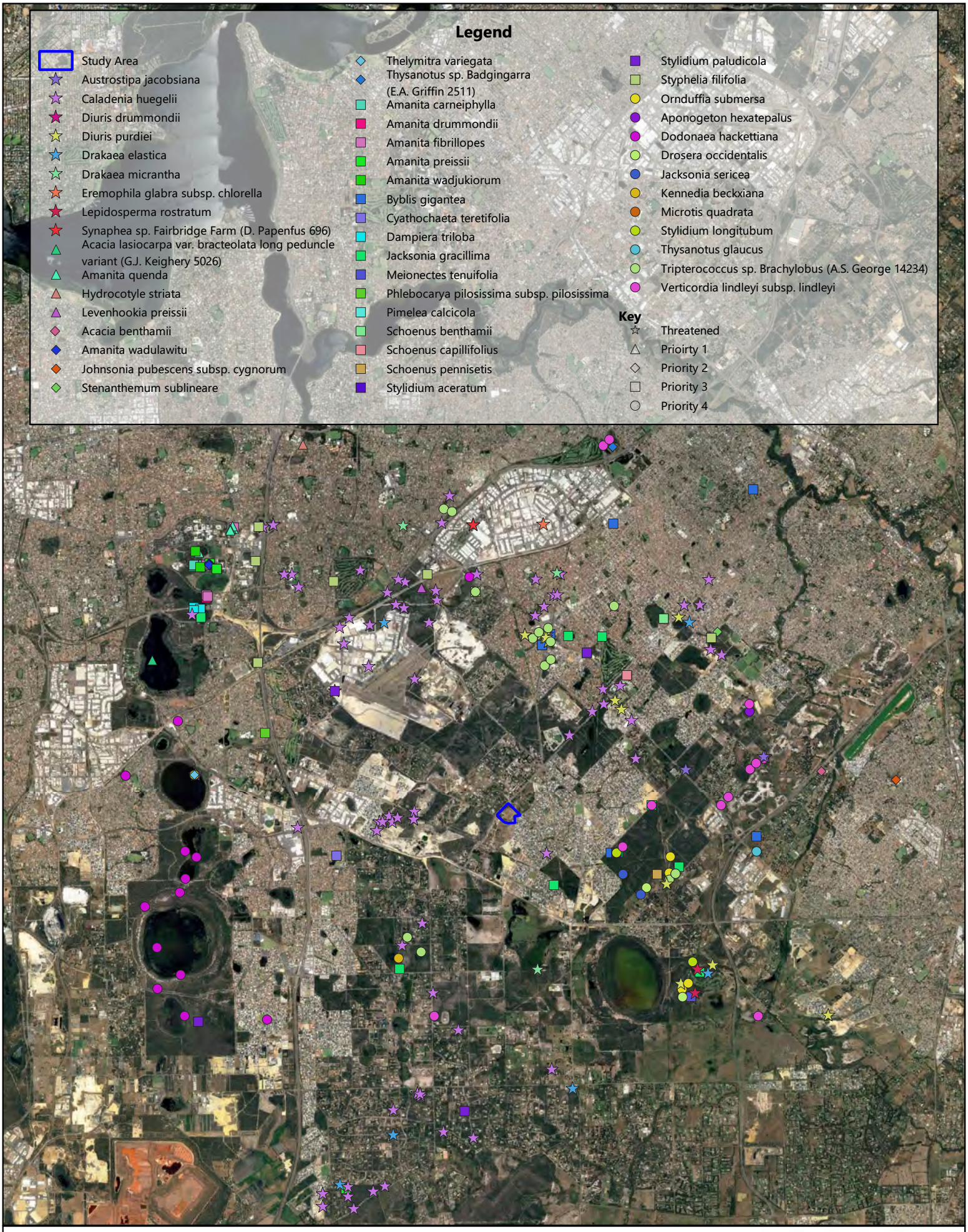

Figure 4 - Previously Recorded Threatened and Priority Flora

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4.2 FIELD ASSESSMENT

4.2.1 Flora

In total, 57 flora species were recorded within the study area (**Appendix D**). Of these, six (10.53%) are introduced (weed) species but none are listed as Declared Pest (plants) listed under the *Biosecurity and Agricultural Management Act* (BAM Act) (Department of Primary Industries and Regional Development (DPIRD) 2020). No Declared Pests listed under the BAM Act were recorded within the study area.

4.2.1.1 Threatened and Priority Flora

No Threatened flora species, listed under the EPBC Act, were recorded within the study area. One possible Priority flora species according to the DBCA, *Jacksonia* ?*gracillima* (P3), was recorded within the study area. One specimen of this species was recorded in site PR02, although the identity of the collection was not certain, due to insufficient material as a result of sub-optimal survey timing.

Jacksonia gracillima (P3) is a prostrate to spreading shrub growing between 0.5 to 1.5 m high occurring from north of Perth south to Busselton (Western Australian Herbarium (WAH) 2020). It flowers from October to November (WAH 2020), hence the specimen collected was sterile but considered possibly *Jacksonia gracillima* (P3) based on morphological attributes.

The timing of the field survey (late March) was sub-optimal to conduct a targeted significant flora survey, as March is outside the flowering period for most conservation significant species identified as potentially occurring from the desktop search. The Bennett (2011) field assessment, conducted on 10-11 October 2011 was suitably timed to target the four Threatened flora species focused on during the current study (*Austrostipa jacobsiana*, *Caladenia huegelii, Diuris purdiei* and *Drakaea elastica*). One of the aims of the current study was to identify the specific suitability of the habitat within the study area for the four conservation significant flora which were the main focus. Targeted search traverses demonstrating search effort are presented in **Figure 5**.

Of the four Threatened species listed above, on a regional level, potentially suitable habitat is considered to be provided within the study area for *Caladenia huegelii* within the upland, Banksia woodland vegetation (particularly units EmBaLW and BaEtLW), and for *Austrostipa jacobsiana* and *Drakaea elastica* within the lower-lying vegetation (particularly units EmBaLW(-B) and BaEtLW(-B)). Potentially suitable habitat for *Drakaea micrantha* is also generally considered to be supported by the study area, within the lower-lying areas (predominantly EmBaLW(-B) and BaEtLW(-B)). However, on a site-specific level, the actual micro-habitat suitability of the study area are is low and therefore, the likelihood of occurrence of the four Threatened flora species focused on is also low, as discussed further below.

Caladenia huegelii has previously been recorded 1 km from the study area. This species occurs in areas of mixed *Eucalyptus marginata* and *Banksia attenuata* and *B. menziesii* woodland with scattered *Allocasuarina fraseriana* over *Hibbertia hypericoides* and *Xanthorrhoea preissii* on deep grey-white sand (Department of Environment and Conservation (DEC) 2009a), consistent with vegetation unit EmBmLW.

Austrostipa jacobsiana is known to occur from two populations; Gosnells and Bunbury. The population in Gosnells (closest to the study area) occurs in calcareous-clay to fine sandy-clay soil in low-lying area fringing seasonally wet depression (Department of Parks and Wildlife (DPaW) 2016). Vegetation units EmBaLW(-B) and BaEtLW(-B)) are somewhat low-lying, supporting *Melaleuca preissiana* and *Kunzea glabrescens,* which may provide suitable habitat. There is a more pronounced (small) low-lying area in the eastern part of the study area, however this area is significantly degraded, with an understorey consisting of weedy grasses. It is therefore considered possible that this species could occur within the study area. However, if present, it is also considered likely that it would have been observed during the March field assessment.

Diuris purdiei grows in sand, sandy-clay soils in winter wet depressions amongst sedges and dense heath with emergent *Melaleuca preissiana, Corymbia calophylla, Eucalyptus marginata* and *Nuytsia floribunda* (TSSC 2008). Soils and vegetation of the study area may be suitable for this species, however, *Diuris purdiei* also relies on relatively recent fire, which is not apparent in the study area. Furthermore, the study area lacks the sedges and dense heath preferred by the species. Therefore, it is unlikely this species would occur within the study area.

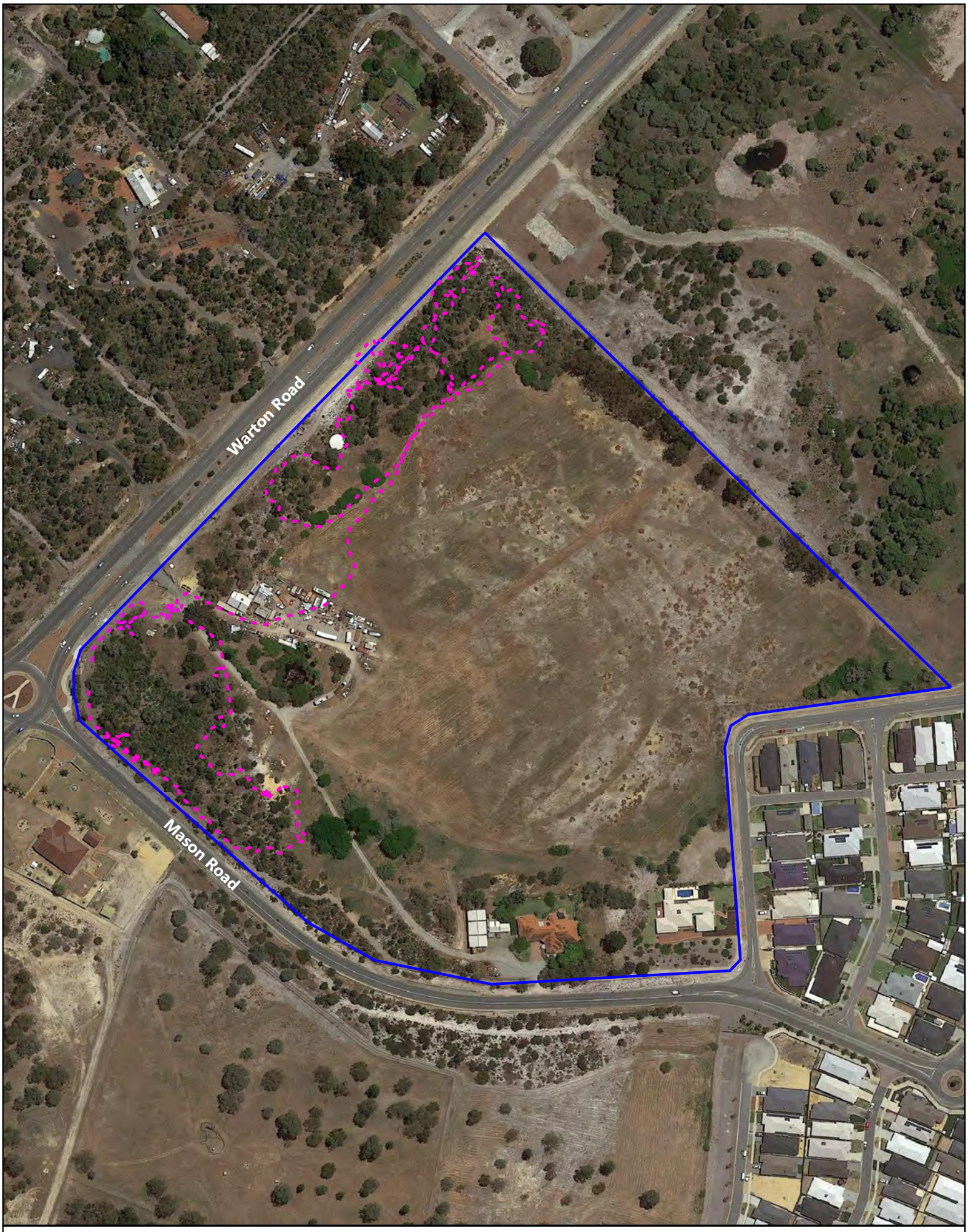
Drakaea elastica has previously been recorded 9 km from the study area. This species grows in bare patches of sand within a mosaic of dense vegetation in low-lying areas adjacent to winter wet swamps. Generally occurring in *Banksia attenuata* and *B. menziesii* woodland or *Kunzea glabrescens* thickets, with a requirement for a shady canopy (DEC 2009b). Similarly, *Drakaea micrantha* typically grows in association with winter-wet swamps, on bare sand lenses, often with *Kunzea* sp. and some upland woodland species, including Banksia (Kellie Bauer-Simpson, pers. comm.). Accordingly, it is possible that either *Drakaea* species could occur within the study area. However, given the lack of bare sand lenses throughput the study area, the likelihood of occurrence of both species is considered reduced.

4.2.2 Vegetation Units

Six vegetation units, plus 'planted' and 'cleared' areas were recorded within the study area. A brief description of each of the recorded units is presented in **Table 5**. Two of the six vegetation units, EmBaLW and BaEtLW were consistent with Bennett (2011) descriptions for the study area. One other vegetation unit described and mapped by Bennett (2011) outside of the study area, MpOLW, was incorporated into the resulting vegetation units for the study area. The description and mapping of three further vegetation units was considered warranted, which included, EmBaLW(-B), a degraded variant of the EmBaLW unit (containing little to no *Banksia attenuata* or *B. menziesii*) and BaEtLW(-B), a degraded variant of the BaEtLW unit (also containing little to no *Banksia attenuata* or *B. menziesii*). These degraded variant units also appear to be lower in the landscape, with Kunzea thickets dominant in some locations. The last of six vegetation units, AcOS, was also added, since none of the Bennett (2011) vegetation units were similar.

Flora species recorded by site are presented in **Appendix D** and site data are presented in **Appendix E**.

Vegetation mapping by Bennett (2011) was refined and added to where appropriate, with additional vegetation units (as listed above) described in accordance with Muir (1977) vegetation structural definitions (**Appendix F**). The descriptions for each of the relevant vegetation units is provided in **Table 5** and the spatial extent of vegetation mapping is presented in **Figure 6**.



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Legend

Study Area

Walked Traverse

Figure 5 - Threatened and Priority Flora Habitat Traverses

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Table 5 – Summary of Recorded Vegetation Units

Vegetation Unit and Description	Representative Relevé	Area (ha)	Area (%)
EmBaLW Low Woodland A of *Eucalyptus marginata* subsp. *marginata* over *Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana* and *Nuytsia floribunda* and Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata* and **Ehrharta calycina* in grey sand.	PR02	0.340	2.676
BaEtLW Low Woodland A of *Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana, Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata* in grey sand.	PR03	0.225	1.770
EmBaLW(-B) Low Woodland A of *Eucalyptus marginata* subsp. *marginate* over *Allocasuarina fraseriana, Nuytsia floribunda* and *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata* and **Ehrharta calycina* in grey sand.	PR01	0.832	6.549
BaEtLW(-B) Low Woodland A of *Eucalyptus todtiana, Allocasuarina fraseriana* and *Nuytsia floribunda* over Thicket of *Kunzea glabrescens* over Low Scrub B dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* in grey sand.	PR05	0.597	4.699
MpOLW Open Low Woodland A of *Melaleuca preissiana* over Dense Tall Grass of **Ehrharta calycina, *Eragrostis curvula* and **Ehrharta longiflora* in low lying grey sand over Open Herbs dominated by **Arctotheca calendula* in low lying grey sand.	NA	0.045	0.354
AcOS Open Scrub of *Adenanthos cygnorum* regrowth over scattered sparse mixed shrubs and herbs.	PR04	0.138	1.086
Planted Introduced tree species.	NA	1.061	8.351
Cleared Cleared areas for commercial operations, tracks.	NA	9.467	75.514
	Total	**12.705**	

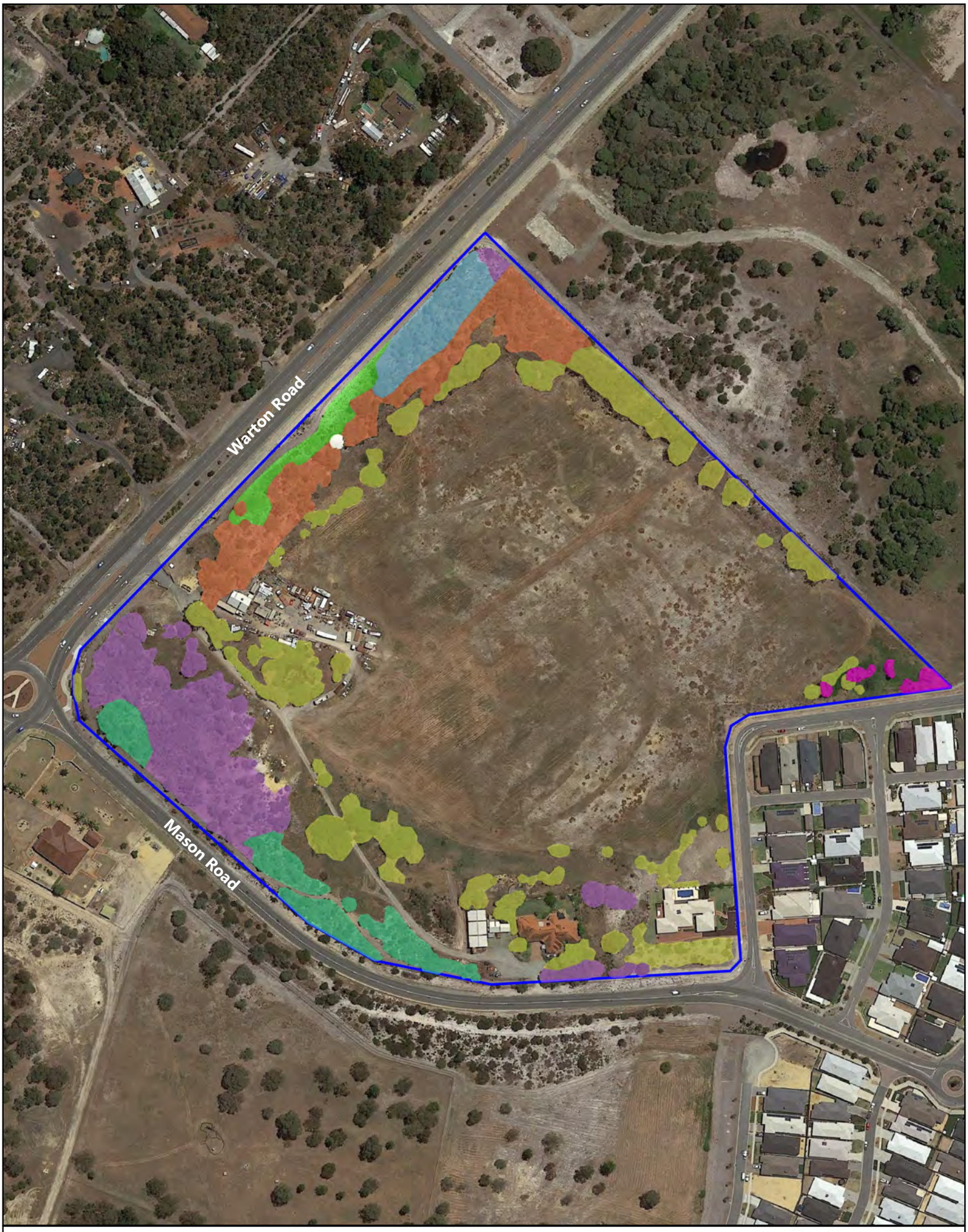

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Figure 6 - Vegetation Units

Legend

- Study Area
- AcOS
- BaEtLW
- BaEtLW(-B)
- EmBaLW
- EmBaLW(-B)
- MpOLW
- Planted

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4.2.3 Vegetation Condition

The majority of the study area has been subjected to clearing and subsequent commercial use for turf farming. Areas of better condition vegetation are limited to the southern and western outer fringes of the property, adjacent to fire breaks.

Excluding cleared areas categorised as 'Completely Degraded' (equating to 74.514 % of the study area), but not specifically mapped, the condition of the vegetation within the study area was found to range from 'Good' to 'Degraded – Completely Degraded'. The majority (9.595%) of the mapped vegetation was considered to be in 'Degraded – Completely Degraded' condition. Areas considered to be in 'Good' condition represent 5.171% of the study area and are limited to small areas within the EmBaLW and BaEtLW vegetation units (**Table 6** and **Figure 7**).

Table 6 – Summary of Recorded Vegetation Condition

Vegetation Condition	Area (ha)	Area (%)
Good	0.665	5.171
Degraded – Good	0.782	6.226
Degraded	0.571	4.494
Degraded – Completely Degraded	1.218	9.595
Completely Degraded	9.467	74.514
Total	**12.705**	**100**

Bennett (2011) vegetation condition mapping generally differed from the results of the current study, with areas previously mapped as 'Degraded – Completely Degraded' now considered to be in better condition, 'Degraded – Good', and conversely areas Bennett (2011) mapped as 'Good' were considered to be in poorer condition, now mapped as 'Degraded' or 'Degraded – Good'. Differences between vegetation condition mapping may be due to temporal changes and possibly from regrowth and vegetation improvement or increased disturbance over the period of time between the studies.

It is possible that a field survey conducted during spring may produce different results for vegetation condition, since annual and ephemeral native and introduced flora will be present, however, it is considered unlikely that results and mapping would differ considerably from those reported herein.

4.2.4 Conservation-Significant Vegetation

4.2.4.1 Banksia Woodlands TEC

Two vegetation units described and mapped within the study area, EmBaLW and BaEtLW are Banksia woodlands. The respective degraded variant units, EmBaLW(-B) and BaEtLW(-B) are not considered to be banksia woodlands, due to a complete lack or near lack of any Banksia trees and various levels of degradation.

Relevé data from vegetation units EmBaLW and BaEtLW were analysed to determine likely equivalence to the Banksia Woodlands TEC, based on a checklist derived from the Conservation Advice (Threatened Species Scientific Committee (TSSC) 2016). The results of this analysis determined that the vegetation characteristics are representative of the Banksia Woodlands TEC (**Table 6**), the extent of which is presented in **Figure 8**.

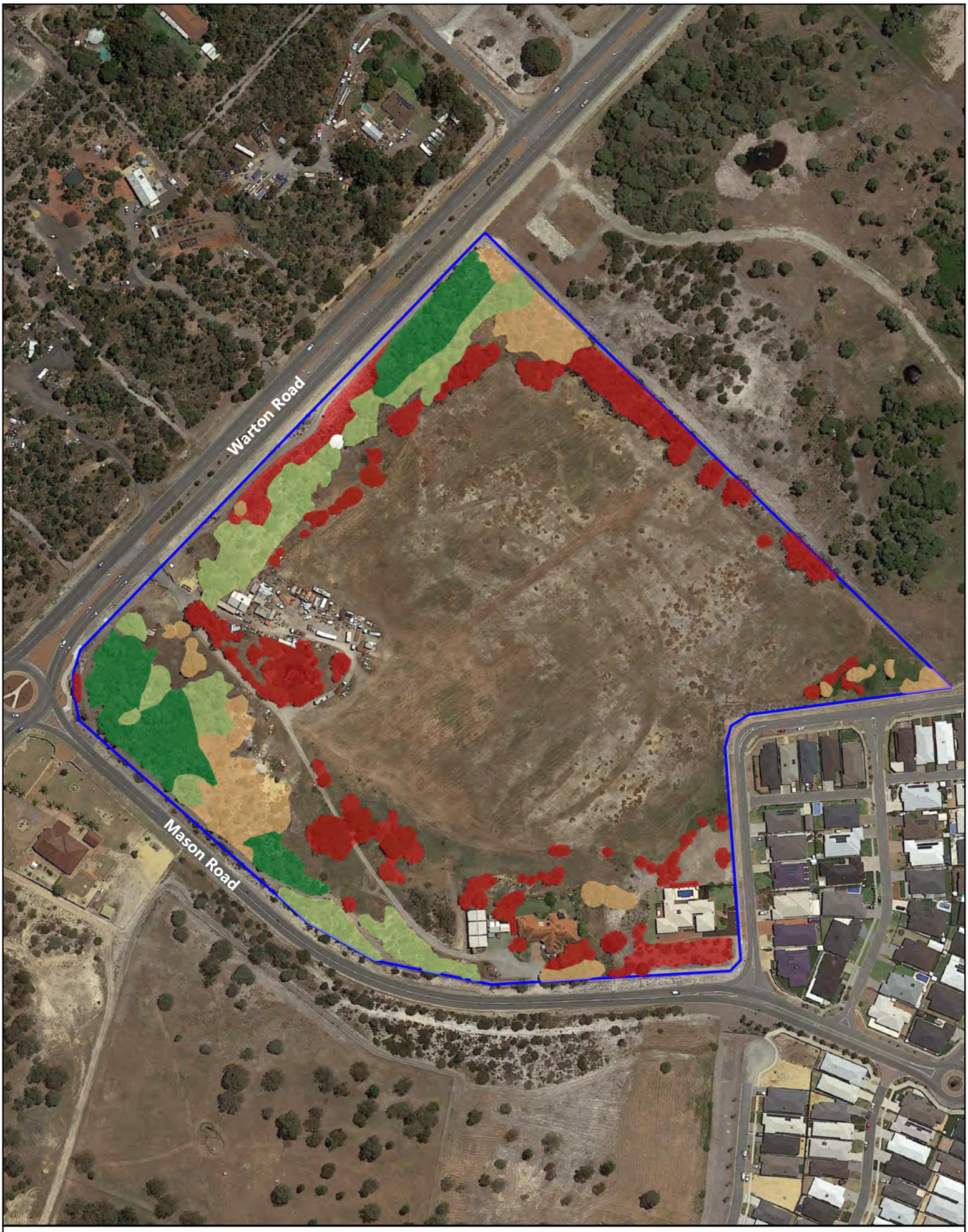

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Figure 7 - Vegetation Condition

Legend

Study Area
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Table 7 – Banksia Woodlands TEC Characterisation of Relevant Relevés

Key Character*			a).	b).	c).	d).	e).	f).	g).	Confirmed?
Relevé No./Unit	PR02	EmBaLW	+	+	+	+	+	+	+	Yes
	PR03	BaEtLW	+	+	+	-	+	+	+	Yes

***Key**

a) Swan Coastal Plain or Jarrah Forest location

b) Soils and landform either deep Bassendean, Spearwood or occasionally Quindalup sands, sandy colluvium, Aeolian sands of the Ridge Hill Shelf or Whicher Scarp

c) Distinctive upper sclerophyllous layer dominated by *Banksia attenuata, Banksia menziesii, Banksia ilicifolia* or *Banksia prionotes*

d) With (although can be without) an emergent tree layer of *Corymbia calophylla, Eucalyptus marginata* or *Eucalyptus gomphocephala*

e) With (although can be without) other trees including *Eucalyptus todtiana, Nuytsia floribunda, Allocasuarina fraseriana, Callitris arenaria, Callitris pyramidalis* or *Xylomelum occidentale*

f) Understorey/mid-ground sclerophyllous shrub layer including mostly Asteraceae, Dilleniaceae, Droseraceae, Ericaceae, Fabaceae, Haemodoraceae, Iridaceae, Myrtaceae, Orchidaceae, Proteaceae, Restionaceae

g) Herbaceous ground layer including mostly Apiaceae, Asteraceae, Cyperaceae, Haemodoraceae, Poaceae, Restionaceae, Stylidiaceae

To be considered a MNES protectable under the EPBC Act, a Banksia Woodland patch the must meet at least the 'Good' condition category as outlined in the Conservation Advice (TSSC 2016). Although the vegetation within units EmBaLW and BaEtLW has been diagnosed to be representative of the Banksia Woodlands TEC, in accordance with diagnostic criteria from the Conservation Advice (TSSC 2016), the advice also stipulates condition thresholds and minimum patch sizes as follows:

- Pristine - no minimum patch size
- Excellent – 0.5 ha
- Very Good – 1 ha
- Good – 2 ha.

None of the local patches within the study area meet any of the above area and condition thresholds, with the areas of 'Good' condition vegetation (some of which is Banksia woodland) totalling only 0.665 ha across the entire study area.

To be considered part of a regional patch (connected to other areas of Banksia woodland outside the study area), the areas of eligible Banksia woodland within the study area would need to be adjacent to other areas of eligible Banksia woodland and separated by not more than 30 m. The closest adjacent Banksia Woodland vegetation occurs on the other side of Warton Road, which is approximately 39 m from the closest occurrence of Banksia woodland within the study area. Therefore, Banksia woodland within the study area is not considered part of a broader regional patch.

0 25 50 75 100 m

GDA 94 / MGA Zone 50

Figure 8 - Banksia Vegetation

Legend

Study Area

Banksia Vegetation

FOCUSED VISION consulting

4.2.5 Vegetation Representation

The Environmental Protection Authority's (EPA) Position Statement No. 2 lists a series of objectives which relate to biodiversity (EPA 2000). One of them is to protect at least 30% of the original extent of vegetation complexes in unconstrained areas and 10% in constrained areas (i.e. urban regions). Pre-European vegetation (1001 vegetation association) within the study area is above the 10% threshold for constrained areas. Within the City of Armadale, 33.30% of the 1001 vegetation association remains and 22.13% remains within the Swan Coastal Plain.

5 CONCLUSION AND RECOMMENDATIONS

The key findings arising from the flora and vegetation review of the study area are as follows:

- No Threatened flora listed under EPBC Act or BC Act were recorded.
- One possible Priority flora species, *Jacksonia* ?*gracillima* (P3), was recorded within vegetation unit EmBaLW.
- The survey timing (late March) was not optimal for the identification of flowering flora, annual and ephemeral species and therefore, it is unlikely all species relevant to the study area were recorded.
- The timing of the field assessment could have also limited the accuracy of vegetation unit and condition mapping, since not all flora species naturally occurring during spring would have been observable. However, given the degraded nature of the majority of the study area, this is unlikely to have represented a major limitation.
- Of the four Threatened flora species given particular focus; *Austrostipa jacobsiana*, *Caladenia huegelii, Diuris purdiei* and *Drakaea elastica*, it is considered that all could possibly occur. However, specific habitat suitability for all species besides *Caladenia huegelii* is low to negligible. *Caladenia huegelii* could occur within vegetation units EmBaLW or BaEtLW.
- It is also considered possible for a fifth Threatened flora species, *Drakaea micrantha,* to occur, however, specific micro-habitats (bare sand lenses) were not observed within the study area and therefore, the actual likelihood if this species occurrence is also considered unlikely.
- Six vegetation units, plus 'planted' and 'cleared' areas were recorded within the study area, with two of the recorded units representing remnant vegetation with areas in 'Good' or better condition.
- Of the recorded vegetation units, two represent Banksia woodland, which both meet diagnostic criteria to be considered representative of the Banksia Woodlands TEC. However, the size of the areas of these woodlands do not meet minimum condition thresholds, even when considered in the context of regional adjacent Banksia woodland vegetation and therefore are not eligible for inclusion as a MNES protectable under the EPBC Act

Based on the findings of the study, it is recommended that suitably timed targeted flora surveys be carried out, focused on *Caladenia huegelii* and *Jacksonia gracillima,* and also addressing other relevant species arising from the desktop assessment.

It is not considered that any follow-up survey work for the characterisation of vegetation types, condition or conservation significance is required, based on the combined results of the Bennett (2011) and current studies.

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APPENDIX A – BENNETT (2011)

Botanical Assessment of Selected Lots
Along Warton Road, Armadale Road and Wright Road
FORRESTDALE

Prepared for:
COTERRA ENVIRONMENT
19/336 Churchill Avenue,
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Prepared by:
Bennett Environmental Consulting Pty Ltd

Sollya heterophylla

PO Box 341
KALAMUNDA 6926

December 2011

STATEMENT OF LIMITATIONS

Scope of Services

This report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Eleanor Bennett ("the Author"). In some circumstances a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services.

Reliance on Data

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, the Author has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

Environmental Conclusions

In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. The Author assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of the Author or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report. The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

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SUMMARY

Bennett Environmental Consulting Pty Ltd undertook a vegetation and flora overview of Lots 737, 9006, 9001, 1001, 88, 99, 100, 151 and 150 along Warton Road; Lots 13, 14, 15, 3, 28 and 29 along Armadale Road and Lots 4, 5, 6 and 1 along Wright Road in Forrestdale, within the City of Armadale. Large areas were completely cleared and only small pockets of remnant vegetation remained. The vegetation at the site could be classified upon its location in the landscape. The vegetation units described are provided below.

UPLAND VEGETATION

- Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus marginata* subsp. *marginata* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata* and **Ehrharta calycina* in grey sand.
- Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata* in grey sand.
- Open Low Woodland A of *Banksia attenuata* over Scrub of *Kunzea glabrescens* over Dense Tall Grass of **Ehrharta calycina* over Open Herbs dominated by **Hypochaeris glabra* in pale grey sand.

WETLAND VEGETATION

- Low Forest A of *Eucalyptus rudis* subsp. *rudis* over Open Herbs dominated by **Lotus subbiflorus* over Open Tall Sedges of *Juncus pallidus* in black sandy loam.
- Dense Low Forest A of *Melaleuca preissiana* over Scrub of *Taxandria linearifolia* over Dense Tall Sedges of *Lepidosperma longitudinale* and *Juncus pallidus* in black sand.
- Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* in grey sand.
- Low Woodland A of *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Scrub of *Melaleuca teretifolia* and *Astartea scoparia* over Tall Grass dominated by **Eragrostis curvula* and **Ehrharta longifolia* over Herbs dominated by **Lotus subbiflorus* in black sandy loam.
- Dense Low Forest A of *Melaleuca preissiana* with occasional trees of *Eucalyptus rudis* subsp. *rudis* over Open Scrub of *Astartea scoparia* over Dense Herbs dominated by **Zantedeschia aethiopicum* in very damp grey sand with areas of open water in which *Lemna disperma* was recorded.
- Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub C dominated by *Hypocalymma angustifolium* and *Lechenaultia floribunda* over Tall Sedges of *Schoenus rigens* in grey sand.
- Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabresecns* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand.
- Heath A of *Melaleuca viminea* and *Melaleuca incana* subsp. *incana* over Open Herbs dominated by **Hypochaeris glabra* and **Lotus subbiflorus* over Tall Sedges dominated by *Baumea juncea* and *Lepidosperma longitudinale* in damp grey sand.
- Open Low Woodland A of *Melaleuca preissiana* over Dense Tall Grass of **Ehrharta calycina*, **Eragrostis curvula* and **Ehrharta longiflora* in low lying grey sand over Open Herbs dominated by **Arctotheca calendula* in low lying grey sand.

HERBLAND/SEDGELAND/GRASSLAND

- Dense Herbs dominated by **Lotus subbiflorus* over Open Tall Sedges of *Meeboldina scariosa* and *Baumea articulata* in damp sandy loam.
- Open Low Grass of *Pennisetum clandestinum* over Open Herbs dominated by **Lotus subbiflorus* over Very Open Low Sedges of **Cyperus tenellus* in very damp grey sand.

The vegetation at the site varied between very good and completely degraded. Some of the better condition vegetation was recorded from:

- Lot 6 Wright Road recorded vegetation in very good condition. The remnant vegetation was at the back of the block;
- Lot 99 Warton Road, again at the back of the block where it adjoined Lot 6, the vegetation was in very good to good condition;
- Lot 5 Wright Road, also at the back of the block where it adjoined Lot 6 had an area where the vegetation was regrowing after disturbance, and its vegetation condition was recorded as good but there were patches of very good and others of degraded condition; and
- Three other lots, Lot 9103 and Lot 100 along Warton Road and Lot 15 along Armadale Road recorded patches of vegetation that were in good condition.

None of the vegetation units are listed as threatened or priority ecological communities and no threatened or priority flora were observed.

Most of the area is low lying, and some was damp when the survey was undertaken. Although most of the site recorded a degraded to completely degraded condition, due to clearing and planting with non-endemics or clearing with occasional scattered native trees retained, consideration will need to be given to the low lying nature of the area if development is to proceed.

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1. INTRODUCTION

1.1 Background

Coterra Environment commissioned Bennett Environmental Consulting Pty Ltd to undertake a vegetation overview and listing of selected Lots in Forrestdale, within the City of Armadale. The lots were 737, 9006, 9001, 1001, 88, 99, 100, 151 and 150 along Warton Road; Lots 13, 14, 15, 3, 28 and 29 along Armadale Road and Lots 4, 5, 6 and 1 along Wright Road ('the site').

Figure 1. Location of the site surveyed - outlined in red.

1.2 Scope of Works

The requirements for this project were to:

i. Undertake a Level 2 vegetation survey (Environmental Protection Authority, 2004); and to
ii. Search for and record all significant species at the site.

2. BACKGROUND INFORMATION

2.1 Geology and Landform

The area is included in the Bassendean Dunes which have off-white to pale grey sands at the surface and cream to yellow sands at depth. The Bassendean Dunes are again separated into three units based on the characteristics of their swamps. The study site occurs within the Southern River Complex, the sand appears to have been blown over the alluvial soils resulting in swamps with a clay base (Churchward and McArthur, 1980).

2.2 Vegetation

The Interim Biogeographical Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995) recognizes 85 bioregions. The IBRA is used as the common unit to compare biological and biophysical attributes. Bioregions represent a landscape-based approach to classifying the land surface and each region is defined by a set of major environmental influences, which shape the occurrence of flora and fauna and their interaction with the physical environment. Baldivis occurs in the Swan Coastal Plain, which has been subdivided into the northern section and the southern section. The study area is located in the southern section, abbreviated SWA2 (Mitchell, Williams and Desmond, 2002).

The survey area is mapped by Beard (1981) as a Low Woodland of *Allocasuarina fraseriana*, *Banksia* species and *Eucalyptus marginata* (abbreviated e2,3Mi). Shepherd *et al.* (2002) have determined the pre-European and current extent of the vegetation associations described by Beard. In addition they have assessed the percentage of each vegetation association remaining, the amount in IUCN reserves and the percentage in other reserves. The pre-European area of e2,3Mi is estimated to be 79,001ha, the current extent is 18,398ha which represents 23.2% remaining vegetated of which 38% is included in conservation.

Heddle *et al.* (1980) described the vegetation complexes of the Darling System at a scale of 1:250 000. There was found to be a distinct pattern of plant distribution linked to landforms, soils and climate. The most obvious trend was associated with increasing aridity from west to east on the Darling Plateau. The vegetation changes observed were a decrease in height and percentage cover of the tallest stratum and a distinct change in floristics. Forrestdale occurs in the Southern River Complex which is described as an Open Woodland of *Corymbia calophylla – Eucalyptus marginata* subsp. *marginata* and Banksia species with fringing Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* along creek beds.

Bush Forever (Government of Western Australia, 2000) states that 17% of the original area of the Southern River Complex remains vegetated within the Swan Coastal Plain. The area proposed for protection (Government of Western Australia, 2000) is 10%.

2.3 Threatened Ecological Communities

An ecological community is a naturally occurring biological assemblage that occurs in a particular type of habitat. A Threatened Ecological Community is one which falls into one of the following categories, presumed totally destroyed, critically endangered, endangered or vulnerable (Department Environment and Conservation, 2011b).

A possible ecological community which does not meet the above is added to the Priority Ecological Community List. Priorities 1, 2, and 3 are adequately known but are not currently believed to be threatened. Those that have recently been removed from the threatened list are listed as Priority 4. Conservation dependent ecological communities are placed in Priority 5.

2.4 Significant Flora

Prior to undertaking the field work a search was undertaken of the Department of Conservation and Environment Threatened Flora Database. The resulting data is provided in Table 3.

Table 1. Code and description of Threatened and Priority Flora (Department Environment and Conservation, 2011a)

Code	Declared Rare and Priority Flora Categories
T	T (Threatened Flora) -Extant Taxa. Taxa, which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.
X	T (Threatened Flora) -Presumed Extinct Taxa. Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.
1	Priority One -Poorly Known Taxa. Taxa, which are known from one or a few (generally <5) populations, which are under threat.
2	Priority Two -Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat.
3	Priority Three -Poorly Known Taxa. Taxa, which are known from several populations, at least some of which are not believed to be under immediate threat.
4	Priority Four - Rare, Near Threatened and other species in need of monitoring. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.
5	Priority Five - Conservation dependent species. Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Table 1 presents the definitions of Threatened and the five Priority Flora ratings under the Wildlife Conservation Act (1950) as extracted from Department of Environment and Conservation (2011a). Table 2 presents the definitions of the threatened species under the Environmental Protection and Biodiversity Conservation Act, 1999 (Department of Sustainability, Environment, Water, Populations and Communities, 2011).

Table 2. Categories of Threatened Flora Species (Department of Sustainability, Environment, Water, Populations and Communities, 2011)

Code	Declared Rare and Priority Flora Categories
Ex	Extinct Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of this species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at any particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered Taxa, which is not critically endangered, and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.

Code	Declared Rare and Priority Flora Categories
V	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Table 3. Threatened and Priority Flora Species List as provided by the Department of Environment and Conservation

Taxon	Code	Description
Caladenia huegelii	T	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.
Diuris purdiei	T	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, Sep to Oct. Grey-black sand, moist. Winter-wet swamps.
Drakaea elastica	T	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow, Oct to Nov. White or grey sand. Low-lying situations adjoining winter-wet swamps.
Drakaea micrantha	T	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow, Sep to Oct. White-grey sand.
Lepidosperma rostratum	T	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown. Peaty sand, clay.
Eryngium pinnatifidum subsp. *palustre*	3	Erect perennial, herb, 0.15-0.5 m high. Fl. white/blue, Oct to Nov. Clay, sandy clay. Claypans, seasonally wet flats.
Jacksonia gracillima	3	No description provided.
Stylidium longitubum	3	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink, Oct to Dec. Sandy clay, clay. Seasonal wetlands.
Drosera occidentalis subsp. *occidentalis*	4	Fibrous-rooted, rosetted perennial, herb, to 0.01 m high. Fl. pink/white, Nov to Dec. Sandy & clayey soils. Swamps & wet depressions.
Grevillea thelemanniana subsp. *thelemanniana*	4	No description provided.
Jacksonia sericea	4	Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.
Ornduffia submersa	4	No description provided.
Thysanotus glaucus	4	Caespitose, glaucous perennial, herb, 0.1-0.2 m high. Fl. purple, Oct to Dec or Jan to Mar. White, grey or yellow sand, sandy gravel.
Tripterococcus paniculatus	4	Perennial, herb, to 1 m high. Fl. yellow-green, Oct to Nov. Grey, black or peaty sand. Winter-wet flats.
Verticordia lindleyi subsp. *lindleyi*	4	Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan. Sand, sandy clay. Winter-wet depressions.

3. METHODS

All tracks were driven and transects were walked through the remnant bushland listing the vegetation units in the area and the dominant taxa. As this was being undertaken the bushland was searched for Threatened and Priority Flora. As a Level 2 vegetation survey was required temporary quadrats were recorded. Plants unknown in the field were collected, pressed and identified using the Reference Collection at the Western Australian Herbarium, which has limited collections and sometimes makes the positive identification difficult. The vegetation at the site is described using the vegetation classification of Muir (1977) as described in Table 4.

Table 4 Vegetation Classification (from Muir, 1977)

LIFE FORM / HEIGHT CLASS	Canopy Cover			
	DENSE 70 % - 100%	**MID DENSE 30% - 70%**	**SPARSE 10% - 30%**	**VERY SPARSE 2% - 10%**
Trees > 30 m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
Trees 15 – 30 m	Dense Forest	Forest	Woodland	Open Woodland
Trees 5 – 15 m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
Trees < 5 m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
Mallee (tree form)	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Mallee (shrub form)	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs > 2 m	Dense Thicket	Thicket	Scrub	Open Scrub
Shrubs 1.5 – 2 m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
Shrubs 1 - 1.5 m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
Shrubs 0.5 – 1 m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
Shrubs 0 - 0.5 m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
Hummock grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
Bunch grass > 0.5 m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
Bunch grass < 0.5 m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
Sedges > 0.5 m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
Sedges < 0.5 m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, liverworts	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

4. RESULTS

Field work was undertaken on 10-11th October 2011. Some sites were completely cleared Lot 737 Warton Road, Lot 14 Armadale Road, Lots 28 and 29 Armadale Road.

4.1 Vegetation

As with the vegetation description for the Bush Forever Sites it is possible to divide the vegetation at the site into Uplands and Wetlands. The descriptions below will be general covering the different vegetation units recorded from each of the individual lots. The taxa recorded from each quadrat are listed in Appendix B and the vegetation recorded from each Lot is mapped in Appendix C.

UPLAND VEGETATION

- Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus marginata* subsp. *marginata* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata* and **Ehrharta calycina* in grey sand.
  This vegetation was recorded from the slopes and crest of the sand dune at the site. It was recorded from Lot 88 Warton Road (no quadrat), Lot 99 Warton Road (quadrat F6) , Lot 1001 Warton, Lot (quadrat F21) and Lot 9103 Warton Road (quadrats F02 and F03).

- Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata* in grey sand.
  This vegetation was recorded from the lower slopes of sand dunes at the site. It was recorded from Lot 9103 Warton Road (quadrat F04), Lot 15 Armadale Road (quadrat F10) and Lot 9101 Warton Road (quadrat F20).

- Open Low Woodland A of *Banksia attenuata* over Scrub of *Kunzea glabrescens* over Dense Tall Grass of **Ehrharta calycina* over Open Herbs dominated by **Hypochaeris glabra* in pale grey sand.

This vegetation was recorded from low lying ground in Lot 100 Warton Road (quadrat F08).

WETLAND VEGETATION

- Low Forest A of *Eucalyptus rudis* subsp. *rudis* over Open Herbs dominated by**Lotus subbiflorus* over Open Tall Sedges of *Juncus pallidus* in black sandy loam.
  This vegetation was recorded from Lot 9006 Warton Road (quadrat F17).

- Dense Low Forest A of *Melaleuca preissiana* over Scrub of *Taxandria linearifolia* over Dense Tall Sedges of *Lepidosperma longitudinale* and *Juncus pallidus* in black sand.
  This vegetation was recorded from low lying ground in Lot 6 Wright Road (quadrat F14).

- Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* in grey sand.
  This vegetation was recorded from the lower slope to flat. At Lot 100 the trees of *Melaleuca preissiana* were scattered and not a dominant stratum of the vegetation It was recorded from Lot 100 (quadrat F07) and Lot 9103 Warton Road (quadrat F01).

- Low Woodland A of *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Scrub of *Melaleuca teretifolia* and *Astartea scoparia* over Tall Grass dominated by **Eragrostis curvula* and **Ehrharta longifolia* over Herbs dominated by **Lotus subbiflorus* in black sandy loam.
  This vegetation was recorded in Lot 9101 Wright Road (quadrat F19).

- Dense Low Forest A of *Melaleuca preissiana* with occasional trees of *Eucalyptus rudis* subsp. *rudis* over Open Scrub of *Astartea scoparia* over Dense Herbs dominated by **Zantedeschia aethiopicum* in very damp grey sand with areas of open water in which *Lemna disperma* was recorded.
  This vegetation was recorded from low lying ground in Lot 3 Armadale Road (quadrat F11).

- Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub C dominated by *Hypocalymma angustifolium* and *Lechenaultia floribunda* over Tall Sedges of *Schoenus rigens* in grey sand.
  This vegetation was recorded from low lying ground in Lot 15 Armadale Road (quadrat F09).

- Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand.
  This vegetation was recorded from low lying ground in Lot 5 Wright Road (quadrat F12) and Lot 99 (quadrat F05).

- Heath A of *Melaleuca viminea* and *Melaleuca incana* subsp. *incana* over Open Herbs dominated by **Hypochaeris glabra* and **Lotus subbiflorus* over Tall Sedges dominated by *Baumea juncea* and *Lepidosperma longitudinale* in damp grey sand.
  This vegetation was recorded from damp, flat ground in Lot 6 Wright Road (quadrat F13).

- Open Low Woodland A of *Melaleuca preissiana* over Dense Tall Grass of **Ehrharta calycina*, **Eragrostis curvula* and **Ehrharta longiflora* in low lying grey sand over Open Herbs dominated by **Arctotheca calendula* in low lying grey sand.
  This vegetation was recorded from Lot 9006 Warton Road (quadrat F18).

HERBLAND/SEDGELAND/GRASSLAND

- Dense Herbs dominated by **Lotus subbiflorus* over Open Tall Sedges of *Meeboldina scariosa* and *Baumea articulata* in damp flat area. This vegetation was recorded from Lot 5 Wright Road (quadrat F15).

- Open Low Grass of *Pennisetum clandestinum* over Open Herbs dominated by **Lotus subbiflorus* over Very Open Low Sedges of **Cyperus tenellus* in very damp grey sand.
  This vegetation was recorded from Lot 9006 Warton Road (quadrat F16).

4.2 Vegetation Condition

Bushland has been historically subject to ongoing degradation and is especially susceptible to disturbances arising as a result of indirect impacts from surrounding developments and human activity. Degradation is caused by a wide range of factors, including isolation, edge effects, weed invasion, plant diseases, changes in fire frequency, landscape fragmentation, increased predation on native fauna by feral animals, decrease in species richness and general modification of ecological function.

Vegetation condition was rated according to the vegetation condition scale used in Keighery (1994). The vegetation condition of the remnant vegetation at the survey site was mainly good (condition 4) to completely degraded (condition 6) with a small area on the south eastern side that was in very good condition. There were groups of trees with good cover or scattered trees where the understorey had been completely replaced with weeds. These areas were degraded (condition 5). Where there were no trees or scattered trees and the weeds were dominant the vegetation condition was completely degraded (condition 6). The vegetation condition of the site is mapped in Figure 3, Appendix C.

Table 5. Explanation of Vegetation Condition Rating (Keighery, 1994)

Rating	Description	Explanation
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.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Table 6. Vegetation condition recorded for each quadrat

VEGETATION CONDITION	QUADRAT NUMBERS
Very good	F13, F14
Very good to good	F05
Good	F03, F04, F07, F09, F10, F12
Good to degraded	F02, F16, F19, F20, F21
Degraded	F01, F17
Degraded to completely degraded	F06, F08, F11, F15
Completely degraded	F18

The vegetation condition for each of the individual lots is discussed under the lot number in Appendix C.

4.3 Species Recorded

A total of 58 vascular plant families, 173 genera and 244 species were recorded during the survey (See Appendix A). The dominant plant families were: Myrtaceae (Eucalyptus family) with 24 species; Fabaceae (Wattle and pea family) with 23 species; Poaceae (grass family) with 23 species; and Asteraceae (daisy family) with 17 species.

4.4 Weeds

A total of 74 weeds were recorded during the current survey with the dominant weed families being Poaceae recording 17 and Asteraceae 11 weed species. All have been determined as weeds by the Western Australian Herbarium (2011) and Department of Environment and Conservation (2011c). There are several ratings allocated to each weed in the Invasive Plant Prioritisation but only three have been selected to include in this report. These are ecological impacts, impact attributes and invasiveness which are shown in Table 7 for each of the non-endemic species recorded. Thirty three of the weeds are listed as having a high ecological impact on the environment and 47 are listed having a rapid rate of dispersal.

Table 6. Ecological Impacts and Invasiveness of recorded weeds

Species	Ecological Impacts		Invasiveness
	Ecological impact L – low impact species M – medium impact species H – high impact species U – unknown impact	Impact attributes 1, 2,3,4, 5, 6, 7, 8, 9, 10. See explanation below table	Rate of dispersal R=rapid, M=moderate, S=slow
**Acacia longifolia*	H	1,2,4,6,7,8,9	M
**Aira caryophyllaceae*	U		U
**Arctotheca calendula*	H	8,9	R
**Arundo donax*	H		S
**Avena barbata*	H		R
**Briza maxima*	U		R
**Briza minor*	U		R
**Bromus diandrus*	H		R
**Carpobrotus edulis*	H	8,9	R
**Cicendia filiformis*	L		H
**Conyza bonariensis*	L		M
**Cotula coronopifolia*	U		R
**Crepis capillaris*	L		Not recorded
**Cynodon dactylon*	H	9	R
**Cyperus tenellus*	L		U
**Echium plantagineum*	H	increasing	R
**Ehrharta calycina*	H	1,2,6,8,9	R
**Ehrharta longiflora*	H	1,2,6,8,9	R
**Eragrostis curvula*	H		R
**Erodium botrys*	U		M
**Euphorbia peplus*	H	8,9	R
**Euphorbia terracina*	H	8,9	R
**Ficus carica*	H		M
**Foeniculum vulgare*	L		M
**Freesia alba x leichtlinii*	H	8,9	R
**Fumaria capreolata*	H	7,9	R
**Gladiolus caryophyllaceus*	H		R
**Gomphocarpus fruticosus*	H	9	R
**Hedypnois rhagadioloides*	U		U
**Holcus lanatus*	H		U
**Hordeum vulgare*	H		U
**Hypochaeris glabra*	H		R
**Isolepis marginata*	U		U
**Juncus bufonius*	U		R

Species	Ecological Impacts		Invasiveness
	Ecological impact L – low impact species M – medium impact species H – high impact species U – unknown impact	Impact attributes 1, 2,3,4, 5, 6, 7, 8, 9, 10. See explanation below table	Rate of dispersal R=rapid, M=moderate, S=slow
**Juncus capitatus*	U		R
**Lactuca serriola*	H		R
**Lagurus ovatus*	H		R
**Lolium rigidum*	M		R
**Lotus subbiflorus*	U		R
**Lysimachia arvensis*	U		R
**Lythrum hyssopifolia*	M		R
**Medicago polymorpha*	L		Not recorded
**Monopsis debilis*	M		R
**Moraea flaccida*	H	8,9	R
**Ornithopus pinnatus*	M		R
**Orobanche minor*	U		R
**Oxalis corniculata*	L		S
**Oxalis pes-caprae*	H		S
**Oxalis purpurea*	H		S
**Paspalum urvillei*	H		M
**Pelargonium capitatum*	H	8,9	R
**Pennisetum clandestinum*	H		S
**Petrorhagia dubia*	M	8	R
**Phytolacca octandra*	U		M
**Ranunculus sessiliflorus*	U		R
**Raphanus raphanistrum*	U		M
**Ricinus communis*	M	2,8,9	R
**Romulea rosea*	U		R
**Rubus laudatus*	H	3,7,8,9	M
**Rumex crispus*	U		R
**Schinus terebinthifolia*	H	3,7,8,9	M
**Silene gallica*	L		M
**Solanum americanum*	U		R
**Solanum nigrum*	M		R
**Sonchus asper*	U		R
**Sonchus oleraceus*	U	increasing	R
**Stellaria media*	L		R
**Trifolium campestre*	U		U
**Ursinia anthemoides*	U	increasing	R
** Vellereophyton dealbatum*	M		R
**Vicia sativa*	U		U
**Vulpia bromoides*	H		R
**Wahlenbergia capensis*	U		R
**Zantedeschia aethiopicum*	H	6,7,8,9,10	R

Impact Attributes: 1 - changed fire regime; 2 - changed nutrient conditions; 3 - changed hydrological patterns; 4 - changed soil erosion patterns; 5 - changed geomorphological processes; 6 - changed biomass distribution; 7 - changed light distribution; 8 - loss of biodiversity; 9 - substantially reduces regeneration opportunities of native plants; 10 - allelopathic effects. Increasing means that the weed is increasing its distribution from original known areas.

4.5 Significant Taxa

No Threatened or Priority Flora were recorded during the survey.

5. DISCUSSION

The greatest proportion of the total area surveyed was completely degraded due to clearing, gardens associated with homes, the planting of non-endemic taxa and a market garden which grew strawberries. The site varied between high ground and low ground, and at the time of the survey some areas were inundated.

Most of the remnant vegetation in the higher ground areas recorded a number of tree deaths, especially *Banksia* species but also some *Eucalyptus marginata* subsp. *marginata*. These deaths follow recent very hot summers and low rainfall years which would be expected to put trees under stress. These deaths considerably reduced the vegetation condition of these vegetation units in the Lots where they were recorded.

The lower ground vegetation varied considerably in condition but there several *Melaleuca preissiana* trees scattered through even the degraded areas that were of a good size. On the whole the wetland vegetation did not seem to be suffering the same number of tree deaths as the higher ground.

Lot 6 had remnant vegetation in the best condition with a large area of Lot 5 also being in a good condition. The better condition vegetation of these two lots adjoined each other representing a remnant of a reasonable size. The area represented by quadrat F11 on Lot 3 had very dense *Melaleuca preissiana* and a few *Melaleuca rhaphiophylla* trees, all of a reasonable size and in very good condition. Unfortunately the understory had mainly been replaced by weeds but the area was fenced keeping any stock out.

The vegetation condition recorded for the different lots (see Table 6) has 9 lots with a vegetation condition of good or better and 12 with a vegetation condition between good to degraded and completely degraded. This may suggest that the remnant vegetation present at the Lots is of a reasonably quality, but quadrats were placed in the area within each lot where the vegetation was in the best condition, skewing the overall results to the better or above end of the vegetation condition scale. Very little of the remnant vegetation was worthy of retention but a very important factor irrespective of the vegetation units and their condition is the dampness level of the whole site and how any proposed development could alter that regime.

None of the vegetation units are threatened or priority ecological communities and no threatened or priority flora were recorded.

Several aggressive weeds were recorded including Blackberry (**Rubus lauatus*) and Arum lily (**Zantedeschia aethiopica*).

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APPENDIX A

Species Listed Under Vascular Plant Family

FAMILY	***species***
ANACARDIACEAE	**Schinus terebinthifolia*
APIACEAE	*Centella asiatica*
	**Foeniculum vulgare*
	Homalosciadium homalocarpum
	Trachymene pilosa
ARACEAE	*Lemna disperma*
	**Zantedeschia aethiopica*
APOCYNACEAE	**Gomphocarpus fruticosus*
ASPARAGACEAE	*Chamaescilla corymbosa*
	Laxmannia grandiflora
	Lomandra caespitosa
	Lomandra hermaphrodita
	Lomandra nigricans
	Lomandra preissii
	Lomandra suaveolens
	Thysanotus dichotomus
	Thysanotus patersonii
	Thysanotus tenellus
ASTERACEAE	**Arctotheca calendula*
	**Conyza bonariensis*
	**Cotula coronopifolia*
	**Crepis capillaris*
	**Hedypnois rhagadioloides*
	Hyalosperma cotula
	**Hypochaeris glabra*
	**Lactuca serriola*
	Millotia tenuiflora var. *tenuiflora*
	Podolepis angustifolia
	Podotheca gnaphalioides
	Senecio pinnatifida subsp. *latilobus*
	Siloxerus multiflorus
	**Sonchus asper*
	**Sonchus oleraceus*
	**Ursinia anthemoides*
	**Vellereophyton dealbatum*
BORAGINACEAE	**Echium plantagineum*
BRASSICACEAE	**Raphanus raphanistrum*
CAMPANULACEAE	**Monopsis debilis*
	**Wahlenbergia capensis*
	Wahlenbergia gracilenta
	Wahlenbergia preissii
CARYOPHYLLACEAE	**Petrorhagia dubia*
	**Silene gallica*
	**Stellaria media*

FAMILY	***species***
CASUARINACEAE	*Allocasuarina fraseriana*
	Allocasuarina humilis
CENTROLEPIDACEAE	*Aphelia cyperoides*
	Centrolepis drummondiana
COLCHICACEAE	*Burchardia umbellata*
CRASSULACEAE	*Crassula colorata*
CYPERACEAE	*Baumea articulata*
	Baumea juncea
	**Cyperus tenellus*
	Isolepis cyperoides
	**Isolepis marginatus*
	Lepidosperma leptostachyum
	Lepidosperma longitudinale
	Lepidosperma squamatum
	Schoenus clandestinus
	Schoenus curvifolius
	Schoenus efoliatus
	Schoenus rigens
DASYPOGONACEAE	*Calectasia narragara*
	Dasypogon bromeliifolius
DILLENIACEAE	*Hibbertia huegelii*
	Hibbertia hypericoides
	Hibbertia racemosa
DROSERACEAE	*Drosera erythrorhiza*
	Drosera gigantea subsp. *gigantea*
	Drosera glanduligera
	Drosera macrantha
	Drosera paleacea subsp. paleacea
	Drosera pallida
EPACRIDACEAE	*Astroloma xerophyllum*
	Conostephium pendulum
	Conostephium preissii
	Leucopogon conostephioides
	Leucopogon propinquus
	Styphelia tenuiflora
EUPHORBIACEAE	**Euphorbia peplus*
	**Euphorbia terracina*
	Monotaxis grandiflora
	**Ricinus communis*

FAMILY	***species***
FABACEAE	*Acacia huegelii*
	**Acacia longifolia*
	Acacia pulchella var. *glabrescens*
	Acacia pulchella var. *pulchella*
	Acacia saligna
	Acacia stenoptera
	Aotus gracillima
	Bossiaea eriocarpa
	Daviesia triflora
	Eutaxia virgata
	Gastrolobium capitatum
	Gompholobium tomentosum
	Hovea trisperma
	Jacksonia furcellata
	Kennedia prostrata
	**Lotus subbiflorus*
	**Medicago polymorpha*
	**Ornithopus pinnatus*
	Oxylobium linearifolium
	Pultenaea reticulata
	Sphaerolobium medium
	**Trifolium campestre*
	**Vicia sativa*
FUMARIACEAE	**Fumaria capreolata*
GENTIANACEAE	**Cicendia filiformis*
GERANIACEAE	**Erodium botrys*
	Geranium solandri
	**Pelargonium capitatum*
GOODENIACEAE	*Dampiera linearis*
	Goodenia pulchella
	Lechenaultia floribunda
	Scaevola repens
HAEMODORACEAE	*Anigozanthos humilis*
	Anigozanthos manglesii
	Conostylis aculeata subsp. *aculeata*
	Conostylis serrulata
	Haemodorum spicatum
	Phlebocarya ciliata
	Phlebocarya filifolia
HALORAGACEAE	*Gonocarpus pithyoides*
	Myriophyllum tillaeoides

FAMILY	***species***
HEMEROCALLIDACEAE	*Arnocrinum preissii*
	Caesia micrantha
	Dianella revoluta
	Hensmania turbinata
	Tricoryne elatior
IRIDACEAE	**Freesia alba* x *leichtlinii*
	**Gladiolus caryophyllaceus*
	**Moraea flaccida*
	Patersonia juncea
	Patersonia occidentalis
	**Romulea rosea*
JUNCACEAE	**Juncus bufonius*
	**Juncus capitatus*
	Juncus pallidus
JUNCAGINACEAE	*Triglochin lineare*
LAMIACEAE	*Hemiandra pungens*
LAURACEAE	*Cassytha capillaris*
	Cassytha racemosa
LOBELIACEAE	*Lobelia alata*
LOGANIACEAE	*Phyllangium paradoxa*
LORANTHACEAE	*Nuytsia floribunda*
LYTHRACEAE	**Lythrum hyssopifolium*
MESEMBRYANTHACEAE	**Carpobrotus edulis*
MORACEAE	**Ficus carica*
MYRTACEAE	*Astartea scoparia*
	Calothamnus lateralis
	Calytrix flavescens
	Calytrix fraseri
	Eremaea pauciflora
	Eucalyptus marginata subsp. *marginata*
	Eucalyptus rudis subsp. *rudis*
	Eucalyptus todtiana
	Hypocalymma angustifolium
	Hypocalymma robustum
	Kunzea glabrescens
	Melaleuca incana subsp. *incana*
	Melaleuca pauciflora
	Melaleuca preissiana
	Melaleuca rhaphiophylla
	Melaleuca seriata
	Melaleuca systena
	Melaleuca teretifolia
	Melaleuca thymoides
	Melaleuca viminea subsp. *viminea*

FAMILY	***species***
MYRTACEAE (cont.)	*Pericalymma ellipticum*
	Regelia ciliata
	Scholtzia involucrata
	Taxandria linearifolia
ORCHIDACEAE	*Caladenia flava* subsp. *flava*
	Caladenia paludosa
	Caladenia sp.
	Diuris corymbosa
	Eriochilus dilatatus
	Lyperanthus nigricans
	Microtis media subsp. *media*
	Prasophyllum gracile
	Prasophyllum sp.
	Pterostylis pyramidalis
	Pterostylis pyramidalis
	Pterostylis vittata
	Thelymitra crinita
OROBANCHACEAE	**Orobanche minor*
OXALIDACEAE	**Oxalis corniculata*
	**Oxalis pes-caprae*
	**Oxalis purpurea*
PHYTOLACCACEAE	**Phytolacca octandra*
POACEAE	**Aira caryophyllaceae*
	Amphibromus nervosus
	Amphipogon turbinatus
	**Arundo donax*
	Austrostipa compressa
	**Avena barbata*
	**Briza maxima*
	**Briza minor*
	**Bromus diandrus*
	**Cynodon dactylon*
	**Ehrharta calycina*
	Eragrostis elongata
	**Ehrharta longiflora*
	**Eragrostis curvula*
	**Holcus lanatus*
	**Hordeum vulgare*
	**Lagurus ovatus*
	**Lolium rigidum*
	**Paspalum urvillei*
	**Pennisetum clandestinum*
	**Vulpia bromoides*
	**Vulpia sp.*
POLYGALACEAE	**Rumex crispus*

FAMILY	***species***
PORTULACEAE	*Calandrinia corrigioloides*
	Calandrinia granulifera
	Calandrinia linifolia
PRIMULACEAE	**Lysimachia arvensis*
PROTEACEAE	*Adenanthos cygnorum* subsp. *cygnorum*
	Banksia attenuata
	Banksia ilicifolia
	Banksia menziesii
	Petrophile linearis
	Stirlingia latifolia
	Synaphea spinulosa
RANUNCULACEAE	*Ranunculus colonorum*
RANUNCULACEAE	**Ranunculus sessiliflorus*
RESTIONACEAE	*Desmocladus flexuosus*
	Dielsia stenostachya
	Hypolaena exsulca
	Lepyrodia glauca
	Lyginia barbata
	Meeboldina scariosa
ROSACEAE	**Rubus laudatus*
RUTACEAE	*Boronia ramosa* subsp. *anethifolia*
	Philotheca spicatus
SOLANACEAE	**Solanum americanum*
STYLIDIACEAE	*Levenhookia stipitata*
	Stylidium brunonianum
	Stylidium piliferum
	Stylidium repens
	Stylidium schoenoides
XANTHORRHOEACEAE	*Xanthorrhoea brunonis*
	Xanthorrhoea preissii
ZAMIACEAE	*Macrozamia riedlei*

APPENDIX B

Quadrat Data

QUADRAT F01

Location: Lot 9103
GPS: 396749E; 6445152N also at 396743E; 6445296N
Soil Type: Grey sand
Vegetation Description: Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* (mainly dead)
Vegetation Condition: Degraded
Notes: It was on the edge of the vegetation where the greater diversity was recorded

SPECIES	HEIGHT (cm)	% COVER
**Arctotheca calendula*	45	<1
Banksia attenuata	1200	all dead 3%
Banksia ilicifolia	1200	2
Bossiaea eriocarpa	40	3
**Briza maxima*	60	1
**Briza minor*	25	70
Burchardia umbellata	70	<1
Caesia micrantha	70	<1
Caladenia flava subsp. *flava*	35	<1
Caladenia paludosa	50	<1
Conostylis serrulata	45	2
Dasypogon bromeliifolius	60	50
Drosera macrantha	twiner	<1
**Ehrharta calycina*	75	1
**Ehrharta longiflora*	60	<1

SPECIES	HEIGHT (cm)	% COVER
Eriochilus dilatatus	10	<1
**Euphorbia terracina*	60	<1
**Fumaria capreolata*	50	<1
**Gladiolus caryophyllaceus*	80	<1
Gompholobium tomentosum	50	<1
**Hypochaeris glabra*	50	<1
Kunzea glabrescens	1200	1
**Lactuca serriola*	55	<1
Lepidosperma longitudinale	50	25
Lomandra caespitosa	50	<1
Melaleuca preissiana	1200	<1
Monotaxis grandiflora	10	<1
**Pelargonium capitatum*	5	<1
Pterostylis pyramidalis	35	<1
Pterostylis vittata	30	1
Ranunculus sessiliflorus	5	<1
Schoenus curvifolius	60	1
**Sonchus oleraceus*	40	1
Stylidium schoenoides	50	<1
Thysanotus tenellus	50	<1
Trachymene pilosa	30	<1
Tricoryne elatior	40	<1
**Avena barbata*	Opportunistic	
Acacia pulchella var. *pulchella*	Opportunistic	
Allocasuarina fraseriana	Opportunistic	
Amphipogon turbinatus	Opportunistic	
Astartea scoparia	Opportunistic	
Boronia ramosa	Opportunistic	
**Bromus diandrus*	Opportunistic	
Chamaescilla corymbosa	Opportunistic	
Conostephium preissii	Opportunistic	
Conostylis aculeata subsp. *aculeata*	Opportunistic	
Desmocladus flexuosus	Opportunistic	
**Freesia alba* x *leichtlinii*	Opportunistic	
Hibbertia hypericoides	Opportunistic	
Hyalosperma cotula	Opportunistic	
Kennedia prostrata	Opportunistic	
Lomandra caespitosa	Opportunistic	
Lomandra preissii	Opportunistic	
Lyginia barbata	Opportunistic	
**Lysimachia arvensis*	Opportunistic	
Melaleuca seriata	Opportunistic	
Melaleuca thymoides	Opportunistic	
Microtis media subsp. *media*	Opportunistic	
**Oxalis purpurea*	Opportunistic	
Patersonia occidentalis	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
Philotheca spicatus	Opportunistic	
Phyllangium paradoxa	Opportunistic	
Scholtzia involucrata	Opportunistic	
**Sonchus oleraceus*	Opportunistic	
Thelymitra crinita	Opportunistic	
**Ursinia anthemoides*	Opportunistic	
**Wahlenbergia capensis*	Opportunistic	
Xanthorrhoea brunonis	Opportunistic	
Xanthorrhoea preissii	Opportunistic	

QUADRAT F02

Location: Lot 9103
GPS: 396802E; 6445083N
Soil Type: Grey / yellow sand
Vegetation Description: Low Woodland A of *Banksia attenuata, Banksia menziesii* and occasional trees of *Eucalyptus marginata* subsp. *marginata* over Low Scrub B of *Xanthorrhoea preissii* over Dwarf Scrub C dominated by *Hibbertia hypericoides* over Herbs dominated by *Burchardia umbellata*
Vegetation Condition: Good
Notes: Most of this unit is degraded with large areas of **Ehrharta calycina*. Several deaths in *Banksia* species possibly due to hot summer of 2010-2011 and dry 2010 winter

SPECIES	HEIGHT (cm)	% COVER
Adenanthos cygnorum subsp. *cygnorum*	120	<1
Arnocrinum preissii	60	<1
**Avena barbata*	95	1
Banksia attenuata	800	15
Banksia menziesii	800	3
**Briza maxima*	50	5
Burchardia umbellata	70	15
Chamaescilla corymbosa	20	5
Dasypogon bromeliifolius	70	1
Desmocladus flexuosus	50	5
**Ehrharta calycina*	95	70
**Ehrharta longiflora*	65	5
Eriochilus dilatatus	15	<1
**Gladiolus caryophyllaceus*	90	5
Gompholobium tomentosum	75	1

SPECIES	HEIGHT (cm)	% COVER
Hibbertia hypericoides	60	<1
**Hypochaeris glabra*	30	1
Kennedia prostrata	5	1
Kunzea glabrescens	200	1
Lepidosperma squamatum	70	<1
Lomandra nigricans	40	<1
Lyginia barbata	80	<1
**Lysimachia arvensis*	10	<1
Macrozamia riedlei	75	2
Melaleuca thymoides	90	<1
Monotaxis grandiflora	5	<1
Nuytsia floribunda	600	1
**Pelargonium capitatum*	50	2
Schoenus curvifolius	50	2
Scholtzia involucrata	50	<1
**Sonchus oleraceus*	65	2
Trachymene pilosa	20	<1
Tricoryne elatior	70	<1
**Ursinia anthemoides*	70	5
**Vicia sativa*	twiner	<1-25
Xanthorrhoea brunonis	75	2
Xanthorrhoea preissii	120	10
Allocasuarina fraseriana	Opportunistic	
Anigozanthos humilis	Opportunistic	
Astroloma xerophyllum	Opportunistic	
Austrostipa compressa	Opportunistic	
Banksia ilicifolia	Opportunistic	
Boronia ramosa	Opportunistic	
**Briza minor*	Opportunistic	
**Bromus diandrus*	Opportunistic	
Caladenia flava subsp. *flava*	Opportunistic	
Calandrinia liniflora	Opportunistic	
Calytrix flavescens	Opportunistic	
Conostephium preissii	Opportunistic	
Conostylis aculeata subsp. *aculeata*	Opportunistic	
Crassula colorata	Opportunistic	
Dampiera linearis	Opportunistic	
Daviesia triflora	Opportunistic	
Eucalyptus marginata subsp. *marginata*	Opportunistic	
**Euphorbia terracina*	Opportunistic	
**Freesia alba x leichtlinii*	Opportunistic	
**Fumaria capreolata*	Opportunistic	
Gastrolobium capitatum	Opportunistic	
Hemiandra pungens	Opportunistic	
Hibbertia racemosa	Opportunistic	
Hyalosperma cotula	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
Laxmannia grandiflora	Opportunistic	
Lomandra caespitosa	Opportunistic	
Melaleuca systena	Opportunistic	
Microtis media subsp. *media*	Opportunistic	
**Oxalis pes-caprae*	Opportunistic	
Patersonia occidentalis	Opportunistic	
Petrophile linearis	Opportunistic	
Podolepis angustifolia	Opportunistic	
Podotheca gnaphalioides	Opportunistic	
Schoenus clandestinus	Opportunistic	
Senecio pinnatifida subsp. *latilobus*	Opportunistic	
Stirlingia latifolia	Opportunistic	
Synaphea spinulosa	Opportunistic	
**Wahlenbergia capensis*	Opportunistic	

QUADRAT F03

Location: Lot 9103
GPS: 396879E; 6444990N
Soil Type: Yellow grey sand
Vegetation Description: Open Low Woodland A of *Banksia attenuata* over Dwarf Scrub C of mixed taxa dominated by *Hibbertia hypericoides* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Burchardia umbellata* and *Chamaescilla umbellata*
Vegetation Condition: Good
Notes: Very small area at the eastern edge of the property

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *glabrescens*	70	<1
Adenanthos cygnorum subsp. *cygnorum*	250	3
Allocasuarina humilis	150	3
Amphipogon turbinatus	60	<1
Arnocrinum preissii	70	<1
Astroloma xerophyllum	50	1
**Avena barbata*	120	3
Banksia attenuata	600	5
Boronia ramosa	70	<1
**Briza maxima*	70	5
Burchardia umbellata	70	5
Chamaescilla corymbosa	20	5
Conostephium pendulum	50	<1
Daviesia triflora	75	1
**Ehrharta calycina*	120	15
**Euphorbia terracina*	30	<1
**Fumaria capreolata*	70	<1

SPECIES	HEIGHT (cm)	% COVER
**Gladiolus caryophyllaceus*	120	3
Gompholobium tomentosum	60	1
Hemiandra pungens	10	<1
Hensmania turbinata	20	1
Hibbertia huegelii	25	<1
Hibbertia hypericoides	70	5
**Hypochaeris glabra*	15	<1
Jacksonia furcellata	200	<1
Laxmannia grandiflora	10	<1
Lomandra caespitosa	50	1
Melaleuca systena	80	1
**Oxalis pes-caprae*	40	<1
**Romulea rosea*	50	1
Schoenus clandestinus	5	<1
Stirlingia latifolia	175	3
Synaphea spinulosa	60	1
Thysanotus dichotomus	70	<1
Trachymene pilosa	25	<1
Tricoryne elatior	60	<1
**Ursinia anthemoides*	60	5
Acacia huegelii	Opportunistic	
Allocasuarina fraseriana	Opportunistic	
Anigozanthos humilis	Opportunistic	
**Arctotheca calendula*	Opportunistic	
Austrostipa compressa	Opportunistic	
Calytrix flavescens	Opportunistic	
Conostylis aculeata subsp. *aculeata*	Opportunistic	
Dampiera linearis	Opportunistic	
Eucalyptus marginata subsp. *marginata*	Opportunistic	
Eucalyptus todtiana	Opportunistic	
Gonocarpus pithyoides	Opportunistic	
Hibbertia racemosa	Opportunistic	
Kunzea glabrescens	Opportunistic	
Lyginia barbata	Opportunistic	
Melaleuca thymoides	Opportunistic	
Millotia tenuiflora var. *tenuiflora*	Opportunistic	
Nuytsia floribunda	Opportunistic	
Patersonia occidentalis	Opportunistic	
**Pelargonium capitatum*	Opportunistic	
Petrophile linearis	Opportunistic	
Philotheca spicatus	Opportunistic	
Podotheca gnaphalioides	Opportunistic	
Thysanotus patersonii	Opportunistic	
**Wahlenbergia capensis*	Opportunistic	

QUADRAT F04

Location: Lot 9103
GPS: 396879E; 6445297N
Soil Type: Grey sand
Vegetation Description: Low Forest A of *Eucalyptus todtiana* and *Banksia attenuata* over Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Ehrharta calycina* over Herbs of mixed taxa dominated by *Gladiolus caryophyllaceus*
Vegetation Condition: Good
Notes: Occasional *Eucalyptus marginata* subsp. *marginata* trees in this vegetation unit

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *pulchella*	60	<1
Allocasuarina humilis	90	1
Astroloma xerophyllum	50	<1
Austrostipa compressa	50	1
Banksia attenuata	500	8
Bossiaea eriocarpa	50	<1
**Briza maxima*	70	10
Burchardia umbellata	75	5
Caesia micrantha	50	<1
Calectasia narragara	60	<1
Chamaescilla corymbosa	5	3
Conostylis aculeata subsp. *aculeata*	50	3
Dampiera linearis	20	<1
Dasypogon bromeliifolius	90	3
Desmocladus flexuosus	35	1
Diuris corymbosa	70	<1

SPECIES	HEIGHT (cm)	% COVER
Drosera erythrorhiza	2	<1
**Ehrharta calycina*	90	<1
Eriochilus dilatatus	15	<1
Eucalyptus todtiana	1400	45
**Gladiolus caryophyllaceus*	120	40
Gompholobium tomentosum	70	<1
Hibbertia huegelii	50	<1
Hibbertia hypericoides	80	10
Lomandra caespitosa	60	<1
Lomandra hermaphrodita	50	<1
**Lysimachia arvensis*	30	<1
Microtis media subsp. *media*	50	<1
Patersonia occidentalis	60	1
**Pelargonium capitatum*	50	<1
Petrophile linearis	40	<1
Pterostylis vittata	50	<1
Senecio pinnatifida subsp. *latilobus*	10	<1
**Sonchus oleraceus*	70	1
Stirlingia latifolia	70	1
Thysanotus dichotomus	70	<1
Thysanotus patersonii	twiner	<1
Trachymene pilosa	10	5
**Ursinia anthemoides*	80	5
**Zantedeschia aethiopica*	20	<1
Acacia saligna	Opportunistic	
Adenanthos cygnorum subsp. *cygnorum*	Opportunistic	
Allocasuarina fraseriana	Opportunistic	
Anigozanthos humilis	Opportunistic	
**Bromus diandrus*	Opportunistic	
Calytrix flavescens	Opportunistic	
Conostephium pendulum	Opportunistic	
Daviesia triflora	Opportunistic	
Eucalyptus marginata subsp. *marginata*	Opportunistic	
**Euphorbia terracina*	Opportunistic	
Hibbertia racemosa	Opportunistic	
Laxmannia grandiflora	Opportunistic	
Lyginia barbata	Opportunistic	
Melaleuca systena	Opportunistic	
Melaleuca thymoides	Opportunistic	
Nuytsia floribunda	Opportunistic	
Phlebocarya filifolia	Opportunistic	
Scaevola repens	Opportunistic	
Scholtzia involucrata	Opportunistic	
Xanthorrhoea preissii	Opportunistic	

QUADRAT F05

Location: Lot 99
GPS: 396653E; 6444217N: also recorded from Lot 100 at 396661E; 6444150N
Soil Type: Black silty sand
Vegetation Description: Dense Low Forest A of *Melaleuca preissiana* over Dense Tall Sedges dominated by *Lepidosperma longitudinale*
Vegetation Condition: Good to very good at Lot 99; degraded to completely degraded at Lot 100
Notes: Thick humus layer. Where the area is more open there are a lot of *Astartea* regenerating. At Lot 100 the area has been sown with wheat

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *glabrescens*	60	<1
Aotus gracillima	80	<1
Astartea scoparia	175	1
**Avena barbata*	70	<1
**Briza maxima*	30	<1
**Bromus diandrus*	70	
**Conyza bonariensis*	5	<1
Dianella revoluta	60	<1
Dielsia stenostachya	80	20-75
Juncus pallidus	120	1
Lepidosperma longitudinale	120	75-0
Lobelia alata	20	<1
Melaleuca preissiana	1200	85
Myriophyllum tillaeoides	5	<1
**Pennisetum clandestinum*	80	<1

SPECIES	HEIGHT (cm)	% COVER
Pterostylis pyramidalis	10	<1
**Rubus laudatus*	90	5-50
**Sonchus oleraceus*	50	<1
**Zantedeschia aethiopica*	90	5
Aphelia cyperoides	Opportunistic	
**Briza minor*	Opportunistic	
Cassytha capillaris	Opportunistic	
**Cotula coronopifolia*	Opportunistic	
Dampiera linearis	Opportunistic	
Eutaxia virgata	Opportunistic	
**Ficus carica*	Opportunistic	
**Fumaria capreolata*	Opportunistic	
Gomphocarpus fruticosus	Opportunistic	
Goodenia pulchella	Opportunistic	
Hypocalymma angustifolium	Opportunistic	
**Hypochaeris glabra*	Opportunistic	
**Juncus bufonius*	Opportunistic	
**Juncus capitatus*	Opportunistic	
Kunzea glabrescens	Opportunistic	
**Lolium rigidum*	Opportunistic	
**Lotus subbiflorus*	Opportunistic	
**Monopsis debilis*	Opportunistic	
Oxylobium linearifolium	Opportunistic	
Patersonia juncea	Opportunistic	
Patersonia occidentalis	Opportunistic	
**Pelargonium capitatum*	Opportunistic	
**Pennisetum clandestinum*	Opportunistic	
Phyllangium paradoxa	Opportunistic	
Pultenaea reticulata	Opportunistic	
**Romulea rosea*	Opportunistic	
**Schinus terebinthifolia*	Opportunistic	
Schoenus efoliatus	Opportunistic	
**Solanum americanum*	Opportunistic	
Taxandria linearifolia	Opportunistic	
**Vellereophyton dealbatum*	Opportunistic	
Xanthorrhoea preissii	Opportunistic	

QUADRAT F06N

Location: Lot 99
GPS: 396272E; 6444401N also at 396454E; 6444331
Soil Type: Pale yellow grey sand
Vegetation Description: Low Woodland A of *Banksia attenuata, Banksia menziesii, Eucalyptus marginata* subsp. *marginata* and *Allocasuarina fraseriana* over Low Heath C of mixed shrubs dominated by *Hibbertia hypericoides* over Open Sedges dominated by *Lyginia barbata*
Vegetation Condition: Good
Notes: Best high ground vegetation recorded during the survey

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *glabrescens*	90	1
Acacia stenoptera	30	<1
Adenanthos cygnorum subsp. *cygnorum*	300	5
Allocasuarina fraseriana	900	3
Allocasuarina humilis	90	<1
Amphipogon turbinatus	70	1
Austrostipa compressa	60	
Banksia attenuata	800	15
Banksia menziesii	600	5
Bossiaea eriocarpa	60	<1
**Briza maxima*	70	1
Burchardia umbellata	70	<1
Caladenia flava subsp. *flava*	20	<1
Calytrix flavescens	50	2
Calytrix fraseri	80	<1
Conostylis aculeata subsp. *aculeata*	30	2
Dampiera linearis	20	<1
Daviesia triflora	70	<1

SPECIES	HEIGHT (cm)	% COVER
Desmocladus flexuosus	60	5
Diuris corymbosa	70	<1
Drosera pallida	twiner	<1
**Ehrharta calycina*	150	5
Eremaea pauciflora	100	2
**Gladiolus caryophyllaceus*	90	5
Gompholobium tomentosum	60	2
Hemiandra pungens	20	<1
Hibbertia hypericoides	70	10
Hibbertia racemosa	50	1
Hovea trisperma	50	<1
**Hypochaeris glabra*	30	3
Jacksonia furcellata	120	1
Kunzea glabrescens	200	<1
Laxmannia grandiflora	25	<1
Lomandra caespitosa	30	<1
Lyginia barbata	80	5
Lyperanthus nigricans	2	<1
Lysimachia arvensis	30	<1
Microtis media subsp. *media*	60	<1
Nuytsia floribunda	700	2
Petrophile linearis	60	2
Phlebocarya filifolia	60	5
Phyllangium paradoxa	10	<1
Pterostylis vittata	30	<1
Scholtzia involucrata	50	8
Senecio pinnatifida subsp. *latilobus*	10	<1
**Sonchus oleraceus*	60	1
Stirlingia latifolia	120	5
Stylidium brunonianum	20	<1
Stylidium piliferum	5	<1
Stylidium repens	5	<1
Thelymitra crinita	30	<1
Thysanotus patersonii	twiner	<1
Trachymene pilosa	15	3
**Ursinia anthemoides*	60	1
**Wahlenbergia capensis*	70	<1
Eucalyptus marginata subsp. *marginata*	Opportunistic	
Haemodorum spicatum	Opportunistic	
**Hedypnois rhagadioloides*	Opportunistic	
Hypocalymma robustum	Opportunistic	
Macrozamia riedlei	Opportunistic	
Schoenus curvifolius	Opportunistic	

QUADRAT F07

Location: Lot 100
GPS: 396527E; 6444181N
Soil Type: Grey sand
Vegetation Description: Dense Thicket of *Kunzea glabrescens* over Low Scrub A of *Xanthorrhoea preissii* and *Xanthorrhoea brunonis* over Herbs dominated by *Dasypogon bromeliifolius*
Vegetation Condition: Good

SPECIES	HEIGHT (cm)	% COVER
**Aira caryophyllaceae*	15	<1
**Briza maxima*	60	<1
Caladenia flava subsp. *flava*	20	<1
Caladenia sp.	10	<1
Crassula colorata	10	<1
Dasypogon bromeliifolius	50	20-50
**Gladiolus caryophyllaceus*	40	<1
**Hypochaeris glabra*	40	5
Kunzea glabrescens	1000	90
**Lagurus ovatus*	30	<1
Lobelia alata	30	<1
Lomandra hermaphrodita	30	<1
Pterostylis pyramidalis	40	<1
Schoenus curvifolius	40	1
**Solanum americanum*	50	<1
Trachymene pilosa	25	<1
**Ursinia anthemoides*	60	1

SPECIES	HEIGHT (cm)	% COVER
**Vulpia bromoides*	30	<1
**Wahlenbergia gracilenta*	50	<1
Xanthorrhoea brunonis	100	10
Xanthorrhoea preissii	120	10
**Zantedeschia aethiopica*	5	<1
Allocasuarina fraseriana	Opportunistic	
Calandrinia liniflora	Opportunistic	
Conyza bonariensis	Opportunistic	
**Crepis capillaris*	Opportunistic	
Drosera paleacea subsp. *paleacea*	Opportunistic	
Eremaea pauciflora	Opportunistic	
**Isolepis marginatus*	Opportunistic	
**Lactuca serriola*	Opportunistic	
Melaleuca preissiana	Opportunistic	
**Sonchus oleraceus*	Opportunistic	
**Wahlenbergia preissii*	Opportunistic	

QUADRAT F 08

Location: Lot 100
GPS: 396455E; 6444227N
Soil Type: Pale grey sand
Vegetation Description: Open Woodland A of *Banksia attenuata* over Scrub of *Kunzea glabrescens* over Dense Tall Grass dominated by **Ehrharta calycina* over Very Open Herbs dominated by *Dasypogon bromeliifolius*
Vegetation Condition: Degraded to completely degraded
Notes: Most of the Banksias and Kunzeas are dead

SPECIES	HEIGHT (cm)	% COVER
**Arctotheca calendula*	5	<1
Banksia attenuata	1200	5
**Briza maxima*	80	<1
Burchardia umbellata	70	3
Caladenia flava subsp. *flava*	20	<1
Crassula colorata	15	<1
Dasypogon bromeliifolius	60	5
**Ehrharta calycina*	120	3
**Ehrharta longiflora*	90	75
Eucalyptus todtiana	400	3
**Gladiolus caryophyllaceus*	120	3
**Hypochaeris glabra*	10	25
**Isolepis marginatus*	5	<1
Kunzea glabrescens	800	20
Lomandra suaveolens	30	<1
Nuytsia floribunda	500	2

SPECIES	HEIGHT (cm)	% COVER
**Solanum americanum*	70	<1
**Stellaria media*	20	<1
**Ursinia anthemoides*	50	5
**Briza minor*	Opportunistic	
**Bromus diandrus*	Opportunistic	
Calytrix flavescens	Opportunistic	
**Lagurus ovatus*	Opportunistic	
**Wahlenbergia capensis*	Opportunistic	

QUADRAT F09

Location: Lot 15
GPS: 396625E; 6444096N
Soil Type: Grey sand
Vegetation Description: Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub C of *Hypolaena angustifolia* and *Lechenaultia floribunda* over Tall Sedges of *Schoenus rigens*
Vegetation Condition: Good
Notes: Large area in this good condition

SPECIES	HEIGHT (cm)	% COVER
**Aira caryophyllacea*	10	<1
**Briza maxima*	70	1
Caladenia flava subsp. *flava*	30	2
**Carpobrotus edulis*	5	<1
Cassytha racemosa	twiner	<1
Dampiera linearis	30	<1
Dasypogon bromeliifolius	70	3
Drosera glanduligera	5	1
**Gladiolus caryophyllaceus*	70	<1
Homalosciadium homalocarpum	5	<1
Hypocalymma angustifolium	70	10
**Hypochaeris glabra*	40	2
Hypolaena exsulca	50	2
**Isolepis marginatus*	5	<1
Kunzea glabrescens	600	75
Lechenaultia floribunda	50	10
Nuytsia floribunda	500	2

SPECIES	HEIGHT (cm)	% COVER
Pericalymma ellipticum	120	<1
**Petrorhagia dubia*	30	<1
Phyllangium paradoxa	15	<1
Pterostylis pyramidalis	30	<1
Schoenus rigens	80	35
**Sonchus oleraceus*	50	<1
Trachymene pilosa	20	<1
**Ursinia anthemoides*	70	1
Xanthorrhoea brunonis	100	2
**Acacia longifolia*	Opportunistic	
Allocasuarina fraseriana	Opportunistic	
Crassula colorata	Opportunistic	
Dielsia stenostachya	Opportunistic	
Eucalyptus rudis subsp. *rudis*	Opportunistic	
**Lotus subbiflorus*	Opportunistic	
Melaleuca preissiana	Opportunistic	
Microtis media subsp. *media*	Opportunistic	
**Ornithopus pinnatus*	Opportunistic	
Podotheca gnaphalioides	Opportunistic	

QUADRAT F10

Location: Lot 15
GPS: 396556E; 6444016N
Soil Type: Grey sand
Vegetation Description: Low Woodland A of *Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana* and *Eucalyptus todtiana* over Scrub A of *Kunzea glabrescens* and *Adenanthos cygnorum* subsp. *cygnorum* over Herbs dominated by *Phlebocarya ciliata* and *Dasypogon bromeliifolius*
Vegetation Condition: Good

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *glabrescens*	150	3
Adenanthos cygnorum subsp. *cygnorum*	400	5
Allocasuarina fraseriana	1400	5
**Avena barbata*	70	2
Banksia attenuata	600	2
Banksia menziesii	1000	5
Bossiaea eriocarpa	50	5
**Briza maxima*	60	<1
Caladenia flava subsp. *flava*	25	<1
Calandrinia corrigioloides	5	<1
Calytrix fraseri	40	<1
Conostylis aculeata subsp. *aculeata*	30	<1
Conostylis serrulata	40	<1
Crassula colorata	15	<1
Dasypogon bromeliifolius	50	10-30
Desmocladus flexuosus	30	1
**Ehrharta calycina*	80	2

SPECIES	HEIGHT (cm)	% COVER
**Gladiolus caryophyllaceus*	90	1
Gompholobium tomentosum	70	2
Hibbertia hypericoides	50	2
Hibbertia racemosa	30	1
**Hypochaeris glabra*	30	<1
Hypolaena exsulca	50	<1
Jacksonia furcellata	300	<1
Kunzea glabrescens	600	10
Laxmannia grandiflora	25	<1
Lepidosperma squamatum	80	<1
Leucopogon conostephioides	60	<1
Lomandra caespitosa	30	<1
Lomandra hermaphrodita	70	<1
Lomandra preissii	70	<1
Lyginia barbata	80	1
**Medicago polymorpha*	10	<1
Patersonia occidentalis	60	<1
**Petrorhagia dubia*	70	<1
Phlebocarya ciliata	50	40
Podolepis gnaphalioides	50	1
Pterostylis vittata	70	<1
Regelia ciliata	200	5
Stylidium repens	10	<1
Styphelia tenuiflora	50	<1
Thysanotus patersonii	twiner	<1
**Ursinia anthemoides*	60	<1
Anigozanthos manglesii	Opportunistic	
**Avena barbata*	Opportunistic	
Calytrix flavescens	Opportunistic	
Eucalyptus todtiana	Opportunistic	
**Sonchus oleraceus*	Opportunistic	

QUADRAT F11

Location: Lot 3
GPS: 396643E; 6443837N
Soil Type: Grey sand
Vegetation Description: Dense Forest A of *Melaleuca preissiana* and *Eucalyptus rudis* subsp. *rudis* over Open Low Scrub of *Astartea* over Dense Herbs of **Zantedeschia aethiopica*
Vegetation Condition: Good to degraded
Notes: Although the understorey has been replaced by weeds the density of cover of the Melaleucas is worthy of retention. *Lemna disperma* in open water

SPECIES	HEIGHT (cm)	% COVER
Astartea scoparia	200	10
**Ehrharta longiflora*	60	12
Eucalyptus rudis subsp. *rudis*	1600	10
**Euphorbia peplus*	50	1
Geranium solandri	30	1
**Lysimachia arvensis*	20	<1
Melaleuca preissiana	1200	85
Melaleuca rhaphiophylla	1400	3
**Phytolacca octandra*	70	2
Ranunculus colonorum	40	<1
**Solanum americanum*	50	<1
**Sonchus oleraceus*	60	<1
**Stellaria media*	40	1
**Zantedeschia aethiopica*	120	80
**Arctotheca calendula*	Opportunistic	
**Briza minor*	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
**Fumaria capreolata*	Opportunistic	
**Isolepis marginatus*	Opportunistic	
Lemna disperma	Opportunistic	
**Lotus subbiflorus*	Opportunistic	
Monotaxis grandiflora	Opportunistic	
**Rumex crispus*	Opportunistic	
**Trifolium campestre*	Opportunistic	

QUADRAT F12

Location: Lot 5
GPS: 396661E; 6444086N
Soil Type: Black sandy loam
Vegetation Description: Regenerating Low Woodland A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Herbs dominated by *Mitrasacme paradoxa* and **Hypochaeris glabra* over Open to Dense Low Sedges of *Dielsia stenostachya* and *Hypolaena exsulca*
Vegetation Condition: Varies between very good and degraded
Notes: Areas with deaths of *Hypocalymma angustifolia* and *Dielsia stenostachya*

SPECIES	HEIGHT (cm)	% COVER
Aotus gracillima	50	<1
Astartea scoparia	70	1
**Briza maxima*	35	<1
**Briza minor*	35	1
**Bromus diandrus*	60	1
**Carpobrotus edulis*	5	<1
Dielsia stenostachya	50	95-5
Drosera gigantea subsp. *gigantea*	40	<1
**Ehrharta longiflora*	60	<1
Homalosciadium homalocarpum	5	10
Hypocalymma angustifolium	50	1
**Hypochaeris glabra*	30	10
Hypolaena exsulca	50	2-30
**Isolepis marginatus*	5	2
Jacksonia furcellata	150	<1
Kunzea glabrescens	200	5

SPECIES	HEIGHT (cm)	% COVER
**Lolium rigidum*	50	<1
Melaleuca preissiana	200	15
Myriophyllum tillaeoides	2	2
**Ornithopus pinnatus*	2	1
Patersonia juncea	60	<1
Phyllangium paradoxa	20	20
**Sonchus asper*	130	1
**Sonchus oleraceus*	50	<1
**Ursinia anthemoides*	50	<1
**Vulpia* sp.	5	2
Xanthorrhoea brunonis	70	1
**Acacia longifolia*	Opportunistic	
Acacia saligna	Opportunistic	
Aphelia cyperoides	Opportunistic	
Calothamnus lateralis	Opportunistic	
Cassytha racemosa	Opportunistic	
Centrolepis drummondiana	Opportunistic	
Drosera glanduligera	Opportunistic	
**Ehrharta calycina*	Opportunistic	
Lepidosperma longitudinale	Opportunistic	
Melaleuca incana subsp. *incana*	Opportunistic	
Melaleuca pauciflora	Opportunistic	
Melaleuca viminea subsp. *viminea*	Opportunistic	
Microtis media subsp. *media*	Opportunistic	
Sphaerolobium medium	Opportunistic	
Taxandria linearifolia	Opportunistic	

QUADRAT F13

Location: Lot 6
GPS: 396803E; 6444108N
Soil Type: Black sandy loam
Vegetation Description: Heath A dominated by *Melaleuca viminea* over Open Herbs dominated by **Lotus subbiflorus* and **Hypochaeris glabra* over Open Tall Sedges of *Lepidosperma longitudinale* and *Baumea juncea*
Vegetation Condition: Very good
Notes: Very dense shrubland

SPECIES	HEIGHT (cm)	% COVER
Baumea juncea	70	<1-20
**Briza minor*	30	2
**Bromus diandrus*	70	2
Cassytha racemosa	twiner	1
**Cicendia filiformis*	10	5
**Cyperus tenellus*	5	2
**Eragrostis curvula*	90	<1
**Hypochaeris glabra*	30	15
Isolepis cyperoides	20	<1
**Isolepis marginatus*	5	4
**Juncus bufonius*	10	<1
Lepidosperma longitudinale	70	20
**Lotus subbiflorus*	25	15
Melaleuca incana subsp. *incana*	170	5
Melaleuca viminea subsp. *viminea*	200	40-60
Microtis media subsp. media	50	<1

SPECIES	HEIGHT (cm)	% COVER
**Paspalum urvillei*	40	<1
Prasophyllum sp.	10	<1
**Vulpia bromoides*	25	1
Acacia saligna	Opportunistic	
Baumea articulata	Opportunistic	
**Gladiolus caryophyllaceus*	Opportunistic	
Kunzea glabrescens	Opportunistic	
Melaleuca teretifolia	Opportunistic	
**Sonchus asper*	Opportunistic	
**Zantedeschia aethiopica*	Opportunistic	

QUADRAT F14

Location: Lot 6
GPS: 396730E; 6444214N
Soil Type: Black sand
Vegetation Description: Dense Low Forest A of *Melaleuca preissiana* and *Taxandria linearifolia* over Dense Tall Sedges of *Lepidosperma longitudinale*
Vegetation Condition: Very good
Notes: Near firebreak the condition is good to degraded due to **Acacia longifolia* tall shrubs and **Rubus* species and **Zantedeschia aethiopica*. There are some open areas where *Taxandria linearifolia* has died

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *glabrescens*	70	<1
Eutaxia virgata	50	<1
Hypocalymma angustifolium	120	<1
Juncus pallidus	700	20
Lepidosperma longitudinale	160	80
Meeboldina scariosa	200	2
Melaleuca preissiana	1200	90
Oxylobium lineare	300	1
Podolepis gnaphalioides	50	<1
**Rubus laudatus*	50	<1
Taxandria linearifolia	1000	10
**Zantedeschia aethiopica*	20	<1
Aotus gracillima	Opportunistic	
Astartea scoparia	Opportunistic	
**Briza maxima*	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
Caesia micrantha	Opportunistic	
Cassytha racemosa	Opportunistic	
Dielsia stenostachya	Opportunistic	
Kunzea glabrescens	Opportunistic	
**Paspalum urvillei*	Opportunistic	
Patersonia occidentalis	Opportunistic	
Podotheca gnaphalioides	Opportunistic	
**Schinus terebinthifolia*	Opportunistic	
**Sonchus oleraceus*	Opportunistic	
Xanthorrhoea brunonis	Opportunistic	
Xanthorrhoea preissii	Opportunistic	

QUADRAT F15

Location: Lot 5
GPS: 396837E; 6444033N
Soil Type: Black sand
Vegetation Description: Dense Herbs dominated by **Lotus subbiflorus* over Very Open Tall Sedges of *Baumea articulata* and *Juncus pallidus*
Vegetation Condition: completely degraded
Notes: Many *Prasophyllum gracile* located in this area

SPECIES	HEIGHT (cm)	% COVER
Amphibromus nervosus	110	1
**Arctotheca calendula*	30	<1
Baumea articulata	80	10
**Briza maxima*	40	<1
**Briza minor*	20	5
**Cicendia filiformis*	5	<1
**Cyperus tenellus*	5	3
**Hypochaeris glabra*	20	1
Isolepis cyperoides	15	<1
**Isolepis marginatus*	10	5
**Juncus bufonius*	15	<1
Juncus pallidus	100	34
**Lolium rigidum*	50	<1
**Lotus subbiflorus*	20	95
**Lysimachia arvensis*	20	<1
Meeboldina scariosa	120	5
Prasophyllum gracile	50	<1

SPECIES	HEIGHT (cm)	% COVER
**Romulea rosea*	30	20
**Vulpia bromoides*	60	2
**Arundo donax*	Opportunistic	
**Avena barbata*	Opportunistic	
*Cultivated trees	Opportunistic	
**Gomphocarpus fruticosus*	Opportunistic	
**Hordeum leporinum*	Opportunistic	
Microtis media subsp. *media*	Opportunistic	
**Rumex crispus*	Opportunistic	
Triglochin lineare	Opportunistic	
**Zantedeschia aethiopica*	Opportunistic	

QUADRAT F16

Location: Lot 9006
GPS: Not recorded
Soil Type: Grey sand
Vegetation Description: Low Grass dominated by **Pennisetum clandestinum* over Open Herbs of **Lotus subbiflorus*
Vegetation Condition: Degraded to completely degraded
Notes: Series of wetlands with few sedges

SPECIES	HEIGHT (cm)	% COVER
**Arctotheca calendula*	30	3
**Avena barbata*	150	5
**Cynodon dactylon*	40	3
**Cyperus tenellus*	5	5
**Ehrharta calycina*	90	3
**Erodium botrys*	40	<1
**Holcus lanatus*	70	2
**Juncus bufonius*	25	3
Juncus pallidus	70	5
**Lolium rigidum*	60	2
**Lotus subbiflorus*	40	25
**Lysimachia arvensis*	5	<1
**Lythrum hyssopifolium*	15	5
Melaleuca teretifolia	200	1
**Pennisetum clandestinum*	25	20
**Phytolacca octandra*	60	3
Triglochin lineare	20	1
Astartea scoparia	Opportunistic	

QUADRAT F17

Location: Lot 9001
GPS: 397520E; 6445542N
Soil Type: Black sandy loam
Vegetation Description: Low Forest A of *Eucalyptus rudis* subsp. *rudis* over Herbs dominated by **Lotus subbiflorus* over Tall Sedges dominated by *Juncus pallidus*
Vegetation Condition: Degraded
Notes: Lot of rubbish dumped in area. *Eucalyptus rudis* subsp. *rudis* trees are mainly saplings

SPECIES	HEIGHT (cm)	% COVER
**Avena barbata*	90	<1
Centella asiatica	20	2
Eucalyptus rudis subsp. *rudis*	1500	60
**Isolepis marginatus*	15	5
Juncus pallidus	150	25
**Lotus subbiflorus*	40	2-40
**Lythrum hyssopifolium*	15	1
**Oxalis corniculata*	20	<1
**Paspalidium urvillei*	50	<1
**Acacia longifolia*	Opportunistic	
Astartea scoparia	Opportunistic	
**Carpobrotus edulis*	Opportunistic	
**Ehrharta longiflora*	Opportunistic	
**Homeria flaccida*	Opportunistic	
Melaleuca rhaphiophylla	Opportunistic	
Melaleuca teretifolia	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
Melaleuca viminea subsp. *viminea*	Opportunistic	
**Phytolacca octandra*	Opportunistic	
**Rubus laudatus*	Opportunistic	
**Rumex crispus*	Opportunistic	
**Sonchus oleraceus*	Opportunistic	

QUADRAT 18

Location: Lot 9001
GPS: 397293E; 6445477N
Soil Type: Grey sand
Vegetation Description: Open Low Woodland A of *Melaleuca preissiana* over Tall Grass dominated by **Ehrharta calycina* and **Ehrharta longiflora* over Open Herbs dominated by **Arctotheca calendula*
Vegetation Condition: Completely degraded
Notes: Lots of *Melaleuca preissiana* are dead or with tops dying. Occasional clumps of *Melaleuca preissiana* scattered through area

SPECIES	HEIGHT (cm)	% COVER
Acacia pulchella var. *glabrescens*	150	1
**Arctotheca calendula*	40	15
**Bromus diandrus*	40	<1
**Carpobrotus edulis*	20	5
**Cynodon dactylon*	20	<1
**Ehrharta calycina*	130	20
**Ehrharta longiflora*	90	25
**Eragrostis curvula*	120	10-90
**Lotus subbiflorus*	20	2
Melaleuca preissiana	1200	10
**Orobanche minor*	25	<1
**Romulea rosea*	30	2
**Vulpia bromoides*	40	50
Acacia saligna	Opportunistic	
**Arundo donax*	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
**Avena barbata*	Opportunistic	
Eucalyptus rudis subsp. *rudis*	Opportunistic	
Eucalyptus todtiana	Opportunistic	
**Euphorbia terracina*	Opportunistic	
Jacksonia furcellata	Opportunistic	
Kunzea glabrescens	Opportunistic	
Nuytsia floribunda	Opportunistic	
**Oxalis pes-caprae*	Opportunistic	
**Phytolacca octandra*	Opportunistic	
**Ricinus communis*	Opportunistic	
**Schinus terebinthifolia*	Opportunistic	
**Sonchus oleraceus*	Opportunistic	
**Zantedeschia aethiopica*	Opportunistic	

QUADRAT F19

Location: Lot 9101
GPS: 397103E; 6445486N
Soil Type: Black sandy loam
Vegetation Description: Low Woodland A of *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Scrub of *Astartea scoparia* and *Melaleuca teretifolia* over Tall Grass dominated by *Eragrostis elongata* and* *Ehrharta longiflora* over Open Herbs dominated by **Lotus subbiflorus*
Vegetation Condition: Good to degraded

SPECIES	HEIGHT (cm)	% COVER
**Arctotheca calendula*	15	1
Astartea scoparia	200	10
**Briza minor*	30	2
**Carpobrotus edulis*	15	2
Cassytha racemosa	twiner	5
Centella asiatica	20	2
Drosera glanduligera	10	<1
**Echium plantagineum*	35	3
**Ehrharta calycina*	70	1
**Ehrharta longiflora*	70	10
Eragrostis elongata	70	20
**Hypochaeris glabra*	50	3
Juncus pallidus	80	3
**Lactuca serriola*	40	<1
Lepyrodia glauca	80	1
**Lotus subbiflorus*	20	15
**Lysimachia arvensis*	20	5

SPECIES	HEIGHT (cm)	% COVER
Melaleuca rhaphiophylla	800	15
Melaleuca teretifolia	200	10
**Romulea rosea*	40	3
**Sonchus asper*	90	<1
**Bromus diandrus*	Opportunistic	
Crassula colorata	Opportunistic	
**Euphorbia terracina*	Opportunistic	
Lepidosperma leptostachyum	Opportunistic	
Melaleuca viminea subsp. *viminea*	Opportunistic	
Nuytsia floribunda	Opportunistic	
**Paspalum urvillei*	Opportunistic	
**Pelargonium capitatum*	Opportunistic	
**Schinus terebinthifolia*	Opportunistic	
**Zantedeschia aethiopica*	Opportunistic	

QUADRAT F20

Location: Lot 9101
GPS: 397070E; 6445337N
Soil Type: Pale grey sand
Vegetation Description: Low Forest A of *Eucalyptus todtiana, Banksia attenuata, Banksia menziesii* and *Allocasuarina fraseriana* over Scrub of *Kunzea glabrescens* and *Adenanthos cygnorum* subsp. *cygnorum* over Open Tall Grass dominated by **Ehrharta calycina*
Vegetation Condition: Good to degraded
Notes: Narrow strip only on higher ground

SPECIES	HEIGHT (cm)	% COVER
Adenanthos cygnorum subsp. *cygnorum*	300	5
**Arctotheca calendula*	25	<1
Austrostipa compressa	30	<1
Banksia attenuata	400	2
Boronia ramosa subsp. *anethifolia*	60	1
Bossiaea eriocarpa	60	2
**Briza maxima*	45	3
Burchardia umbellata	80	2
Caesia micrantha	30	<1
Caladenia flava subsp. *flava*	20	<1
Calandrinia granulifera	10	1
Conostylis aculeata subsp. *aculeata*	50	2
Crassula colorata	15	<1
Dasypogon bromeliifolius	50	3
Desmocladus flexuosus	50	2
Drosera pallida	twiner	<1

SPECIES	HEIGHT (cm)	% COVER
**Ehrharta calycina*	90	15
Eucalyptus todtiana	800	30
**Gladiolus caryophyllaceus*	80	2
Gompholobium tomentosum	50	2
Hibbertia hypericoides	70	5
Hyalosperma cotula	20	<1
**Isolepis marginatus*	10	<1
Jacksonia furcellata	250	3
Kunzea glabrescens	300	10
Lepidosperma squamatum	60	<1
Leucopogon propinquus	65	1
Levenhookia stipitata	5	<1
Lomandra caespitosa	40	<1
Lyginia barbata	70	3
Monotaxis grandiflora	5	<1
**Oxalis pes-caprae*	50	<1
Patersonia occidentalis	70	1
**Pelargonium capitatum*	30	<1
Pterostylis vittata	60	<1
Scholtzia involucrata	30	<1
Siloxerus multiflorus	2	<1
Stirlingia latifolia	70	5
Thysanotus patersonii	twiner	<1
Trachymene pilosa	15	<1
**Ursinia anthemoides*	70	3
Wahlenbergia preissii	40	<1
**Zantedeschia aethiopica*	40	<1
Acacia pulchella var. *glabrescens*	Opportunistic	
Acacia stenoptera	Opportunistic	
Allocasuarina fraseriana	Opportunistic	
Allocasuarina humilis	Opportunistic	
Calandrinia corrigioloides	Opportunistic	
Cassytha racemosa	Opportunistic	
Conostephium pendulum	Opportunistic	
Dampiera linearis	Opportunistic	
Hemiandra pungens	Opportunistic	
Lechenaultia floribunda	Opportunistic	
Nuytsia floribunda	Opportunistic	
Stylidium repens	Opportunistic	

QUADRAT F21

Location: Lot 1001
GPS: 396588E; 6444401N
Soil Type: Pale grey sand
Vegetation Description: Low Forest A of *Eucalyptus marginata* subsp. *marginata, Banksia attenuata, Banksia menziesii* and *Allocasuarina fraseriana* over Open Low Scrub B of *Macrozamia riedlei* and *Xanthorrhoea preissii* over Open Dwarf Scrub C of *Hibbertia hypericoides* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by **Gladiolus caryophyllaceus*
Vegetation Condition: Good to degraded
Notes: Very narrow strip at the top of the dune. Down slope there was a lot of *Adenanthos cygnorum* subsp. *cygnorum* and *Acacia microstachya*. The remainder of this lot planted with non-endemic species with a small amount of natural regeneration after the sand pit was closed

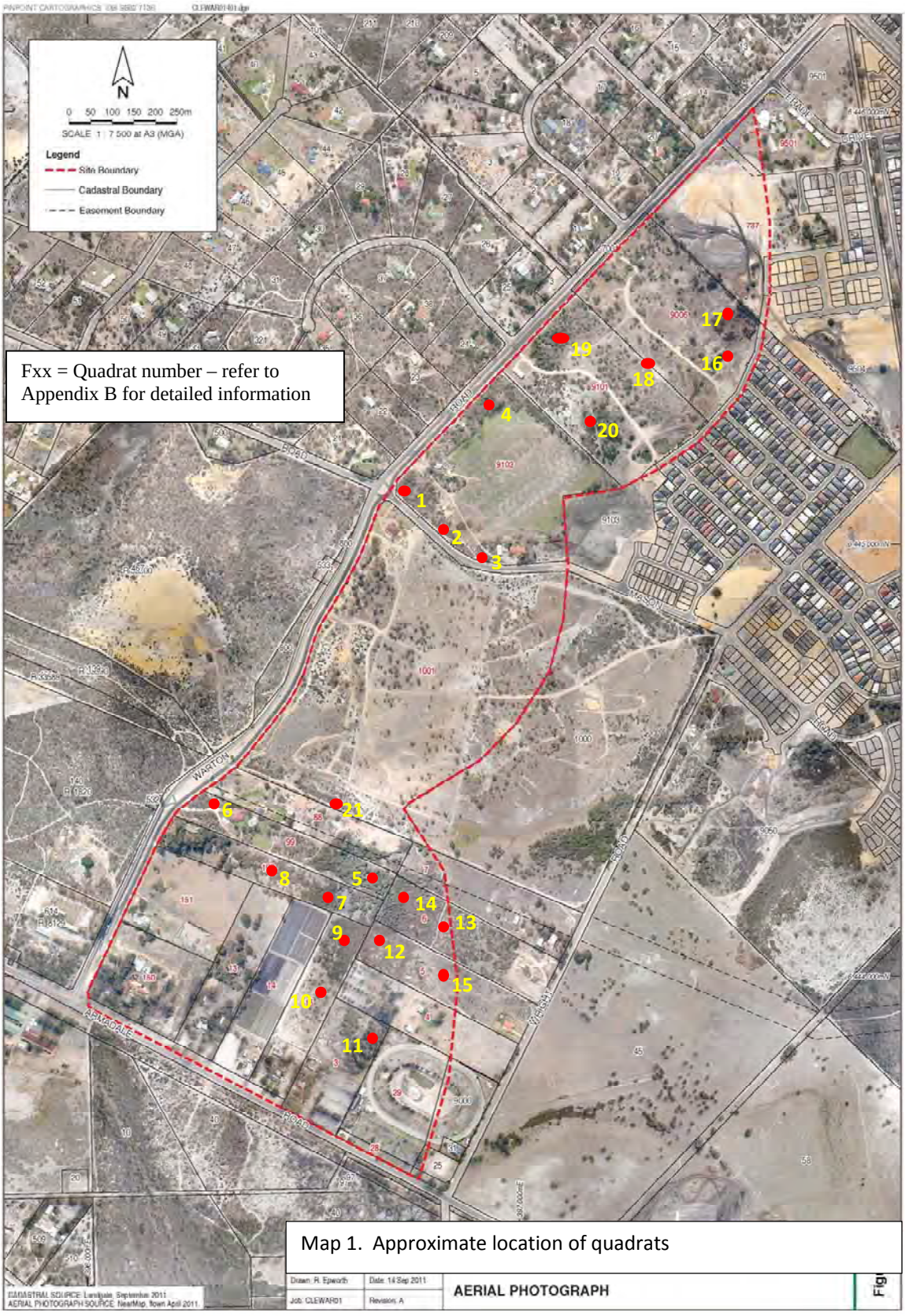
SPECIES	HEIGHT (cm)	% COVER
Acacia stenoptera	70	<1
Adenanthos cygnorum subsp. *cygnorum*	200	5
Allocasuarina fraseriana	1200	5
Austrostipa compressa	45	<1
**Avena barbata*	150	3
Banksia attenuata	600	3
Banksia menziesii	600	3
Burchardia umbellata	80	3
Caladenia flava subsp. *flava*	25	<1
Calandrinia granulifera	400	3
Conostylis aculeata subsp. *aculeata*	40	2
Dampiera linearis	20	<1
Dasypogon bromeliifolius	40	1
Desmocladus flexuosus	30	1

SPECIES	HEIGHT (cm)	% COVER
Dianella revoluta	80	2
Drosera pallida	twiner	<1
**Ehrharta calycina*	100	10
**Gladiolus caryophyllaceus*	80	15
Gompholobium tomentosum	70	2
Hibbertia hypericoides	60	5
Jacksonia furcellata	200	2
Laxmannia grandiflora	30	<1
Lepidosperma squamatum	50	5
Levenhookia stipitata	10	<1
Lomandra caespitosa	50	3
Lyginia barbata	70	2
Lyperanthus nigricans	2	<1
Macrozamia riedlei	120	5
Microtis media subsp. *media*	70	<1
Patersonia occidentalis	70	2
**Sonchus oleraceus*	20	<1
Stirlingia latifolia	90	3
Trachymene pilosa	25	<1
**Ursinia anthemoides*	50	5
Xanthorrhoea preissii	175	5
**Zantedeschia aethiopica*	20	<1
Bossiaea eriocarpa	Opportunistic	
Hypocalymma robustum	Opportunistic	
Kunzea glabrescens	Opportunistic	
Lomandra hermaphrodita	Opportunistic	
Melaleuca thymoides	Opportunistic	
Thysanotus patersonii	Opportunistic	

APPENDIX C

Maps

1. Approximate Location of Quadrats
2. Vegetation Units
3. Vegetation Condition

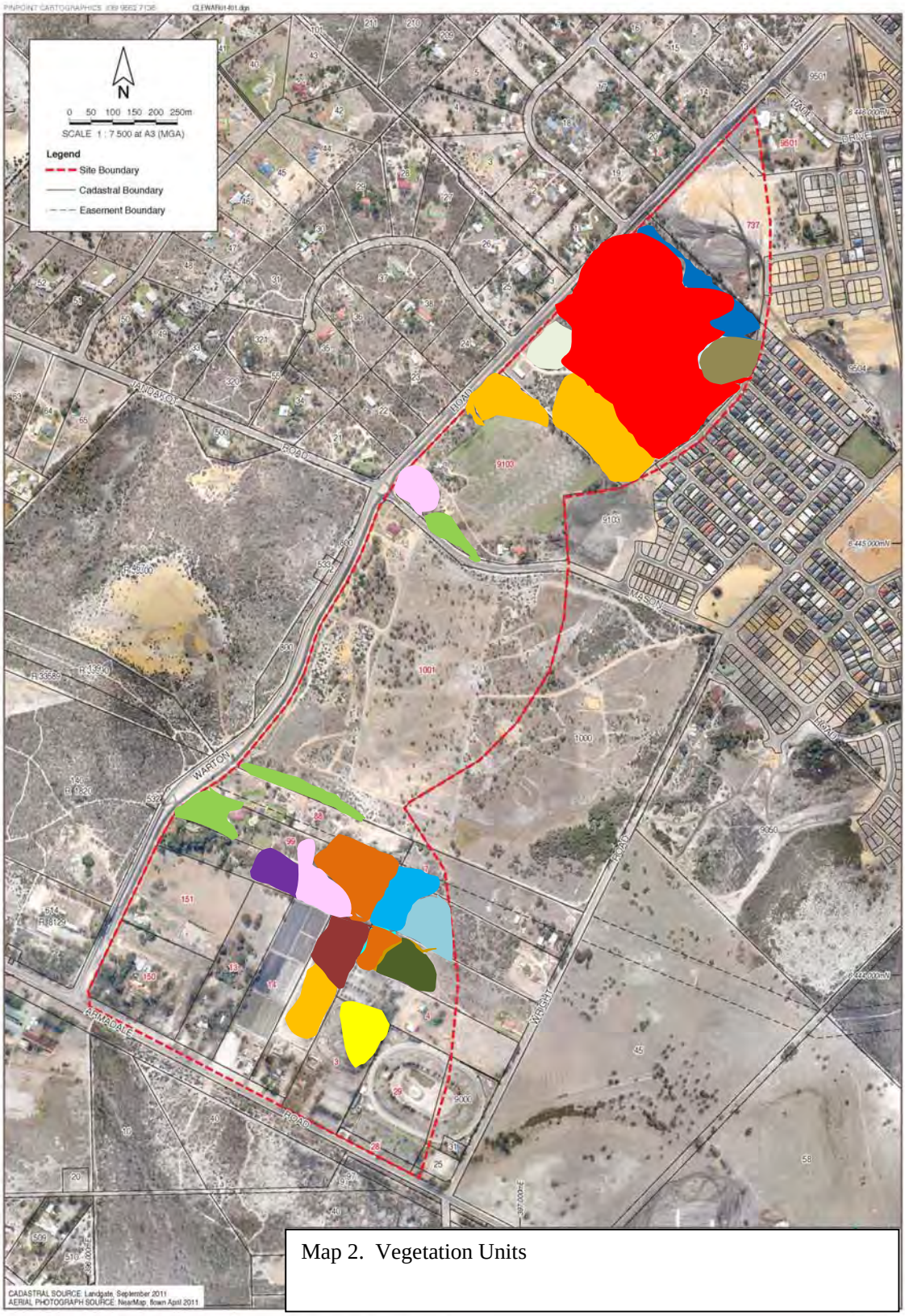


Map 1. Approximate location of quadrats

Figure 2. Vegetation Units

Colours used in vegetation map

Colour	Vegetation Description
	Low Woodland A of *Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana, Nuytsia floribunda* and *Eucalyptus marginata* subsp. *marginata* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata and *Ehrharta calycina* in grey sand
	Low Woodland A of *Banksia attenuata, Banksia menziesii, Allocasuarina fraseriana, Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata in* grey sand
	Open Low Woodland of *Banksia attenuata* over Scrub of *Kunzea glabrescens* over Dense Tall Grass of **Ehrharta calycina* over Open Herbs dominated by **Hypochaeris glabra* in pale grey sand.
	Low Forest of *Eucalyptus rudis* subsp. *rudis* over Open Herbs dominated by**Lotus subbiflorus* over Open Tall Sedges of *Juncus pallidus* in black sandy loam.
	Dense Low Forest A of *Melaleuca preissiana* over Scrub of *Taxandria linearifolia* over Dense Tall Sedges of *Lepidosperma longitudinale* and *Juncus pallidus* in black sand.
	Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* in grey sand
	Low Woodland A of *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Scrub of *Melaleuca teretifolia* and *Astartea scoparia* over Tall Grass dominated by **Eragrostis curvula* and **Ehrharta longifolia* over Herbs dominated by **Lotus subbiflorus* in black sandy loam.
	Dense Low Forest A of *Melaleuca preissiana* with occasional trees of *Eucalyptus rudis* subsp. *rudis* over Open Scrub of *Astartea scoparia* over Dense Herbs dominated by **Zantedeschia aethiopicum* in very damp grey sand with areas of open water
	Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub C dominated by *Hypocalymma angustifolium* and *Lechenaultia floribunda* over Tall Sedge of *Schoenus rigens* in grey sand
	Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand.
	Heath A of *Melaleuca viminea* and *Melaleuca incana* subsp. *incana* over Open Herbs dominated by **Hypochaeris glabra* and **Lotus subbiflorus* over Tall Sedges dominated by *Baumea juncea* and *Lepidosperma longitudinale* in damp grey sand.
	Open Low Woodland A of *Melaleuca preissiana* over Dense Tall Grass of **Ehrharta calycina*, **Eragrostis curvula* and **Ehrharta longiflora* in low lying grey sand over Open Herbs dominated by **Arctotheca calendula* in low lying grey sand.
	Dense Herbs dominated by **Lotus subbiflorus* over Open Tall Sedges of *Meeboldina scariosa* and *Baumea articulata* in damp flat area.
	Open Low Grass of *Pennisetum clandestinum* over Open Herbs dominated by **Lotus subbiflorus* over Very Open Sedges of **Cyperus tenellus* in very damp grey sand.
No colour	Cleared areas, homes and surrounds or planted non-endemic trees



Map 2. Vegetation Units

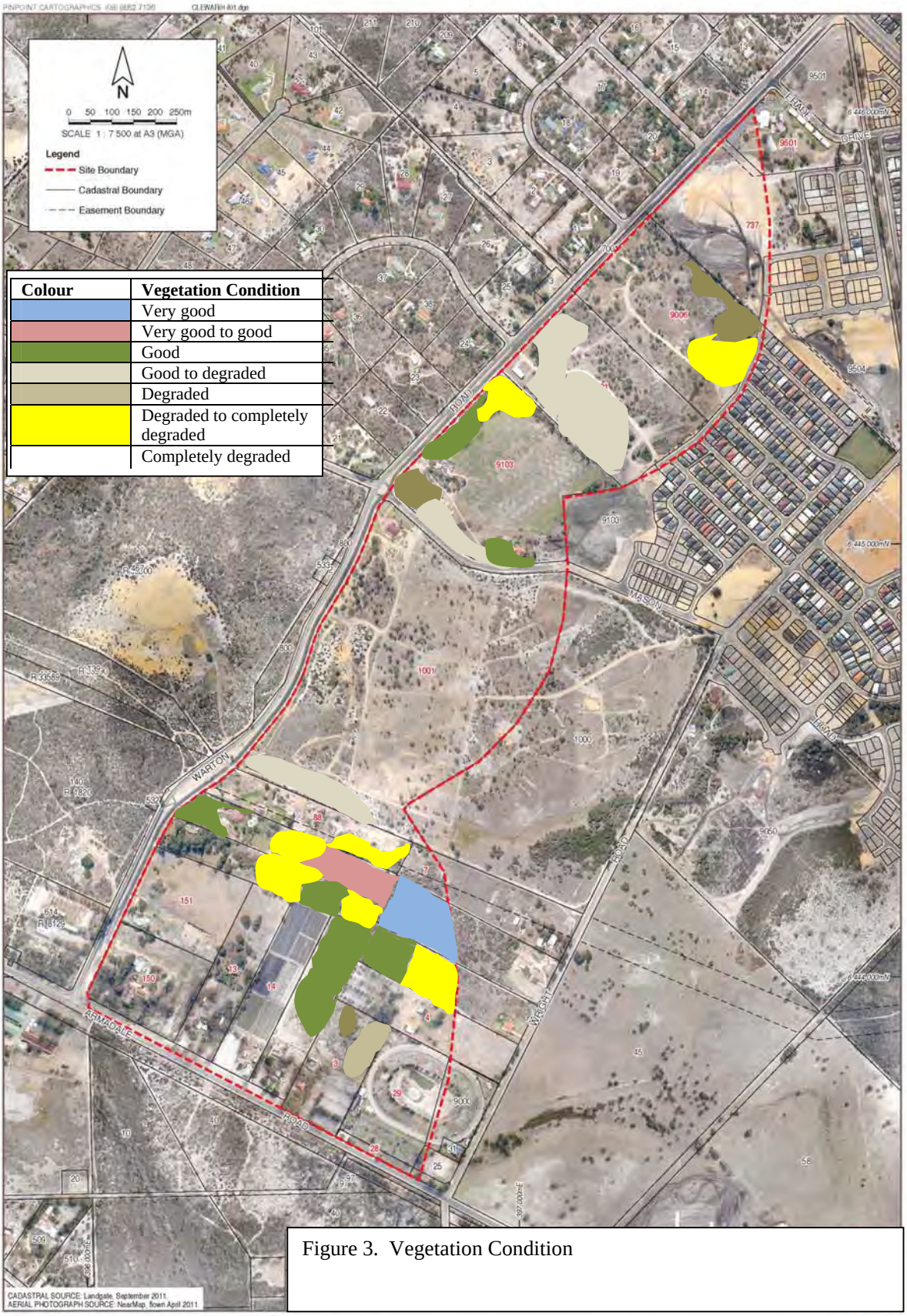


Figure 3. Vegetation Condition

APPENDIX D

Detailed Vegetation Units Maps for Lots with Remnant Vegetation

Vegetation Unit Abbreviation	Vegetation Description
Bm	Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus marginata* subsp. *marginata* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata and* **Ehrharta calycina* in grey sand
Bt	Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata in* grey sand
BK	Open Low Woodland of *Banksia attenuata* over Scrub of *Kunzea glabrescens* over Dense Tall Grass of **Ehrharta calycina* over Open Herbs dominated by **Hypochaeris glabra* in pale grey sand.
Er	Low Forest of *Eucalyptus rudis* subsp. *rudis* over Open Herbs dominated by**Lotus subbiflorus* over Open Tall Sedges of *Juncus pallidus* in black sandy loam.
Mp	Dense Low Forest A of *Melaleuca preissiana* over Scrub of *Taxandria linearifolia* over Dense Tall Sedges of *Lepidosperma longitudinale* and *Juncus pallidus* in black sand.
MK	Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* in grey sand
MM	Low Woodland A of *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Scrub of *Melaleuca teretifolia* and *Astartea scoparia* over Tall Grass dominated by **Eragrostis curvula* and **Ehrharta longifolia* over Herbs dominated by **Lotus subbiflorus* in black sandy loam.
EA	Dense Low Forest A of *Melaleuca preissiana* with occasional trees of *Eucalyptus rudis* subsp. *rudis* over Open Scrub of *Astartea scoparia* over Dense Herbs dominated by **Zantedeschia aethiopicum* in very damp grey sand with areas of open water
Kg	Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub C dominated by *Hypocalymma angustifolium* and *Lechenaultia floribunda* over Tall Sedge of *Schoenus rigens* in grey sand
MD	Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand.
ML	Heath A of *Melaleuca viminea* and *Melaleuca incana* subsp. *incana* over Open Herbs dominated by **Hypochaeris glabra* and **Lotus subbiflorus* over Tall Sedges dominated by *Baumea juncea* and *Lepidosperma longitudinale* in damp grey sand.
ME	Open Low Woodland A of *Melaleuca preissiana* over Dense Tall Grass of **Ehrharta calycina*, **Eragrostis curvula* and **Ehrharta longiflora* in low lying grey sand over Open Herbs dominated by **Arctotheca calendula* in low lying grey sand.
Ms	Dense Herbs dominated by **Lotus subbiflorus* over Open Tall Sedges of *Meeboldina scariosa* and *Baumea articulata* in damp flat area.
Pc	Open Low Grass of *Pennisetum clandestinum* over Open Herbs dominated by **Lotus subbiflorus* over Very Open Sedges of **Cyperus tenellus* in very damp grey sand.
	Cleared areas, homes and surrounds or planted non-endemic trees

Where a quadrat was placed in the vegetation at the Lot being described the quadrat number is recorded. However where the vegetation was the same as that described in a different Lot the above vegetation abbreviation is used (in red lettering). The condition is also recorded (in yellow numbering).

Vegetation at Lot 3

Higher ground: Dense Thicket of *Kunzea glabrescens* over Tall Sedge of *Schoenus rigens* in grey sand. **Vegetation unit Kg.** Vegetation condition: Degraded

Lower ground: Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand. **Vegetation unit EA**. Quadrat F11. Vegetation condition good to degraded

Remainder of the Lot was cleared or with planted non-endemic trees. Vegetation condition completely degraded

Vegetation at Lots 5, 6 and 7 Wright Road

Regenerating Low Woodland A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Herbs dominated by *Mitrasacme paradoxa* and **Hypochaeris glabra* over Open to Dense Low Sedges of *Dielsia stenostachya* and *Hypolaena exsulca* in black sandy loam. **Vegetation unit MD**. Quadrat F12. Vegetation condition very good to degraded.

Heath A dominated by *Melaleuca viminea* over Open Herbs dominated by **Lotus subbiflorus* and **Hypochaeris glabra* Open Tall Sedges of *Lepidosperma longitudinale* and *Baumea juncea* in black sandy loam **Vegetation unit ML**. Quadrat F13. Vegetation condition very good.

Dense Low Forest A of *Melaleuca preissiana* and *Taxandria linearifolia* over Dense Tall Sedges of *Lepidosperma longitudinale* in black sand. **Vegetation Unit Mp**. Quadrat F14. Vegetation condition very good.

Dense Herbs dominated by **Lotus subbiflorus* over Very Open Tall Sedges of *Baumea articulata* and *Meeboldina scariosa* in black sand. **Vegetation unit Ms**. Quadrat F15. Vegetation condition degraded to completely degraded.

No remnant native vegetation. All trees were planted. Vegetation condition completely degraded


F09
C4
F10
C4
C5-6
14
15
Scattered trees
C6
Scattered
trees
C6
3
Lot 15

Vegetation at Lot 15

Dense Thicket of *Kunzea glabrescens* over Dwarf Scrub C dominated by *Hypocalymma angustifolium* and *Lechenaultia floribunda* over Tall Sedge of *Schoenus rigens* in grey sand. **Vegetation unit Kg.** This was represented by quadrat F09. Vegetation condition was good.

Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus todtiana* over Heath B of mixed taxa dominated by *Xanthorrhoea preissii* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Dasypogon bromeliifolius* or *Phlebocarya ciliata* in grey sand. **Vegetation unit Bt.** This was represented by quadrat F10. As indicated on the aerial the vegetation varied between good and degraded to completely degraded.

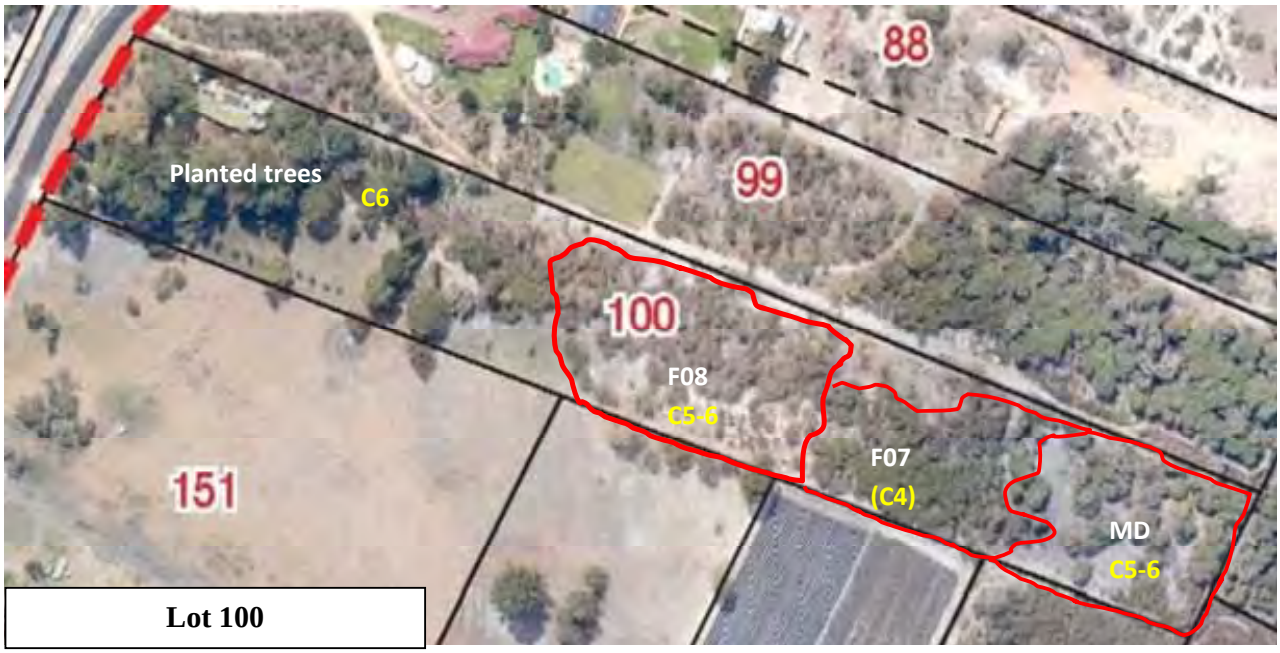
The remainder of the lot had planted trees or was cleared. The vegetation condition was completely degraded.

Lots 88 and 99

Vegetation at Lots 88 and 99

Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand. **Vegetation unit MD.** This was represented by quadrat F05 placed in Lot 99. The vegetation condition of this vegetation unit in Lot 99 was very good to good but in Lot 88 it was degraded to completely degraded.

Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus marginata* subsp. *marginata* over Low Scrub B dominated by *Xanthorrhoea preissii* or Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Avena barbata and *Ehrharta calycina* i*n grey sand. **Vegetation unit BM.** The quadrat F06 was placed between the residence and the road where the vegetation was in good condition. The second location adjacent to F05 was in a degraded to completely degraded condition.



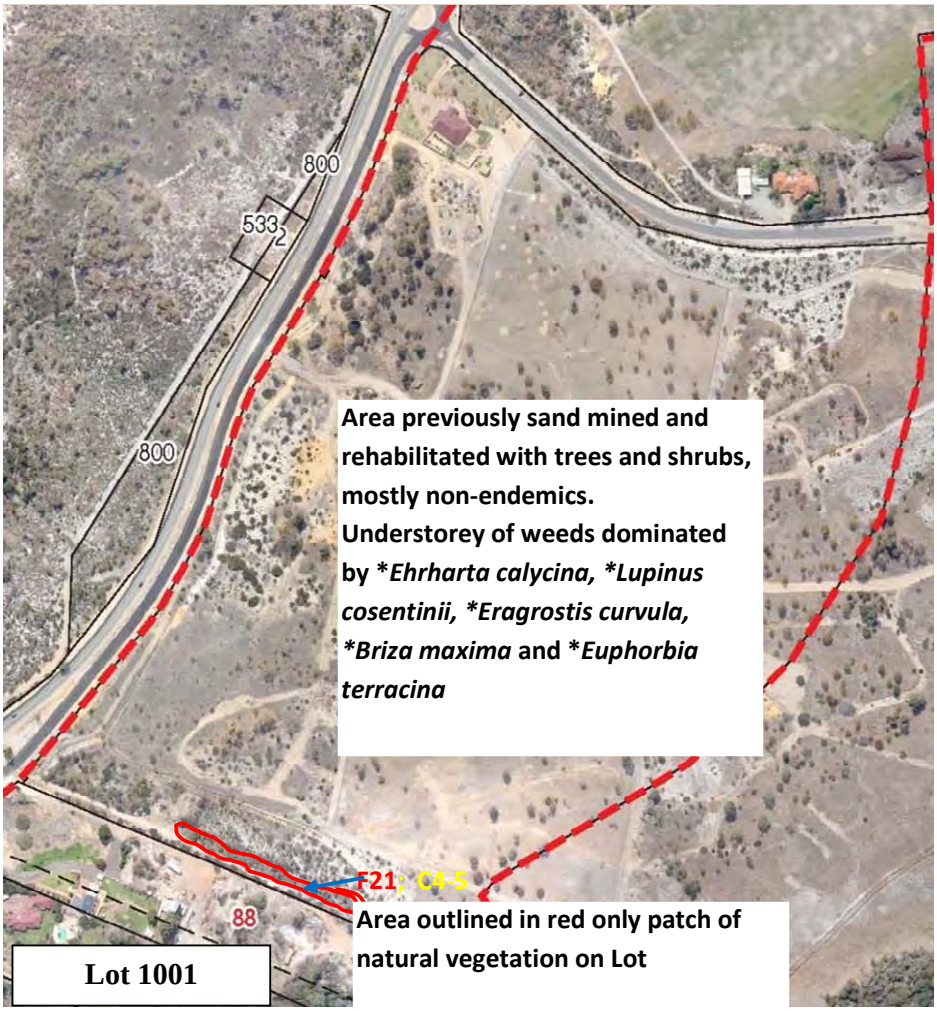
Vegetation at Lot 100

Dense Low Forest A of *Melaleuca preissiana* over Open Scrub of *Kunzea glabrescens* over Dense Tall Sedges of *Lepidosperma longitudinale* and/or *Dielsia stenostachya* and/or *Hypolaena exsulca* in black silty sand. **Vegetation unit MD**. The vegetation condition varied between degraded to completely degraded.

Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* in grey sand. **Vegetation unit MK**. It was represented by quadrat F07 but at this Lot the trees of *Melaleuca preissiana* were scattered and not a dominant stratum of the vegetation. The vegetation condition was good.

Open Low Woodland of *Banksia attenuata* over Scrub of *Kunzea glabrescens* over Dense Tall Grass of **Ehrharta calycina* over Open Herbs dominated by **Hypochaeris glabra* in pale grey sand. **Vegetation unit BK.** This was represented by quadrat F08. The vegetation condition was degraded to completely degraded. There were many dead trees of *Banksia attenuata* and *Kunzea glabrescens.*

The remainder of the Lot had planted trees, especially around the house.



Vegetation at Lot 1001

This was the largest area of the lots surveyed but was rehabilitating after sand extraction. Only a small area of remnant vegetation remained adjoining Lot 88.

Low Woodland A of *Banksia attenuata*, *Banksia menziesii*, *Allocasuarina fraseriana*, *Nuytsia floribunda* and *Eucalyptus marginata* subsp. *marginata* over Open Low Scrub B dominated by *Xanthorrhoea preissii* and *Macrozamia riedlei* over Tall Grass dominated by **Avena barbata and* **Ehrharta calycina* and Open Herbs dominated by **Gladiolus caryophyllaceus* in grey sand. **Vegetation unit BM**. The vegetation condition varied between good and degraded.

The remainder of the Lot consisted of non-endemic trees and shrubs with a few of the endemic flora re-establishing over introduced grasses and herbs. The vegetation condition was completely degraded.

Vegetation at Lots 9006 and 9101

Open Low Woodland A of *Melaleuca preissiana* over Dense Tall Grass of **Ehrharta calycina*, **Eragrostis curvula* and **Ehrharta longiflora* in low lying grey sand over Open Herbs dominated by **Arctotheca calendula* in low lying grey sand. **Vegetation unit ME.** This was represented by quadrat F18 which had scattered *Melaleuca preissiana* trees over weeds. The vegetation condition was completely degraded except for small area along the boundary with Lot 737 where the vegetation was degraded.

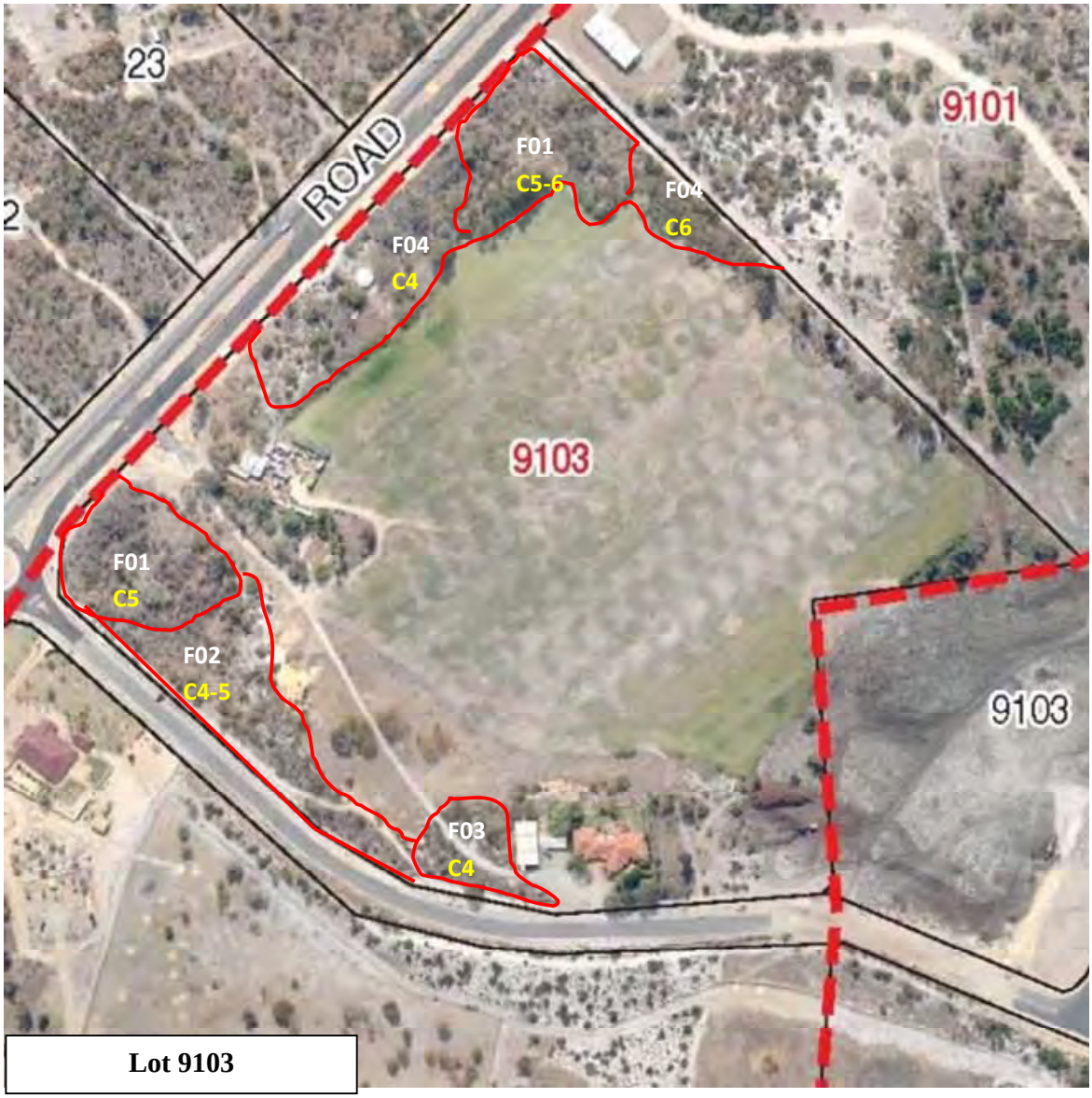
Low Forest of *Eucalyptus rudis* subsp. *rudis* over Open Herbs dominated by**Lotus subbiflorus* over Open Tall Sedges of *Juncus pallidus* in black sandy loam. **Vegetation unit Er.** This vegetation was

represented by quadrat F17 and surrounded a small dam. The vegetation condition varied between degraded and completely degraded.

Open Low Grass of *Pennisetum clandestinum* over Open Herbs dominated by **Lotus subbiflorus* over Very Open Sedges of **Cyperus tenellus* in very damp grey sand. It consisted of a series of wetlands with a few sedges but mainly weeds. **Vegetation unit Pc.** This vegetation was represented by quadrat F16. The vegetation condition was degraded to completely degraded.

Low Woodland A of *Melaleuca preissiana* and *Melaleuca rhaphiophylla* over Scrub of *Astartea scoparia* and *Melaleuca teretifolia* over Tall Grass dominated by *Eragrostis elongata* and* *Ehrharta longiflora* over Open Herbs dominated by **Lotus subbiflorus* in grey sand. **Vegetation unit MM**. It was represented by quadrat F19. The vegetation condition varied between good and degraded.

Low Forest A of *Eucalyptus todtiana, Banksia attenuata, Banksia menziesii* and *Allocasuarina fraseriana* over Scrub of *Kunzea glabrescens* and *Adenanthos cygnorum* subsp. *cygnorum* over Open Tall Grass dominated by **Ehrharta calycina* in grey sand. **Vegetation unit Bt**. It was represented by quadrat F20. The vegetation varied between good and degraded.



Vegetation at Lot 9103

Low Woodland A of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Herbs dominated by *Dasypogon bromeliifolius* (mainly dead). Nearly all the Banksias and Kunzeas are dead and about 95% of the *Dasypogon bromeliifolius*. **Vegetation unit MK**. It was represented by quadrat F01. The vegetation condition was degraded to completely degraded.

Low Woodland A of *Banksia attenuata, Banksia menziesii* and occasional trees of *Eucalyptus marginata* subsp. *marginata* over Low Scrub B of *Xanthorrhoea preissii* over Dwarf Scrub C dominated by *Hibbertia hypericoides* over Herbs dominated by *Burchardia umbellata* in grey sand. **Vegetation unit BM**. It was represented by quadrat F02 and was in good condition.

Low Open Woodland A of *Banksia attenuata* over Dwarf Scrub C of mixed taxa dominated by *Hibbertia hypericoides* over Open Tall Grass dominated by **Ehrharta calycina* over Open Herbs dominated by *Burchardia umbellata* and *Chamaescilla umbellata* in yellow grey sand. **Vegetation unit ML.** This was represented by quadrat F03 which recorded a good vegetation condition.

Low Forest A of *Eucalyptus todtiana* and *Banksia attenuata* over Dwarf Scrub C dominated by *Hibbertia hypericoides* over Tall Grass dominated by **Ehrharta calycina* over Herbs of mixed taxa dominated by *Gladiolus caryophyllaceus* in grey sand. **Vegetation unit Bt.** This was represented by quadrat F04. It recorded a good vegetation condition.

APPENDIX B - DBCA NATURE MAP SEARCH REPORT

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 19/03/2020

Kingdom Plantae
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 54' 27" E,32° 07' 31" S
Buffer 10km

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1.	3237	*Acacia benthamii*		P2	
2.	3373	*Acacia horridula*		P3	
3.	14932	*Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)*		P1	
4.	14131	*Acacia oncinophylla subsp. patulifolia*		P4	
5.	141	*Aponogeton hexatepalus (Stalked Water Ribbons)*		P4	
6.	7849	*Asteridea gracilis*		P3	
7.	38481	*Austrostipa jacobsiana*		T	
8.	4444	*Boronia tenuis (Blue Boronia)*		P4	
9.	3178	*Byblis gigantea (Rainbow Plant)*		P3	
10.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
11.	13653	*Calytrix breviseta subsp. breviseta*		T	
12.	13656	*Calytrix simplex subsp. simplex*		P1	
13.	13999	*Conospermum undulatum*		T	
14.	16245	*Cyathochaeta teretifolia*		P3	
15.	7485	*Dampiera triloba*		P3	
16.	10796	*Diuris drummondii (Tall Donkey Orchid)*		T	
17.	1637	*Diuris purdiei (Purdie's Donkey Orchid)*		T	
18.	4763	*Dodonaea hackettiana (Hackett's Hopbush)*		P4	
19.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
20.	13635	*Drakaea micrantha*		T	
21.	3115	*Drosera occidentalis (Western Sundew)*		P4	
22.	17150	*Eremophila glabra subsp. chlorella*		T	
23.	41801	*Eryngium pinnatifidum subsp. Palustre (G.J. Keighery 13459)*		P3	
24.	6686	*Halgania corymbosa*		P3	
25.	11074	*Hydrocotyle striata*		P1	
26.	20462	*Jacksonia gracillima*		P3	
27.	4027	*Jacksonia sericea (Waldjumi)*		P4	
28.	19272	*Johnsonia pubescens subsp. cygnorum*		P2	
29.	4035	*Kennedia beckxiana (Cape Arid Kennedia)*		P4	
30.	45081	*Lasiopetalum glutinosum subsp. glutinosum*		P3	
31.	942	*Lepidosperma rostratum*		T	
32.	33638	*Meionectes tenuifolia*		P3	
33.	33742	*Microtis quadrata*		P4	
34.	36200	*Ornduffia submersa*		P4	
35.	11557	*Phlebocarya pilosissima subsp. pilosissima*		P3	
36.	5237	*Pimelea calcicola*		P3	
37.	8163	*Pithocarpa corymbulosa (Corymbose Pithocarpa)*		P3	
38.	42022	*Poranthera moorokatta*		P2	
39.	11615	*Ptilotus sericostachyus subsp. roseus*		P1	
40.	974	*Schoenus benthamii*		P3	
41.	980	*Schoenus capillifolius*		P3	
42.	1008	*Schoenus pennisetis*		P3	
43.	19704	*Stenanthemum sublineare*		P2	
44.	18564	*Stylidium aceratum*		P3	
45.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
46.	25800	*Stylidium paludicola*		P3	
47.	48297	*Styphelia filifolia*		P3	
48.	18590	*Synaphea sp. Fairbridge Farm (D. Papenfus 696)*		T	
49.	1717	*Thelymitra variegata (Queen of Sheba)*		P2	
50.	1317	*Thysanotus anceps*		P3	
51.	1334	*Thysanotus glaucus*		P4	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
52.	13783	*Thysanotus sp. Badgingarra (E.A. Griffin 2511)*		P2	
53.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
54.	14714	*Verticordia lindleyi subsp. lindleyi*		P4	

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 C - EPBC PROTECTED MATTERS SEARCH REPORT

Australian Government
Department of the Environment and Energy

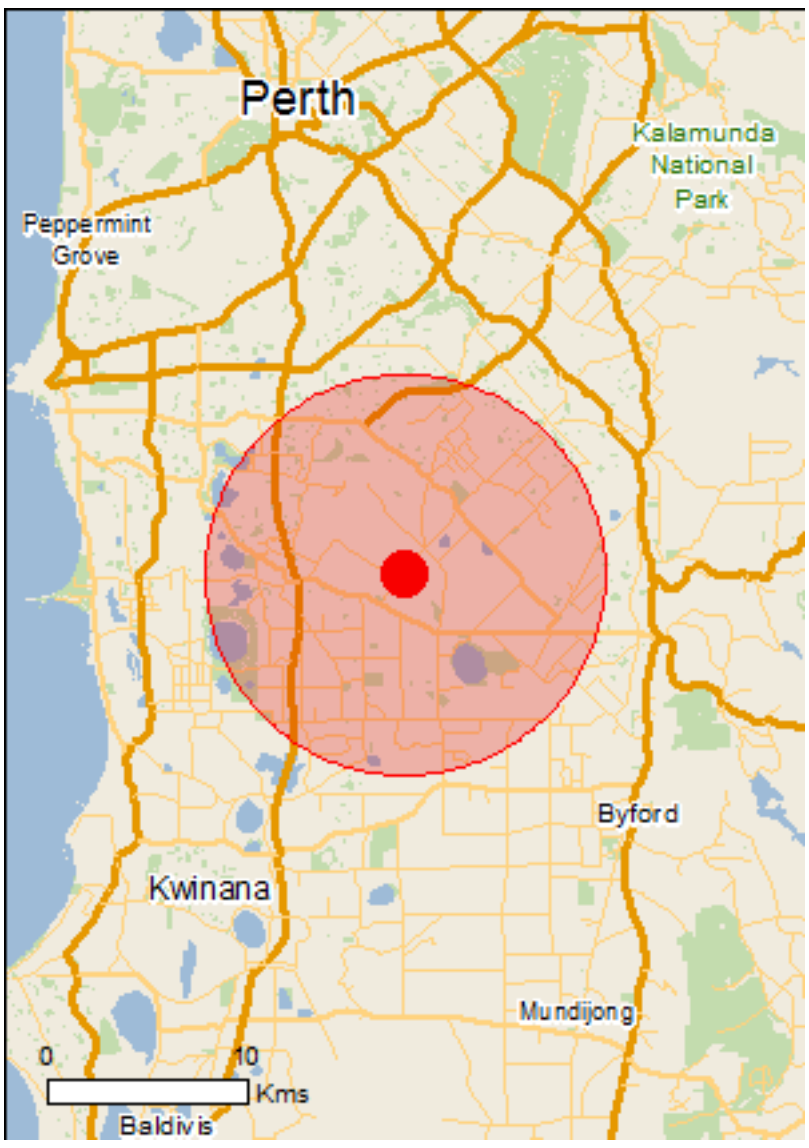
EPBC Act Protected Matters Report

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

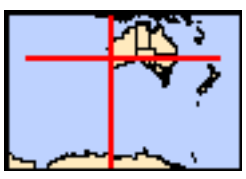
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 19/03/20 15:57:33



Coordinates
Buffer: 10.0Km



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:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	38
Listed Migratory Species:	20

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:	30
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:	10
Regional Forest Agreements:	None
Invasive Species:	42
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Forrestdale and thomsons lakes	Within Ramsar site
Peel-yalgorup system	30 - 40km upstream

Listed Threatened Ecological Communities [Resource Information]

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

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	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		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Insects		
Leioproctus douglasiellus a short-tongued bee [66756]	Critically Endangered	Species or species habitat known to occur within area
Neopasiphae simplicior A native bee [66821]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Austrostipa jacobsiana [87809]	Critically Endangered	Species or species habitat known to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat known to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Eremophila glabra subsp. chlorella [84927]	Endangered	Species or species habitat likely to occur within area
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat likely to occur within area
Goodenia arthrotricha [12448]	Endangered	Species or species habitat likely to occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Grevillea thelemanniana Spider Net Grevillea [32835]	Critically Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known 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]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area

Name	Threatened	Type of Presence
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Balannup Lake	WA
Forrestdale Lake	WA
Gibbs Road	WA
Harry Waring Marsupial Reserve	WA
Piara	WA
Thomsons Lake	WA
Unnamed WA48291	WA
Unnamed WA49299	WA
Unnamed WA49561	WA
Wandi	WA

Invasive Species

[Resource Information]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
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

Name	Status	Type of Presence
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		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
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
Asparagus plumosus Climbing Asparagus-fern [48993]		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 linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur

Name	Status	Type of Presence 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
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		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

Nationally Important Wetlands	[Resource Information]
Name	State
Forrestdale Lake	WA
Gibbs Road Swamp System	WA
Thomsons Lake	WA

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-32.1252 115.90763

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 D - FLORA SPECIES BY SITE

*denotes introduced (weed) species

Family	Species	PR02	PR01	PR04	PR03	PR05
Anarthriaceae	*Lyginia imberbis*			x	x	x
Apiaceae	*Platysace compressa*	x				
Asparagaceae	*Laxmannia squarrosa*			x		
	Lomandra ?caespitosa				x	
	Lomandra sericea				x	
	Lomandra sp.	x				
Asteraceae	* *Ursinia anthemoides*			x		
Casuarinaceae	*Allocasuarina fraseriana*	x				x
Colchicaceae	*Burchardia congesta*	x	x		x	
Cyperaceae	*Lepidosperma squamatum*				x	
	Schoenus curvifolius		x		x	
	Schoenus sp.					x
Dasypogonaceae	*Dasypogon bromeliifolius*	x	x		x	x
Dilleniaceae	*Hibbertia hypericoides*	x		x	x	
Ericaceae	*Conostephium* sp.				x	
	Leucopogon conostephioides			x		
	Styphelia xerophylla			x	x	
Fabaceae	*Acacia pulchella*	x	x	x	x	x
	Acacia stenoptera			x		
	Bossiaea eriocarpa	x	x		x	
	Gompholobium tomentosum	x	x	x	x	
	Hovea trisperma				x	
	Jacksonia furcellata	x	x		x	x
	Jacksonia ?gracillima (P3)	x				
	Kennedia prostrata	x				
Goodeniaceae	*Dampiera linearis*	x			x	
	Lechenaultia floribunda			x	x	
	Scaevola repens			x		
Haloragaceae	*Gonocarpus pithyoides*	x				
Iridaceae	* *Gladiolus caryophyllaceus*	x	x	x	x	x
	Patersonia occidentalis				x	
Lamiaceae	*Hemiandra pungens*			x		x
Myrtaceae	* *Leptospermum laevigatum*				x	
	Calytrix sp.				x	
	Eucalyptus marginata	x				
	Eucalyptus todtiana				x	x
	Hypocalymma robustum	x				
	Kunzea glabrescens		x		x	x
	Melaleuca preissiana	x	x			
	Melaleuca seriata		x			
	Melaleuca thymoides		x		x	
	Scholtzia involucrata			x		
Poaceae	* *Avena barbata*		x			
	* *Briza maxima*	x				
	* *Ehrharta calycina*	x	x	x	x	x
Proteaceae	*Adenanthos cygnorum*	x		x		x
	Banksia attenuata		x		x	
	Banksia ilicifolia				x	
	Banksia menziesii	x	x		x	
	Petrophile linearis				x	
	Stirlingia latifolia			x	x	
Restionaceae	*Loxocarya cinerea*	x	x		x	x

Family	Species	PR02	PR01	PR04	PR03	PR05
Rutaceae	*Boronia ramosa*			x		
Stylidiaceae	*Stylidium repens*				x	
Xanthorrhoeaceae	*Xanthorrhoea gracilis*	x	x			
	Xanthorrhoea preissii	x				x
Zamiaceae	*Macrozamia riedlei*	x				

APPENDIX E - VEGETATION RELEVÉ DATA

Site PR01

Date:	25.03.20
Botanist:	Kellie Bauer-Simpson
NW Corner Coordinates:	396730mE; 6445159mN
Slope:	Flat
Landform:	Flat
Soil Colour:	Grey
Soil Type:	Sand
Litter:	90
Bare Ground:	1
Fire Age:	5 - 10yrs
Vegetation Condition:	Good
Disturbances/Impacts:	Weeds, rabbits, possible dieback and historic clearing
Vegetation Unit:	EmBaLW(-B)

Figure D1 Site PR01

Site PR02

Date:	25.03.20
Botanist:	Kellie Bauer-Simpson
NW Corner Coordinates:	396748mE; 6445101mN
Slope:	Flat
Landform:	Flat
Soil Colour:	Grey
Soil Type:	Sandy loam
Litter:	80
Bare Ground:	5
Fire Age:	>10 years
Vegetation Condition:	Good
Disturbances/Impacts:	Weeds, rabbits, possible dieback and historic clearing
Vegetation Unit:	EmBaLW

Figure D2 Site PR02

Site PR03

Date:	25.03.20
Botanist:	Kellie Bauer-Simpson
NW Corner Coordinates:	396896mE; 6445310mN
Slope:	Flat
Landform:	Flat
Soil Colour:	Grey
Soil Type:	Sandy loam
Litter:	80
Bare Ground:	5
Fire Age:	5 - 10 years
Vegetation Condition:	Good
Disturbances/Impacts:	Weeds, possible dieback and rabbits
Vegetation Unit:	BaEtLW

Figure D3 Site PR03

Site PR04

Date:	25.03.20
Botanist:	Kellie Bauer-Simpson
NW Corner Coordinates:	396884mE; 6445307mN
Slope:	Mild
Landform:	Flat
Soil Colour:	Pale grey
Soil Type:	Sand
Litter:	5
Bare Ground:	90
Fire Age:	5 – 10 years
Vegetation Condition:	Degraded – Completely Degraded
Disturbances/Impacts:	Weeds, erosion, rabbits, loss of structure and historic clearing
Vegetation Unit:	AcOS

Figure D4 Site PR04

Site PR05

Date:	25.03.20
Botanist:	Kellie Bauer-Simpson
NW Corner Coordinates:	396991mE; 6445344mN
Slope:	Mild
Landform:	Flat
Soil Colour:	Grey
Soil Type:	Sand
Litter:	75
Bare Ground:	10
Fire Age:	5 – 10 years
Vegetation Condition:	Degraded
Disturbances/Impacts:	Weeds, rabbits, loss of structure and historic clearing
Vegetation Unit:	BaEtLW(-B)

Figure D5 Site PR05

APPENDIX F - STRUCTURAL VEGETATION CLASSIFICATIONS (MUIR 1977)

Life Form/Height Class	Canopy Cover			
	Dense 70-100%	**Mid-dense 30-70%**	**Sparse 10-30%**	**Very sparse 2-10%**
Trees >30m Trees 15-30m Trees 5-15m Trees <5m	Dense tall forest Dense forest Dense low forest A Dense low forest B	Tall forest Forest Low forest A Low forest B	Tall woodland Woodland Low woodland A Low woodland B	Open tall woodland Open woodland Open low woodland A Open low woodland B
Mallee Tree Form Mallee Shrub form	Dense tree mallee Dense shrub mallee	Tree mallee Shrub mallee	Open tree mallee Open shrub mallee	Very open tree mallee Very open shrub mallee
Shrubs >2m Shrubs 1.5-2m Shrubs 1-1.5m Shrubs 0.5-1m Shrubs <0.5m	Dense thicket Dense heath A Dense heath B Dense low heath C Dense low heath D	Thicket Heath A Heath B Low heath C Low heath D	Scrub Low scrub A Low scrub B Dwarf scrub C Dwarf scrub D	Open scrub Open low scrub A Open low scrub B Open dwarf scrub C Open dwarf scrub D
Mat plants Hummock grass Bunch grass >0.5m Bunch grass <0.5m Herbaceous spp.	Dense mat plants Dense hummock grass Dense tall grass Dense low grass Dense herbs	Mat plants Mid-dense hummock grass Tall grass Low grass Herbs	Open mat plants Hummock grass Open tall grass Open low grass Open herbs	Very open mat plants Open hummock grass Very open tall grass Very open low grass Very open herbs
Sedges >0.5m Sedges <0.5m	Dense tall sedges Dense low sedges	Tall sedges Low sedges	Open tall sedges Open low sedges	Very open tall sedges Very open low sedges
Ferns Mosses, Liverwort	Dense ferns Dense mosses	Ferns Mosses	Open ferns Open mosses	Very open ferns Very open mosses