Natural Area
CONSULTING MANAGEMENT SERVICES

MELconnx

Orchid Ave

Detailed Flora and Vegetation Survey and Basic Fauna Survey

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Contents

1.0 Introduction

Natural Area Consulting Management Services (Natural Area) was commissioned by MELconnx to conduct a detailed flora and vegetation survey, and basic fauna survey of an area of vegetation along Beechboro Road North, Bennett Springs. Information gathered during the surveys will be used to inform stakeholders of the environmental values of the site in preparation for proposed installation of a Water Corporation sewer drain asset. This survey will also provide supporting information for any future environmental approvals.

1.1 Location

The survey area is located along Beechboro Rd North between Marshall Rd to the north and Orchid Ave to the south in the suburb of Bennett Springs (Figure 1). The survey area is approximately 12 km north-east of the Perth Central Business District (CBD). A portion of the site is located within an environmentally sensitive area (Department of Water and Environmental Regulations (DWER), 2023).

1.2 Scope

Natural Area undertook an out-of-season detailed flora survey and a basic fauna survey. Activities undertaken included:

- desktop assessment activities to determine potential flora and fauna species, declared rare and priority listed species (DRF) and ecological communities with the potential to be present within the nominated area, including requests for DBCA database searches for flora, fauna and ecological communities
- basic out-of-season flora survey of the area to determine:
  - flora species composition (native and non-native)
  - presence of any priority of threatened flora species
  - vegetation type and condition extent.
- basic fauna survey, opportunistically noting evidence of fauna including scats, tracks, and diggings in accordance with EPA (2020) *Technical Guidance -Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.*
- mapping and reporting outcomes of the survey activities.

Figure 1:
Survey Boundary
Orchid Ave, Bennett Springs

2.0 Site Characteristics

The characteristics of a site have a strong bearing on the flora, vegetation, fauna, and ecological communities present. The key characteristics of Orchid Avenue are outlined in this section.

2.1 Regional Context

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies bioregions within Western Australia based on environmental factors such as climate, geology and vegetation and fauna assemblies. The survey area is within the Swan Coastal Plain 2 (SWA02) IBRA subregion (Department of Primary Industries and Regional Development (DPIRD), 2023). This region is described as a low-lying coastal plain with dominant sandy soils of Tuart or Banksia vegetation, Melaleuca swamps and outwash plains vegetated with *Casuarina obesa*. The plain rises in the East of the region to duricrust Mesozoic sediments dominated by Jarrah woodlands (Mitchell, Williams & Desmond, 2002).

2.2 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (2023); Perth Airport WA, site number 009021, the region has an average:

- rainfall of 760.1 mm pa, with rain falling predominantly between May and August
- maximum temperature ranging from 18.0 ^{o}C in winter to 32 ^{o}C in summer, with a maximum recorded temperature of 46.7 ^{o}C
- minimum temperatures ranging from 8.1 ^{o}C in winter to 17.6 ^{o}C in summer, with a minimum recorded temperature of -1.3 ^{o}C
- predominant wind direction of year-round morning easterlies except from May to August where north-easterlies dominate. Afternoon south-westerly sea breezes from October to April, turning predominantly to westerly winds from May to September. Monthly afternoon wind speeds of 18.7 km/h with maximum gusts of 124 km/h.

2.3 Topography and Soils

Using the NRInfo Portal, two soil types were identified on site, the Bassendean Jandakot phase in the north and south corners of the site and the Bassendean Yanga phase (Bassendean) in the centre (DPIRD, 2023) (Table 1). The site is relatively flat measuring 30 m Australian Height Datum (AHD) from the north to the south (DPRID, 2019) (Figure 2).

Table 1: Soil types within Orchid Ave

Name	Symbol	Description
Bassendean Jandakot phase	212Bs_Ja	Low dunes with slopes <10%. Grey sand above pale-yellow sands generally underlain by podsols of humus and iron. Low open Banksia woodland with dense shrub.
Bassendean Yanga phase (Bassendean)	212Bs_Ya	Flat and poorly drained with a mix of deep leached sand, shallow sand over limestone or ferruginous

Name	Symbol	Description
		pan, and saline soils. Dense *Melaleuca* spp. present in drainage areas.

2.4 Vegetation Complex

One vegetation complex exists within the site boundary, the Southern River Complex (Department of Biodiversity, Conservation and Attractions (DBCA), 2018d). The elevated areas are described as having an open Marri-Jarrah-Banksia woodland, with *Eucalyptus rudis* and *Melaleuca rhaphiophylla* woodland present along drainage lines. Drainage areas south of the Murray River also contain *Agonis flexuosa* (Heddle *et al.* 1980). The pre-European extent of this vegetation complex remaining is:

- 18.43% within the Swan Coastal Plain
- 16.51% within the City of Swan (Government of Western Australia, 2019).

2.5 Black Cockatoo Habitat

There is potential for the three threatened Black Cockatoo species and their habitat to occur on site, including the Carnaby's Cockatoo (*Zanda latirostris*) and the Baudin's Black Cockatoo (*Zanda baudinii*) listed as Endangered under the *EPBC Act 1999* (Cwlth), and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) listed as Vulnerable under the *EPBC Act 1999* (Cwlth). All are listed as Threatened under the *Biodiversity Conservation Act 2016* (WA). According to NationalMap the survey site occurs within an area classified as:

- Carnaby's Cockatoo Areas requiring investigation as feeding habitat in the Swan Coastal Plain IBRA Region (DBCA, 2018a)
- Carnaby's Cockatoo Confirmed Roost Sites Buffered 6 km (DBCA, 2018b)
- Carnaby's Cockatoo Unconfirmed Roost Sites Buffered 6 km (DBCA, 2018c)

2.6 Hydrology

The survey area is associated with two geomorphic wetlands, namely the Victoria Road Swamp which is classified as a 'Multiple Use' sumpland, and a 'Conservation' category sumpland known as Orchid Park (DBCA, 2023) (Figure 3).

2.7 Heritage Values

No European heritage sites have been recorded within the survey area (Government of Western Australia, 2023). The survey area falls within the extent of one Aboriginal heritage site; 'Bennett Brook: in toto' (site ID 3692), which is recorded as a 'creation/dreaming narrative' place (Department of Planning, Lands and Heritage (DPLH), 2023). The heritage boundary is however, located approximately 2.5 km east of the survey area. Another Aboriginal heritage site, 'Marshall, Beechboro' (site ID 3180), which is recorded as artefacts/scatters within close proximity to the survey area. All heritage areas within or in close proximity to the proposed rail alignment has been previously surveyed.

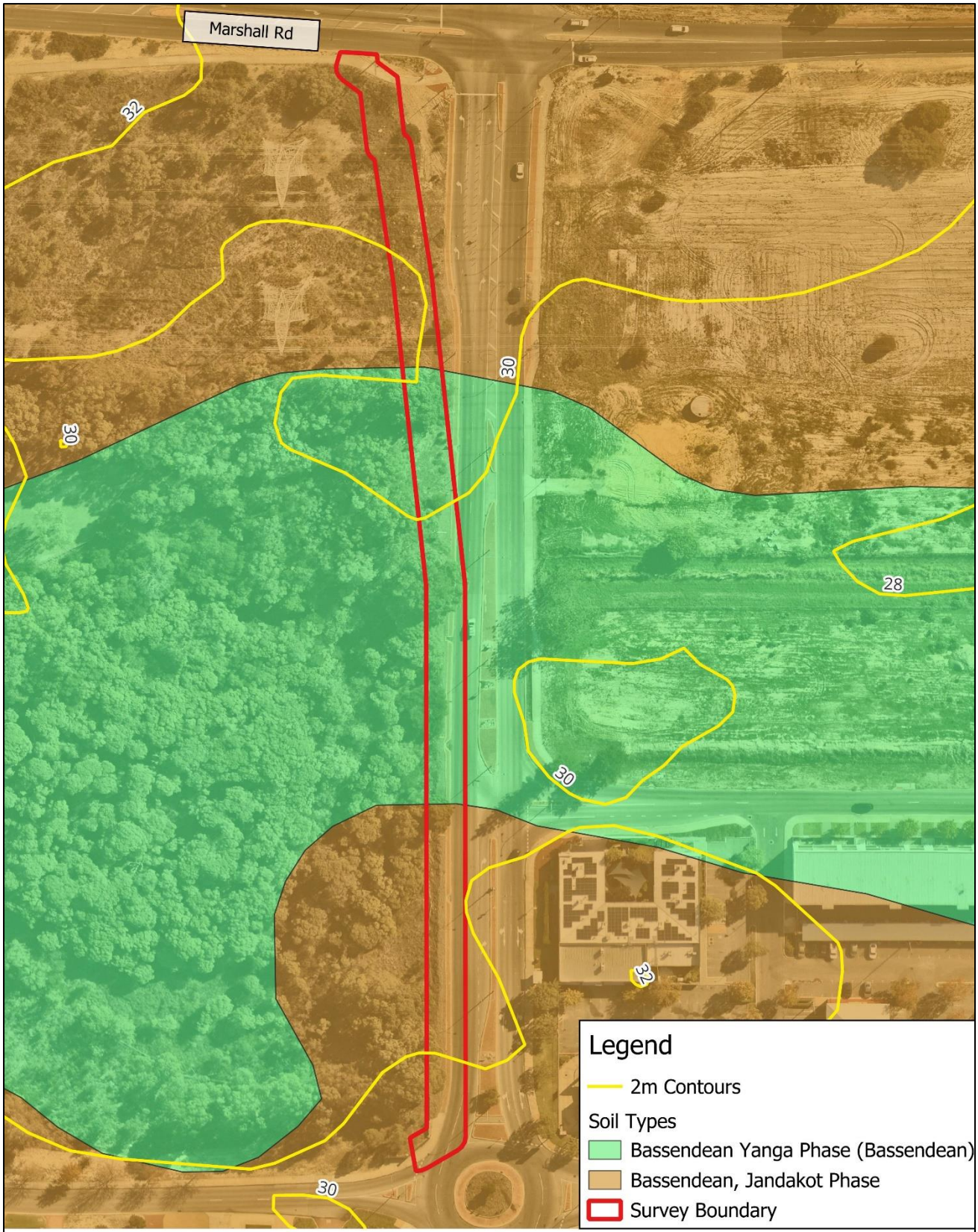

Figure 2:
Soil Types and Contours
Orchid Ave, Bennett Springs

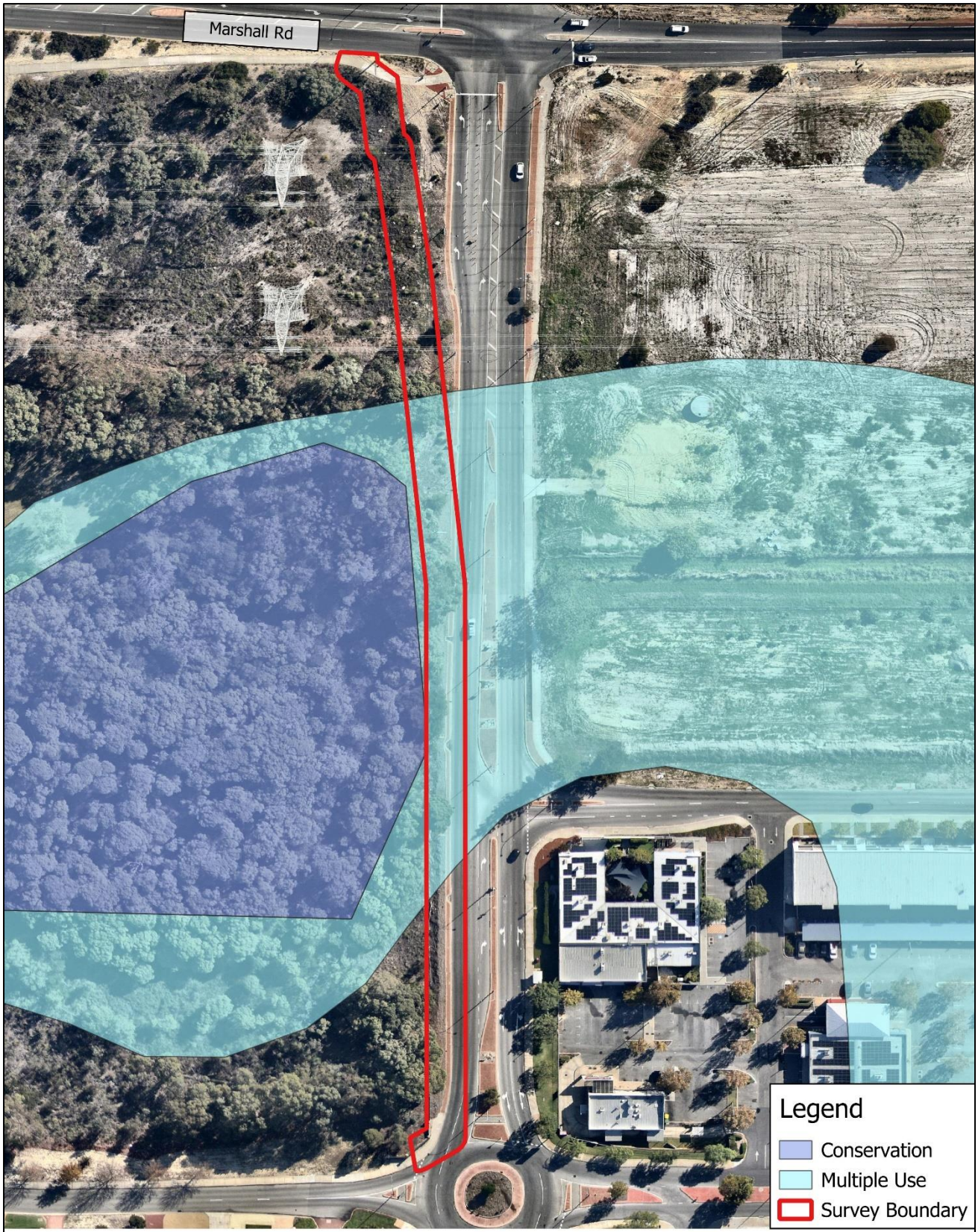

Figure 3:
Geomorphic Wetlands
Orchid Ave, Bennett Springs

3.0 Methodology

3.1 Desktop and Literature Review

The desktop survey included reviewing online databases to gather contextual knowledge and determine preliminary site characteristics including:

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

The following databases were accessed to obtain relevant information:

- NatureMap (Department of Biodiversity, Conservation and Attractions (DBCA), 2023a)
- Protected Matters Search Tool (Department of Climate Change, Energy, the Environment and Water (DCCEEW)), 2023) (Appendix 1)
- FloraBase (WA Herbarium, 1998-)
- Threatened and priority flora/fauna/ecological community database searches (DBCA, 2023b, 2023c, 2023d).

Conservation code definitions for the State and Commonwealth are provided in Appendix 3. Information relating to conservation significant species from database searches were summarised into field reference guides to aid with on-ground flora surveys which is provided in Appendix 2.

3.2 On-ground Flora Survey

The flora and vegetation survey was conducted in accordance with *Technical Guidance-Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority (EPA), 2016). Samples were collected, or photographs taken of unfamiliar species to enable later identification.

Natural Area Environmental Scientists undertook the survey on 26 June 2023, with key data recorded using Mappt software on a handheld tablet. Survey activities included:

- setting out a total of three quadrats across the three vegetation types present due to the linear portioning/ size of the survey boundary (Figure 4)
- photographing each quadrat in the north-west corner and recording GPS coordinates using GDA2020 Zone 50 datum
- recording landscape characteristics including soil types/colour, aspect, slope, surface rock, topography and drainage using Natural Area's modified recording sheets based on the NAIA templates developed for the Perth Biodiversity Project
- determining leaf litter depth, percentage cover, and percentage of bare ground
- recording percentage cover, height, number alive/dead stems and life form for each flora species in the quadrats
- marking locations of any conservation significant flora, Declared Pests (DP) and/or Weeds of National Significance (WoNS) identified
- recording vegetation type including dominant over, middle and understorey species (Table 2) and condition using the scale attributed to Keighery (Table 3) (Government of Western Australia, 2000)

- the use of GPS to map significant species and boundaries of differing vegetation type and condition
- recording evidence of disturbance, such as fire.

3.2.1 Vegetation Type

The vegetation type was determined using the structural classes described in *Australian Vegetation Manual: National Vegetation information System* (2017). The vegetation structure was described by recording the strata in a vegetation profile assessing the structural and floristic properties.

3.2.2 Vegetation Condition

Vegetation condition was assessed using the rating scale attributed to Keighery in *Technical Guidance-Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016) (Table 3). Table 3 provides a description of the rating scale.

Table 3: Vegetation condition ratings

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

Source: EPA, 2016

3.3 On-ground Fauna Survey

The fauna survey was completed in accordance with a Basic Fauna Survey as outlined in the *Technical Guidance, Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA, 2020). Natural Area Environmental Scientists traversed the site on 26 June 2023 and undertook this survey in conjunction with other survey activities. A basic survey is defined as a low-intensity survey, which gathers broad fauna and habitat information including opportunistic fauna observations (EPA, 2020). The fauna survey included

recording opportunistic sightings of fauna species whilst traversing the survey area, along with recording evidence of fauna presence in the form of:

- scats
- tracks
- diggings
- burrows, dens, and warrens
- runnels (vegetative tunnels)
- calls.

3.4 Limitations

Potential limitations encountered while conducting survey activities are detailed in Table 4.

Table 4: Flora survey limitations

Potential Limitation	Degree of Limitation	Comments
Availability of contextual information	None	Government data on regional and local contextual information are readily available for the survey area.
Competency/experience of team	None	Survey activities were undertaken by experienced Environmental Scientists who have extensive experience undertaking detailed flora surveys/fauna surveys within the Swan Coastal Plain.
Proportion of flora recorded/collected, any identification issues	None	A total of 50 flora species (taxa) were recorded from 21 families during the field survey, comprised of 17 introduced (weeds) and 33 native species. Of these, two species (4%) were unable to be identified to species level due to a lack of diagnostic characteristics present at the time of survey. These species (*Eucalyptus* sp.1 and *Eucalyptus* sp.2) were only able to be identified to genus level. None are considered likely to be conservation significant species due to incompatible habitat requirements.
Survey effort and extent	Minor	A detailed flora survey was undertaken over a period of one day, with the entire survey area traversed and all flora species and vegetation types/conditions within the survey area being adequately surveyed. A total of three quadrats were established to adequately survey the three vegetation types present. The fauna survey scope requested a basic survey undertaken by Environmental Scientists during daylight hours. As a result, some faunal groups, such as those which are nocturnal, cryptic, or elusive, are very unlikely to be detected even if present within the survey area. To observe these species, a detailed fauna survey utilising techniques such as trapping and

Potential Limitation	Degree of Limitation	Comments
		motion-sensor cameras, as well as nocturnal surveys, would be required. Fauna habitat within the survey site is limited due to the proximity to live traffic and within an urban matrix. Any opportunistic evidence indicating the presence of Black Cockatoos or suitable habitat was recorded as part of the basic fauna survey. However, a detailed Black Cockatoo habitat assessment including the recording of tree characteristics was not conducted as requested by the client and due to the lack of Black Cockatoo habitat within the survey area.
Access restrictions	None	There were no access restrictions present at the time of survey.
Survey timing	Moderate	The flora survey was conducted outside of the optimal season (spring) for surveys within the Swan Coastal Plain bioregion. This out-of-season survey timing is associated with limitations regarding flora identification as a result of the lack of diagnostic features (i.e. flowers, fruit and seeds) for perennial species and dormancy for annual species. This impacts the recorded species diversity for the survey area and may also exclude a number of conservation significant flora. Of the 29 conservation significant flora species identified in the desktop survey as being likely to occur within the survey area, only two have known flowering periods within the survey period (*Lepidium pseudohyssopifolium* and *Verticordia lindleyi* subsp. *lindleyi*). Of these species: ▪ A total of 24 are perennial herb, shrub, or sedge species for which other characteristics would be present to enable identification to a minimum of genus level. However, flowers may be required for species level identification. ▪ A total of five are annual herbaceous species which are unlikely to be presenting at the time of the survey as the peak flowering and growth periods are around spring. An in-season (spring) flora survey would be required to confirm or exclude the presence of these species.

Potential Limitation	Degree of Limitation	Comments
		As the basic fauna survey was conducted in winter, cool temperatures limit the capacity to observe some species, such as reptiles, which are more active in warmer conditions.
		No evidence of previous fire events was noted within the survey area.
Disturbances	Minor	Signs of historic clearing were observed within the survey area. This is evidence through Landgate aerial imagery from 2000 and 1970 (Government of Western Australia, 2023a).

4.0 Flora Survey Results

4.1 Desktop Survey

A desktop survey of online databases indicated the potential for a total of 109 conservation significant species to occur within 10 km of the survey area (Table 5). NatureMap indicated 42 conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA) or by the Western Australian Herbarium (1998-), as potentially occurring within 10 km radius of the site (DBCA, 2023a). A review of the Protected Matters Search Tool (PMST) (DCCEEW, 2023) indicated 23 significant flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) as potentially occurring within a 10 km radius of the site (Appendix 1). A review of the DBCA (2023d) threatened and priority flora database indicated 96 threatened or priority species have been recorded within 10 km of the site.

Of the conservation significant species potentially found in the area, it was determined that the site conditions (soil type, drainage, location) may be suitable for 29 (highlighted green) of these species (Table 5). Conservation code descriptions are provided in Appendix 3.

Table 5: Threatened and Priority flora species listed by NatureMap, PMST and DBCA

Species Name	Cons Code	NatureMap	PMST	DBCA
Acacia aphylla	T			X
Acacia benthamii	P2	X		X
Acacia denticulosa	T			X
Acacia drummondii subsp. *affinis*	P3			X
Acacia oncinophylla subsp. *oncinophylla*	P3			X
Alyogyne sp. Great Victoria Desert	P3	X		X
Andersonia gracilis	EN		X	
Angianthus micropodioides	P3			X
Anigozanthos humilis subsp. *chrysanthus*	P4	X		X
Anigozanthos viridis subsp. *terraspectans*	VU		X	
Anthocercis gracilis	T			X
Banksia mimica	EN		X	
Banksia pteridifolia subsp. *vernalis*	P3			X
Beaufortia purpurea	P3			X
Bolboschoenus fluviatilis	P1	X		X
Byblis gigantea	P3	X		X
Caladenia huegelii	T	X	X	X
Calandrinia sp. Bayswater	P1	X		X
Calectasia elegans	P2			X

Species Name	Cons Code	NatureMap	PMST	DBCA
Calothamnus accedens	P4			X
Calothamnus graniticus subsp. *leptophyllus*	P4			X
Calothamnus macrocarpus	P2			X
Calytrix breviseta subsp. *breviseta*	T	X	X	X
Carex tereticaulis	P3	X		X
Chamelaucium lullfitzii	EN		X	
Conospermum undulatum	T	X	X	X
Conostylis bracteata	P3			X
Cyanicula ixioides subsp. *ixioides*	P4			X
Cyathochaeta teretifolia	P3	X		X
Dampiera triloba	P3	X		X
Darwinia pimelioides	P4	X		X
Dicrastylis micrantha	P3			X
Diplolaena andrewsii	T		X	X
Diuris drummondii	T	X	X	X
Diuris micrantha	VU		X	
Diuris purdiei	EN		X	
Dodonaea hackettiana	P4			X
Drakaea elastica	EN		X	
Drakaea micrantha	VU		X	
Drosera micra	P1	X		X
Drosera occidentalis	P4	X		X
Drosera patens	P1	X		X
Drosera x badgerupii	P2			X
Drosera x sidjamesii	P1	X		X
Eleocharis keigheryi	T		X	X
Eryngium pinnatifidum subsp. *Palustre*	P3			X
Eryngium sp. Subdecumbens	P3	X		X
Eucalyptus argutifolia	VU		X	
Eucalyptus educta	P2			X
Eucalyptus foecunda subsp. *foecunda*	P4			X
Eucalyptus x balanites	EN		X	
Grevillea christineae	EN		X	

Species Name	Cons Code	NatureMap	PMST	DBCA
Grevillea curviloba	T		X	X
Grevillea dissectifolia	P3			X
Grevillea ornithopoda	P2			X
Haemodorum loratum	P3			X
Halgania corymbosa	P3			X
Hibbertia leptotheca	P3			X
Hydrocotyle lemnoides	P4	X		X
Hydrocotyle striata	P1	X		X
Hypolaena robusta	P4			X
Isopogon autumnalis	P3	X		X
Jacksonia gracillima	P3			X
Jacksonia sericea	P4	X		X
Johnsonia pubescens subsp. *cygnorum*	P2	X		X
Lasiopetalum bracteatum	P4			X
Lasiopetalum glutinosum subsp. *glutinosum*	P3	X		X
Lasiopetalum membranaceum	P3			X
Lepidium pseudohyssopifolium	P1			X
Lepyrodia curvescens	P2			X
Levenhookia preissii	P1	X		X
Macarthuria keigheryi	T	X	X	X
Meionectes tenuifolia	P3	X		X
Melaleuca viminalis	P2			X
Millotia tenuifolia var. *laevis*	P2	X		X
Myriophyllum echinatum	P3	X		X
Netrostylis sp. Chandala	P2	X		X
Ornduffia submersa	P4			X
Persoonia sulcata	P4			X
Phlebocarya pilosissima subsp. *pilosissima*	P3			X
Phyllangium palustre	P2	X		X
Pithocarpa corymbulosa	P3			X
Platysace ramosissima	P3			X
Poranthera moorokatta	P2	X		X
Schoenus benthamii	P3			X

Species Name	Cons Code	NatureMap	PMST	DBCA
Schoenus capillifolius	P3			X
Schoenus griffinianus	P4			X
Schoenus pennisetis	P3			X
Schoenus sp. Waroona	P3			X
Senecio gilbertii	P1			X
Senecio leucoglossus	P4			X
Stachystemon exilis	P1	X		X
Stylidium longitubum	P4	X		X
Stylidium paludicola	P3	X		X
Stylidium striatum	P4			X
Stylidium trudgenii	P3			X
Styphelia filifolia	P3	X		X
Synaphea sp. Fairbridge Farm	CR		X	
Tetratheca pilifera	P3	X		X
Thelymitra dedmaniarum	T		X	X
Thelymitra magnifica	T			X
Thelymitra stellata	EN		X	
Thelymitra variegata	P2			X
Thysanotus anceps	P3			X
Thysanotus brachiatus	P2	X		X
Thysanotus glaucus	P4	X		X
Tricostularia drummondii	P3			X
Trithuria occidentalis	T	X	X	X
Verticordia lindleyi subsp. *lindleyi*	P4	X		X

4.1.1 Threatened and Priority Ecological Communities

A review of the PMST report (DCCEEW, 2023) and threatened and priority ecological communities database (DBCA, 2023b) indicated eight Threatened Ecological Communities (TECs) have been recorded within 10 km of the site. The potential Threatened Ecological Communities within the survey area are outlined in Table 6.

Table 6: Potential Threatened and Priority Ecological Communities within the survey area

Name	Status	Presence
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Community known to occur within area (DCCEEW, 2023)
Banksia Woodlands of the Swan Coastal Plain	Endangered; P3	Community likely to occur within area (DCCEEW, 2023; DBCA, 2023b)
Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. 1994)	Critically Endangered	Community known to occur within area (DBCA, 2023b)
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area (DCCEEW, 2023)
Corymbia calophylla – Kingia Australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area (DCCEEW, 2023)
Shrublands and Woodlands of the eastern Swan Coastal Plain	Vulnerable	Community likely to occur within area (DCCEEW, 2023)
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area (DCCEEW, 2023)
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area (DCCEEW, 2023)

Source: DCCEEW, 2023; DBCA, 2023b

4.2 Flora Survey Results

4.2.1 Vegetation Types

A total of three vegetation types were recorded within the survey area of Orchid Ave, these included *Adenanthos cygnorum* Shrubland, *Xanthorrhoea preissi* Shrubland, and Mixed *Eucalyptus* spp. Open Woodland. These are described in Table 7 and locations shown in Figure 4.

Table 7: Vegetation type within Orchid Ave

Vegetation Type	Description	Photograph
Adenanthos cygnorum Shrubland	A shrubland of *Adenanthos cygnorum* over Perennial Veldt Grass (**Ehrharta calycina*) and *Desmocladus flexuosus*.	

Vegetation Type	Description	Photograph
Xanthorrhoea preissi Shrubland	A shrubland of *Xanthorrhoea preissi* over *Calytrix fraseri, Desmocladus flexuosus,* and Perennial Veldt Grass (**Ehrharta calycina*).	
Mixed *Eucalyptus* spp. Open Woodland	An open woodland of mixed *Eucalyptus* spp. over mixed weeds and *Eremophobia glabra.*	

4.2.2 Vegetation Condition

Vegetation condition in the survey area ranged from Completely Degraded to Degraded (Table 8, Figure 5).

Table 8: Vegetation condition within the survey area

Vegetation Condition	Pristine	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
Area (ha)	0	0	0	0	0.27	0.159	0.429
Area (%)	0	0	0	0	62.94	37.06	100

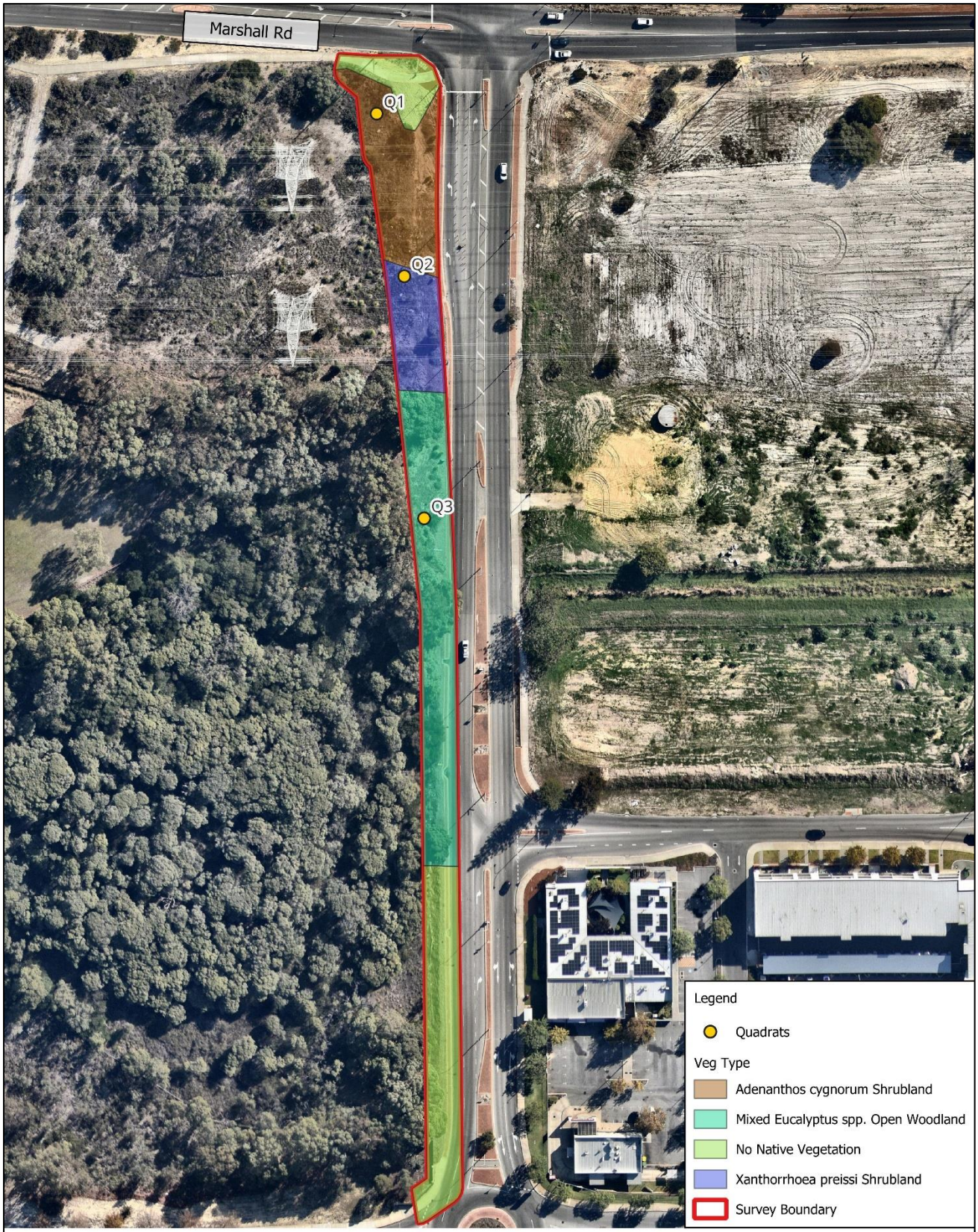

Figure 4:
Vegetation Type
Orchid Ave, Bennett Springs

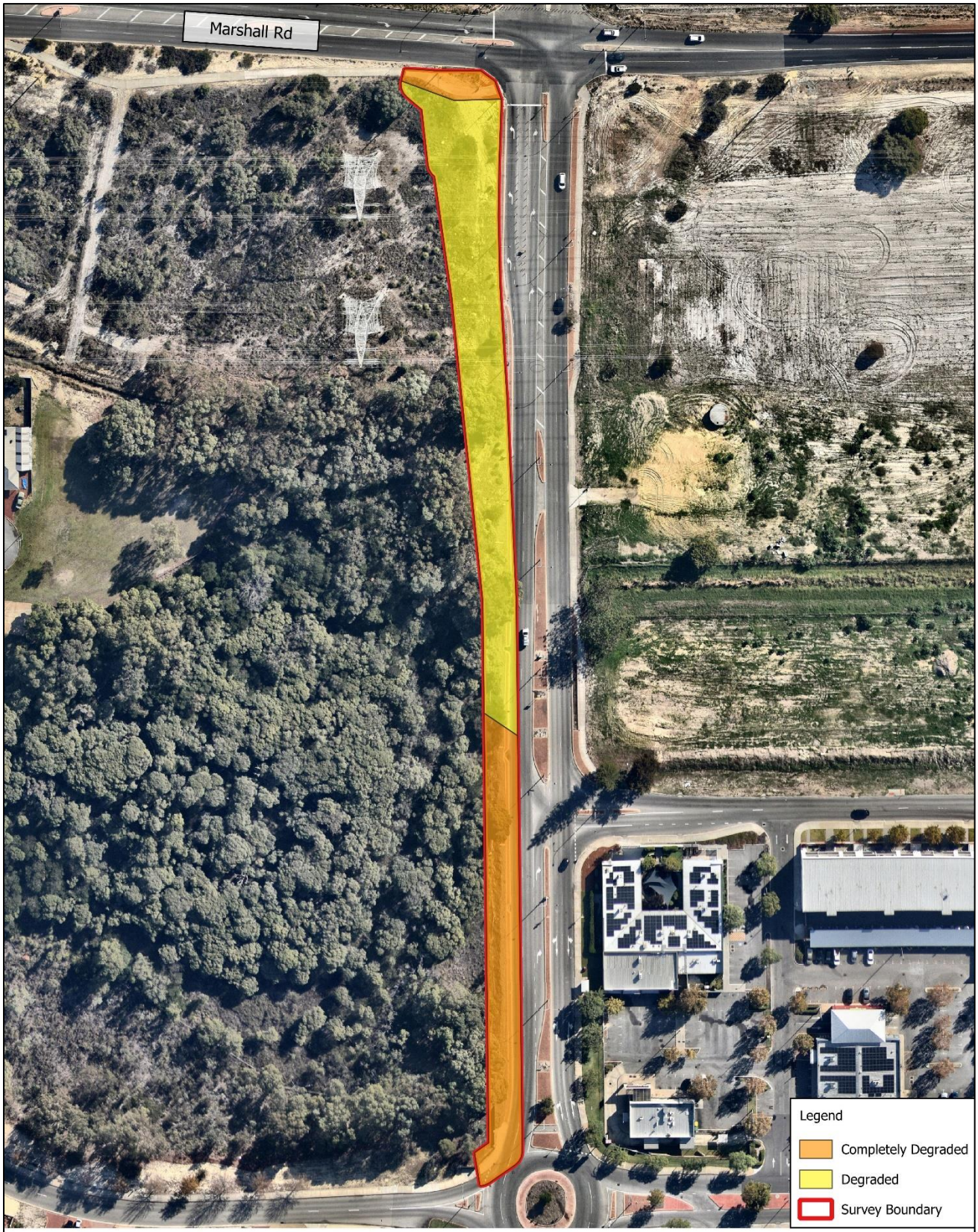

Figure 5:
Vegetation Condition
Orchid Ave, Bennett Springs

4.2.3 Flora

A total of 50 flora species (taxa) were recorded from 21 families during the field survey, this comprised of 17 introduced (weeds) and 33 native species. Examples of native flora species are shown in Figure 6 and weed species in Figure 7. A complete flora species list is provided in Appendix 5 and quadrat data in Appendix 4.

No conservation significant flora species were identified within the survey area at the time of the survey. No declared pests or weeds of national significance were identified within the survey area.

A total of two species (4%) were unable to be identified to species level due to a lack of diagnostic characteristics present at the time of survey. These species (*Eucalyptus* sp.1 and *Eucalyptus* sp.2) were only able to be identified to genus level.

Corymbia calophylla (Marri)

Banksia littoralis (Swamp Banksia)

Adenanthos cygnorum (Common Wollybush)

Phlebocarya ciliata

Figure 6: Examples of native flora species recorded.

Geraldton Carnation Weed
(*_Euphorbia terracina_)

Whiteflower Fumitory
(*_Fumaria capreolata_)

Figure 7: Examples of introduced flora species recorded.

4.2.4 Threatened and Priority Communities

Of the eight Threatened Ecological Communities (TEC) identified during the desktop survey to potentially occur within the site, none were identified within the survey boundary. The 'Banksia Woodlands of the Swan Coastal Plain' TEC (Endangered/Priority 3) and '*Banksia attenuata* woodlands over species rich dense shrublands' TEC (Critically Endangered) have previously been identified within the survey boundary. However, the *Adenanthos cygnorum* Shrubland and *Xanthorrhoea preissi* Shrubland vegetation types/species composition (particularly the absence of *Banksia attenuata* and *Banksia menziesii)* recorded within the survey boundary is not consistent with the criteria/ requirements for these TECs (DAWE, 2016). The remaining TECs identified in the desktop survey were not identified in the survey area.

5.0 Fauna Survey Results

5.1 Desktop Survey

A desktop survey of online databases indicated the potential for a total of 24 conservation significant fauna species to occur within 10 km of the survey area (Table 9). NatureMap indicated 22 conservation significant species listed under the *Biodiversity Conservation Act 2016* (WA) as potentially occurring within a 10 km radius of the site (DBCA, 2023a). The Protected Matters Search Tool (PMST) indicated 10 threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) as potentially occurring within a 10 km radius of the site (DCCEEW, 2023) (Appendix 1). A review of the DBCA threatened and priority fauna species database indicated the potential for 22 conservation significant fauna species to occur within a 10 km radius of the site (DBCA, 2023c).

Both abiotic (soil, climate) and biotic (food resources, predator pressure) will determine the suitability of habitats for specific fauna assemblages, based on their ecological requirements. Evaluating the site locality, existing conditions and known home ranges Natural Area determined that the following ten species (highlighted green in Table 9) have the potential to be present within the survey site.

Table 9: Threatened and Priority fauna species listed by NatureMap, PMST and DBCA

Species Name	Lifeform	Cons Code	DBCA	PMST	Nature Map
Bettongia penicillata ogilbyi	Mammal	CR	X	X	X
Botaurus poiciloptilus	Bird	EN	X	X	X
Cacatua pastinator pastinator	Bird	CD	X		X
Calidris canutus	Bird	EN	X	X	X
Calidris ferruginea	Bird	CE	X	X	X
Calidris tenuirostris	Bird	CE	X		X
Calyptorhynchus banksii naso	Bird	VU	X	X	X
Chaetura caudacuta	Bird	CE	X		X
Charadrius leschenaultii	Bird	VU		X	
Dasyurus geoffroii	Mammal	VU	X	X	X
Diomedea amsterdamensis	Bird	EN		X	
Diomedea epomophora	Bird	VU		X	
Diomedea exulans	Bird	VU		X	
Elanus scriptus	Bird	P4	X		X
Falco peregrinus	Bird	OS	X		X
Hydromys chrysogaster	Mammal	P4	X		X
Isoodon fusciventer	Mammal	P4	X		X
Ixobrychus flavicollis australis	Bird	P2	X		X

Species Name	Lifeform	Cons Code	DBCA	PMST	Nature Map
Leipoa ocellata	Mammal	VU		X	
Macroderma gigas	Mammal	VU		X	
Macronectes giganteus	Bird	EN		X	
Macronectes halli	Bird	VU		X	
Macrotis lagotis	Mammal	VU	X		X
Merops ornatus	Bird	IA	X		
Myrmecobius fasciatus	Mammal	EN			X
Neelaps calonotos	Reptile	P3	X		X
Notamacropus eugenii derbianus	Mammal	P4	X		X
Notamacropus irma	Mammal	P4	X		X
Numenius madagascariensis	Bird	CE		X	
Oxyura australis	Bird	P4	X		X
Pachyptila turtur subantarctica	Bird	VU		X	
Pandion haliaetus	Bird	IA	X		X
Phascogale tapoatafa wambenger	Mammal	CD	X		X
Pseudemydura umbrina	Reptile	CR	X		X
Pseudocheirus occidentalis	Mammal	CR	X	X	X
Rostratula australis	Bird	EN		X	
Sternula nereis nereis	Bird	VU		X	
Thalassarche cauta	Bird	EN		X	
Thalassarche impavida	Bird	VU		X	
Thalassarche melanophris	Bird	VU		X	
Thalassarche steadi	Bird	VU		X	
Zanda baudinii	Bird	EN	X	X	X
Zanda latirostris	Bird	EN	X	X	X

5.2 Fauna Survey Results

5.2.1 Basic Fauna Survey

A total of four fauna species (taxa) were recorded from four families during the field survey, all findings comprised of native bird species. Two nests were recorded with a *Corymbia calophylla* (Marri) on site. All species observed are listed in Table 10.

Table 10: Fauna observations within the Orchid Ave

Family	Species Name	Common Name
Bird		
Artamidae	*Gymnorhina tibicen*	Australian Magpie
Cacatuidae	*Zanda* sp.	White-tailed Black Cockatoo
Corvidae	*Corvus coronoides*	Australian Raven
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail

6.0 Implications of Results

The clearing development footprint for this project lies within the surveyed area, the current design runs along the road edge, underneath the powerlines. (Figure 8). The clearing boundary area has evidence of historic clearing along the road edge and underneath the powerlines, the boundary for the proposed works resides in a Degraded to a Completely Degraded vegetation condition.

6.1 Flora and Vegetation

Three vegetation types were recorded within the survey area, these being *Adenanthos cygnorum* Shrubland, *Xanthorrhoea preissi* Shrubland, and Mixed *Eucalyptus* spp. Open Woodland. Based on Landgate aerial imagery (Government of Western Australia, 2023a), and the middle and understorey species composition recorded in the quadrats, it is considered that the survey area may be historically part of a Banksia woodland. Vegetation condition in the survey area ranged from Completely Degraded to a Degraded condition due to the lack of middle and upper storey present and requires anthropogenic influence to improve this vegetation condition. The current proposed development does not intersect with native vegetation extent due to the development area being previously cleared (Figure 9). The smallest distance between the current proposed development and the native vegetation extent is one metre, it is important that the construction works are undertaken within the metre buffer to mitigate their impact. Evidence of previous clearing in the north of the survey area, likely associated with powerline infrastructure, was evident from Landgate aerial imagery (Government of Western Australia, 2023a).

A total of 50 flora species (taxa) comprising 17 (34%) introduced (weeds) and 33 (66%) native species were recorded in the survey area. No Declared Pests/WoNS were identified within the survey boundary at the time of the survey.

A total of two species (4%) were unable to be identified to species level due to a lack of diagnostic characteristics present at the time of survey. These species were *Eucalypts* and were only able to be identified to genus level. These species were likely planted as the area in which these species were located was previously cleared based on Landgate aerial imagery (Government of Western Australia, 2023a). None are considered likely to be conservation significant species due to incompatible habitat requirements.

Figure 8:
Clearing Boundary
Orchid Ave, Bennett Springs

Figure 9:
Native Vegetation Extent
Orchid Ave, Bennett Springs

6.2 Significant Flora

Of the 29 conservation significant flora species identified in the desktop survey as being likely to occur within the survey area:

- A total of 24 are perennial herb, shrub, or sedge species for which other characteristics would be present to enable identification to a minimum of genus level. However, flowers may be required for species level identification.
- A total of five are annual herbaceous species which are unlikely to be presenting at the time of the survey as the peak flowering and growth periods are around spring.
- Of these 29 species, only two have known flowering periods within the survey period (*Lepidium pseudohyssopifolium* and *Verticordia lindleyi* subsp. *lindleyi*). These are listed as P1 and P4 respectively under the *Biodiversity Conservation Act 2016* (WA).

No flora species of conservation significance were identified during the survey. The flora survey undertaken in June and is considered an out-of-season flora survey. The optimal timing for flora surveys within the Swan Coastal Plain is during spring, to ensure the presence of diagnostic characteristics for identification. No species recorded during the survey had characteristics that align with the conservation significant perennial herb, shrub or sedge species that could potentially occur within the survey area. An in-season (spring) flora survey would be required to confirm or exclude the presence of the five annual herbaceous species.

The likelihood for the presence of conservation significant flora within the clearing development area is low with the area exhibiting evidence of historic clearing. It is unlikely that the vegetation impacted for the project provides a long-term stable habitat for the preservation of conservation species, this is due to the evidence of clearing and the Degraded to Completely Degraded condition of the site.

6.3 Threatened Ecological Communities

Of the eight Threatened and Priority Ecological Communities identified during the desktop survey to potentially occur within the site, none were identified within the survey boundary. The Banksia Woodlands of the Swan Coastal Plain (Endangered/Priority 3) and *Banksia attenuata* woodlands over species rich dense shrublands (Critically Endangered) has previously been identified within the survey boundary. However, the *Adenanthos cygnorum* Shrubland and *Xanthorrhoea preissi* Shrubland vegetation types/species composition (particularly the lack of absence of *Banksia attenuata* and *Banksia menziesii*) recorded within the survey boundary is not consistent with the criteria/ requirements for these TECs. Based on aerial imagery from Landgate, the northern portion of the survey area has been previously cleared in the 1970's (Government of Western Australia, 2023a). In its current state the vegetation types, *Adenanthos cygnorum* Shrubland and *Xanthorrhoea preissi* Shrubland has a low native species diversity, lack of vegetation structure and a large portion of introduced species. This survey area no longer is reflective of its original state and therefore not consistent with the required criteria for classification of the Banksia TECs.

6.4 Fauna

A total of four fauna species (taxa) were recorded from four families during the field survey, all findings comprised of native bird species. One conservation significant species, *Zanda* sp. 'White-tailed Black Cockatoo' was sighted within the survey boundary. This is likely to be a Carnaby's Cockatoo (*Zanda latirostris*). No evidence of Black Cockatoo foraging or roosting was observed during the survey area, a detailed Black Cockatoo habitat assessment and dusk survey would be required to confirm.

The survey area provided little suitable fauna habitat for small reptiles, mammals, and amphibian species, this is due to the lack of native middle and understorey structural layers. Limited habitat characteristics and places of refuge including fallen logs and rocks were available in the survey area, limiting the potential for reptiles and small mammals to utilise the habitat including the conservation significant species identified in the desktop survey. The survey area is directly adjacent to the conservation category wetland 'Orchid Park' this wetland is likely to provide better quality and more suitable fauna habitat including foraging resources, a water source, and shelter.

One *Zanda* sp. (White-tailed Black Cockatoo) was sighted in a Marri (*Corymbia calophylla*) tree. This one Marri tree was the only Black Cockatoo habitat tree observed within the survey boundary. Black Cockatoo habitat including roosting and foraging resources are likely to be present in the bushland surrounding the survey area. No suitable Black Cockatoo breeding hollows were recorded during the survey. This identified Marri tree will be avoided in proposed development with the original design altered to avoid the tree, moving the sewer to its most easterly location. To ensure that the tree will not be impacted by the proposed works the identified tree will be flagged and demarcated, an arborist will be present for any required minor trimming, and the construction will only carry out minor topsoil disturbance to not damage the roots or system (Appendix 6).

6.5 Assessment Against Clearing Principles

An assessment of the proposed clearing of the site against the ten native vegetation clearing principles suggests that this action is not likely to be at variance with six principles. The clearing may be at variance with three principles (A, Cand F). Assessment of all clearing principles is provided in Table 11 below.

Table 11: Native vegetation clearing principles and assessment.

Clearing Principle		Comment
A	Native vegetation should not be cleared if it comprises a high level of biological diversity.	The proposed area may potentially be at variance with this principle: ▪ A total of 50 flora species were identified, this comprised of 17 (34%) introduced (weeds) and 33 (66%) native species. ▪ No threatened or priority flora species were recorded within the survey boundary, however the survey was undertaken out of season (June). ▪ Three vegetation types were identified, *Adenanthos cygnorum* Shrubland, *Xanthorrhoea preissi* Shrubland, and Mixed *Eucalyptus* spp. Open Woodland. ▪ The vegetation condition ranged from Degraded to Completely Degraded. ▪ The survey area is located within an environmentally sensitive area which requires a native vegetation clearing permit.
B	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna	The proposed area to be cleared is not likely to be at variance with this principle: ▪ A total of four fauna species, comprising of all native birds were recorded within the survey area. ▪ One *Zanda* sp. 'White-tailed Black Cockatoo' was sighted within the survey boundary. ▪ Two nests were recorded with a *Corymbia calophylla* (Marri)

Clearing Principle		Comment
	indigenous to Western Australia.	▪ Very little suitable habitat was identified within the site for other native fauna species, and it is considered unlikely to provide significant habitat for native fauna. ▪ Larger areas of higher quality habitat are located in close proximity to the site which are considered to be more suitable for native fauna.
C	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	The proposed area may potentially be at variance with this principle: ▪ No threatened or priority flora species were recorded within the survey boundary. ▪ There is a low likelihood of conservation significant flora residing within the survey area due to the evidence of historic clearing and the low vegetation condition. ▪ Of the 29 conservation significant flora to potentially reside within the survey boundary: – A total of 24 are perennial herb, shrub, or sedge species for which other characteristics would need be present to enable identification to a minimum of genus level. – A total of five are annual herbaceous species which are unlikely to be presenting at the time of the survey as the peak flowering and growth periods are around spring. ▪ An in-season (spring) flora survey would be required to confirm or exclude the presence of the five annual herbaceous species.
D	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	The proposed area to be cleared is not likely to be at variance with this principle: ▪ No Threatened or Priority Ecological Communities were identified within the survey area. ▪ The survey area was observed to be in a Degraded and Completely Degraded condition with many portions of the survey area already been previously cleared.
E	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The proposed area to be cleared is not likely to be at variance with this principle: ▪ The survey area is located within the Swan Coastal Plain (Southern River) Complex, of which large portions have been historically cleared for agricultural purposes. Within the Swan Coastal Plain, there is 18.43% of the Southern River Complex remaining and 16.51% remaining within the City of Swan. ▪ The clearing development footprint does not intersect with any areas regarded as Native Vegetation Extent. ▪ The vegetation within the survey area has been subject to historic clearing. All of the survey area is in a Degraded and Completely Degraded condition with limited vegetation.
F	Native vegetation should not be cleared if it is	The proposed area may potentially be at variance with this principle:

Clearing Principle		Comment
	growing in, or in association with, an environment associated with a watercourse or wetland.	▪ The survey area is located within a multiple use geomorphic wetland known as 'Victoria Road Swamp', the survey area is also located within close proximity to a conservation category wetland known as 'Orchid Park'. ▪ There are no RAMSAR or important wetlands. ▪ No watercourses or wetlands were identified directly within the survey area.
G	Native Vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The proposed area to be cleared is not likely to be at variance with this principle: ▪ The survey area is located in close proximity to native vegetation associated with Orchid Park, this may be impacted by indirect impacts from the clearing activities. ▪ The survey area was observed to be in a Degraded and Completely Degraded condition with many portions of the survey area exhibiting evidence of historic clearing.
H	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The proposed area to be cleared is not likely to be at variance with this principle: ▪ The survey area is located within a multiple use geomorphic wetland known as 'Victoria Road Swamp'; the survey area is also located within close proximity to a conservation category wetland known as 'Orchid Park'. ▪ It is not expected the clearing would have significant impact on the environmental values of this conservation category wetland and adjacent bushland. As the majority of the proposed clearing area includes previously cleared land.
I	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	The proposed area to be cleared is not likely to be at variance with this principle: ▪ The current vegetation within the surrounding vegetation, include large trees and may already provide a buffer between Beechboro Rd North and Orchid Park. The removal of the vegetation within the survey area is not likely to contribute to an increased infiltration and surface water run-off towards Orchid Park. ▪ There is the potential for clearing of the site to impact water quality through road run-off and machinery spills/contamination. ▪ These impacts are considered unlikely and are able to be mitigated during the clearing process. The development of a management plan and strategy is recommended to aid with the mitigation of any water quality impacts.
J	Native vegetation should not be cleared if clearing	The proposed area to be cleared is not likely to be at variance with this principle:

Clearing Principle	Comment
the vegetation is likely to cause, or exacerbate, the incidence of flooding.	▪ There is the potential for water run-off to increase as a result of the loss of large, established trees during clearing, however, many are only planned to be trimmed rather than completely cleared. This is not expected to have a significant impact which would result in an increased risk of flooding. ▪ The development of a management plan and strategy is recommended to assist with the management of surface water on site.

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Appendix 1: PMST Report 10 km

Australian Government

Department of Climate Change, Energy, the Environment and Water

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. Please see the caveat for interpretation of information provided here.

Report created: 09-Jun-2023

Summary

Matters of National Environment 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 (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	60
Listed Migratory Species:	27

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	141
Commonwealth Heritage Places:	1
Listed Marine Species:	31
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	9
Regional Forest Agreements:	1
Nationally Important Wetlands:	3
EPBC Act Referrals:	48
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In feature area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	In buffer area only
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Shrublands and Woodlands of the eastern Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Zanda baudinii listed as Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Roosting known to occur within area	In buffer area only
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding known to occur within area	In feature area
FISH			
Galaxiella nigrostriata Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat may occur within area	In buffer area only
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only
INSECT			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Hesperocolletes douglasi](#) Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
MAMMAL			
[Bettongia penicillata ogilbyi](#) Woylie [66844]	Endangered	Species or species habitat known to occur within area	In feature area
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Neophoca cinerea](#) Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Pseudocheirus occidentalis](#) Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
OTHER			
[Westralunio carteri](#) Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
PLANT			
[Andersonia gracilis](#) Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area	In feature area
[Anigozanthos viridis subsp. terraspectans](#) Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat may occur within area	In feature area
[Banksia mimica](#) Summer Honeypot [82765]	Endangered	Species or species habitat may occur within area	In feature area
[Caladenia huegelii](#) King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calytrix breviseta subsp. breviseta			
Swamp Starflower [23879]	Endangered	Species or species habitat may occur within area	In buffer area only
Chamelaucium lullfitzii listed as Chamelaucium sp. Gingin (N.G.Marchant 6)			
Gingin Wax [92777]	Endangered (listed as Chamelaucium sp. Gingin	Species or species habitat may occur within area	In buffer area only
Conospermum undulatum			
Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diplolaena andrewsii			
[6601]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diuris drummondii			
Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diuris micrantha			
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Diuris purdiei			
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area	In feature area
Drakaea elastica			
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area	In feature area
Drakaea micrantha			
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Eleocharis keigheryi			
Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus argutifolia			
Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea christineae Christine's Grevillea [64520]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea curviloba subsp. curviloba Curved-leaf Grevillea [64908]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area	In feature area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area	In feature area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Trithuria occidentalis Swan Hydatella [42224]	Endangered	Species or species habitat likely to occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
SHARK			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In buffer area only

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Marine Species			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In buffer area only
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat may occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In buffer area only
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [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.

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50180]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50176]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50177]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50179]	WA	In buffer area only
Defence - PALMER BARRACKS - SOUTH GUILDFORD [50178]	WA	In buffer area only
Defence - RAAF CAVERSHAM [50003]	WA	In buffer area only
Unknown		
Commonwealth Land - [50847]	WA	In buffer area only
Commonwealth Land - [50845]	WA	In buffer area only
Commonwealth Land - [50842]	WA	In buffer area only
Commonwealth Land - [50840]	WA	In buffer area only
Commonwealth Land - [50841]	WA	In buffer area only
Commonwealth Land - [51324]	WA	In buffer area only
Commonwealth Land - [51157]	WA	In buffer area only
Commonwealth Land - [51325]	WA	In buffer area only
Commonwealth Land - [50853]	WA	In buffer area only
Commonwealth Land - [51154]	WA	In buffer area only
Commonwealth Land - [51263]	WA	In buffer area only
Commonwealth Land - [51178]	WA	In buffer area only
Commonwealth Land - [51261]	WA	In buffer area only
Commonwealth Land - [51375]	WA	In buffer area only
Commonwealth Land - [51262]	WA	In buffer area only
Commonwealth Land - [51310]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51264]	WA	In buffer area only
Commonwealth Land - [51237]	WA	In buffer area only
Commonwealth Land - [51265]	WA	In buffer area only
Commonwealth Land - [51234]	WA	In buffer area only
Commonwealth Land - [51172]	WA	In buffer area only
Commonwealth Land - [50839]	WA	In buffer area only
Commonwealth Land - [51173]	WA	In buffer area only
Commonwealth Land - [51236]	WA	In buffer area only
Commonwealth Land - [51238]	WA	In buffer area only
Commonwealth Land - [51230]	WA	In buffer area only
Commonwealth Land - [51233]	WA	In buffer area only
Commonwealth Land - [51235]	WA	In buffer area only
Commonwealth Land - [50846]	WA	In buffer area only
Commonwealth Land - [51171]	WA	In buffer area only
Commonwealth Land - [51176]	WA	In buffer area only
Commonwealth Land - [51170]	WA	In buffer area only
Commonwealth Land - [51175]	WA	In buffer area only
Commonwealth Land - [51177]	WA	In buffer area only
Commonwealth Land - [51174]	WA	In buffer area only
Commonwealth Land - [51168]	WA	In buffer area only
Commonwealth Land - [51164]	WA	In buffer area only
Commonwealth Land - [50805]	WA	In buffer area only
Commonwealth Land - [51378]	WA	In buffer area only
Commonwealth Land - [51311]	WA	In buffer area only
Commonwealth Land - [50834]	WA	In buffer area only
Commonwealth Land - [51922]	WA	In buffer area only
Commonwealth Land - [51924]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [50783]	WA	In buffer area only
Commonwealth Land - [51923]	WA	In buffer area only
Commonwealth Land - [50822]	WA	In buffer area only
Commonwealth Land - [50823]	WA	In buffer area only
Commonwealth Land - [51309]	WA	In buffer area only
Commonwealth Land - [51419]	WA	In buffer area only
Commonwealth Land - [50863]	WA	In buffer area only
Commonwealth Land - [51370]	WA	In buffer area only
Commonwealth Land - [50739]	WA	In buffer area only
Commonwealth Land - [51162]	WA	In buffer area only
Commonwealth Land - [51306]	WA	In buffer area only
Commonwealth Land - [50829]	WA	In buffer area only
Commonwealth Land - [51367]	WA	In buffer area only
Commonwealth Land - [50801]	WA	In buffer area only
Commonwealth Land - [51366]	WA	In buffer area only
Commonwealth Land - [50806]	WA	In buffer area only
Commonwealth Land - [51369]	WA	In buffer area only
Commonwealth Land - [50807]	WA	In buffer area only
Commonwealth Land - [51368]	WA	In buffer area only
Commonwealth Land - [51194]	WA	In buffer area only
Commonwealth Land - [51195]	WA	In buffer area only
Commonwealth Land - [51190]	WA	In buffer area only
Commonwealth Land - [51191]	WA	In buffer area only
Commonwealth Land - [51365]	WA	In buffer area only
Commonwealth Land - [51364]	WA	In buffer area only
Commonwealth Land - [50808]	WA	In buffer area only
Commonwealth Land - [51288]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51977]	WA	In buffer area only
Commonwealth Land - [50803]	WA	In buffer area only
Commonwealth Land - [50884]	WA	In buffer area only
Commonwealth Land - [51284]	WA	In buffer area only
Commonwealth Land - [51289]	WA	In buffer area only
Commonwealth Land - [51203]	WA	In buffer area only
Commonwealth Land - [51132]	WA	In buffer area only
Commonwealth Land - [51133]	WA	In buffer area only
Commonwealth Land - [51910]	WA	In buffer area only
Commonwealth Land - [51915]	WA	In buffer area only
Commonwealth Land - [51362]	WA	In buffer area only
Commonwealth Land - [51361]	WA	In buffer area only
Commonwealth Land - [51226]	WA	In buffer area only
Commonwealth Land - [51134]	WA	In buffer area only
Commonwealth Land - [51916]	WA	In buffer area only
Commonwealth Land - [51363]	WA	In buffer area only
Commonwealth Land - [50773]	WA	In buffer area only
Commonwealth Land - [50804]	WA	In buffer area only
Commonwealth Land - [51186]	WA	In buffer area only
Commonwealth Land - [51185]	WA	In buffer area only
Commonwealth Land - [51422]	WA	In buffer area only
Commonwealth Land - [51187]	WA	In buffer area only
Commonwealth Land - [51188]	WA	In buffer area only
Commonwealth Land - [51331]	WA	In buffer area only
Commonwealth Land - [51184]	WA	In buffer area only
Commonwealth Land - [51189]	WA	In buffer area only
Commonwealth Land - [51182]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51183]	WA	In buffer area only
Commonwealth Land - [50858]	WA	In buffer area only
Commonwealth Land - [51307]	WA	In buffer area only
Commonwealth Land - [51344]	WA	In buffer area only
Commonwealth Land - [51346]	WA	In buffer area only
Commonwealth Land - [50753]	WA	In buffer area only
Commonwealth Land - [50752]	WA	In buffer area only
Commonwealth Land - [50757]	WA	In buffer area only
Commonwealth Land - [51906]	WA	In buffer area only
Commonwealth Land - [51909]	WA	In buffer area only
Commonwealth Land - [50851]	WA	In buffer area only
Commonwealth Land - [51516]	WA	In buffer area only
Commonwealth Land - [51515]	WA	In buffer area only
Commonwealth Land - [50878]	WA	In buffer area only
Commonwealth Land - [50877]	WA	In buffer area only
Commonwealth Land - [50748]	WA	In buffer area only
Commonwealth Land - [50747]	WA	In buffer area only
Commonwealth Land - [51371]	WA	In buffer area only
Commonwealth Land - [51213]	WA	In buffer area only
Commonwealth Land - [51373]	WA	In buffer area only
Commonwealth Land - [51372]	WA	In buffer area only
Commonwealth Land - [51161]	WA	In buffer area only
Commonwealth Land - [51166]	WA	In buffer area only
Commonwealth Land - [51167]	WA	In buffer area only
Commonwealth Land - [51424]	WA	In buffer area only
Commonwealth Land - [51374]	WA	In buffer area only
Commonwealth Land - [51379]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51169]	WA	In buffer area only
Commonwealth Land - [51181]	WA	In buffer area only
Commonwealth Land - [51420]	WA	In buffer area only
Commonwealth Land - [51285]	WA	In buffer area only
Commonwealth Land - [51286]	WA	In buffer area only
Commonwealth Land - [50812]	WA	In buffer area only
Commonwealth Land - [51252]	WA	In buffer area only
Commonwealth Land - [50312]	WA	In buffer area only
Commonwealth Land - [51308]	WA	In buffer area only
Commonwealth Land - [51259]	WA	In buffer area only
Commonwealth Land - [51260]	WA	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Inglewood Post Office	WA	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Diomedea amsterdamensis](#) Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area	In buffer area only
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In buffer area only
[Macronectes halli](#) Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Breeding known to occur within area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area	In buffer area only
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thinornis cucullatus as Thinornis rubricollis](#)			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat likely to occur within area overfly marine area	In buffer area only
[Tringa nebularia](#)			
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Mammal			
[Neophoca cinerea](#)			
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat known to occur within area	In buffer area only
Reptile			
[Caretta caretta](#)			
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Chelonia mydas](#)			
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
[Dermochelys coriacea](#)			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In buffer area only
[Natator depressus](#)			
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Errina Road	Nature Reserve	WA	In buffer area only
Helena River	Management Area	WA	In buffer area only
Swan River	Management Area	WA	In buffer area only
Unnamed WA1919/893	Management Area	WA	In buffer area only
Unnamed WA33618	Management Area	WA	In buffer area only
Unnamed WA36440	Management Area	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Unnamed WA44853	Nature Reserve	WA	In feature area
Unnamed WA46919	Nature Reserve	WA	In buffer area only
Unnamed WA46920	Nature Reserve	WA	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

RFA Name	State	Buffer Status
South West WA RFA	Western Australia	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Perth Airport Woodland Swamps	WA	In buffer area only
RAAF Caversham	WA	In buffer area only
Swan-Canning Estuary	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Land Clearing for Light Industrial Development	2022/09419		Completed	In buffer area only
Vegetation Clearing Viticulture project	2021/9099		Completed	In buffer area only
Controlled action				
Airport & Freight Access Gateway	2010/5384	Controlled Action	Post-Approval	In buffer area only
East Landsdale Residential Development	2008/4676	Controlled Action	Post-Approval	In buffer area only
East Wanneroo Cell 9 residential subdivision - Lots 50,51,52,154 & 404	2010/5772	Controlled Action	Completed	In buffer area only
Ellenbrook Reliable Water Storage Project, WA	2015/7421	Controlled Action	Post-Approval	In buffer area only
Morley-Ellenbrook Rail Line Part 2, WA	2019/8546	Controlled Action	Post-Approval	In feature area
Natural Gas Pipeline Expansion	2006/2813	Controlled Action	Post-Approval	In buffer area only
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
Perth-Darwin National Highway alignment (Swan Valley Section),	2013/7042	Controlled Action	Post-Approval	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
WA				
Primary school, residential development and open space, Lots 9000 Bottlebrush Drive, Kiara, WA	2013/7050	Controlled Action	Post-Approval	In buffer area only
Residential Development 822 Youle-Dean Road, Brabham, WA	2015/7458	Controlled Action	Post-Approval	In buffer area only
Residential Subdivision development	2011/6040	Controlled Action	Post-Approval	In buffer area only
Roe Highway and Great Eastern Highway Bypass Grade Separation Interchange, Hazelmere WA	2020/8784	Controlled Action	Further Information Request	In buffer area only
Sand Mining 70/915 Banksia Road, Wellard, WA	2015/7438	Controlled Action	Post-Approval	In buffer area only
Shenton Park Subdivision	2004/1479	Controlled Action	Completed	In buffer area only
To grade separate three intersections on Tonkin Highway, WA	2014/7385	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Brabham North residential development, Brabham, WA	2018/8380	Not Controlled Action	Completed	In buffer area only
Cell 2 of Caversham Local Structure Plan	2012/6259	Not Controlled Action	Completed	In buffer area only
Construction of the Perth Stadium and associated infrastructure	2013/6740	Not Controlled Action	Completed	In buffer area only
Development of 39 (Lot 3000) Hardcastle Avenue, Landsdale, WA	2017/8100	Not Controlled Action	Completed	In buffer area only
Development of Crown Towers Five Star Quality Hotel	2012/6695	Not Controlled Action	Completed	In buffer area only
Ellenbrook Bus Rapid Transit Project, WA	2016/7732	Not Controlled Action	Completed	In buffer area only
Eradication of the European House Borer, Perth metropolitan area, WA	2009/5027	Not Controlled Action	Completed	In buffer area only
Forrestfield Airport Link, WA	2015/7399	Not Controlled Action	Completed	In buffer area only
Gnangara Road upgrade project, city of Swan, WA	2013/6966	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV,	2015/7522	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
sthrn two thirds of Australia				
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In buffer area only
Landsdale Primary School Development, WA	2015/7597	Not Controlled Action	Completed	In buffer area only
Landsdale Residential Subdivision Development	2011/6027	Not Controlled Action	Completed	In buffer area only
Lot 158 Landsdale Rd, Landsdale, WA	2012/6403	Not Controlled Action	Completed	In buffer area only
Lots 71 & 72 Queensway Rd, East Landsdale	2012/6541	Not Controlled Action	Completed	In buffer area only
Reid Highway/Malaga Drive interchange upgrade, City of Swan, WA	2013/6892	Not Controlled Action	Completed	In buffer area only
Residential and commercial development, Lot 1981 Alexander Drive & Lot 152 Gnangara Road, Landsdale,	2013/6982	Not Controlled Action	Completed	In buffer area only
Residential Development, 50 Lot 2 Driver Road, Darch, Western Australia	2020/8677	Not Controlled Action	Completed	In buffer area only
Residential development, Landsdale, WA	2013/6964	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 14143 (16) Harford Way, Girrawheen, WA	2016/7819	Not Controlled Action	Completed	In buffer area only
Residential Development, Lot 500 Park Street, Brabham, WA	2019/8472	Not Controlled Action	Completed	In buffer area only
Residential development, Lot 55 Alexander Drive, Landsdale, WA	2013/6971	Not Controlled Action	Completed	In buffer area only
Residential Subdivision	2012/6410	Not Controlled Action	Completed	In buffer area only
Residential subdivision - lot 169 Kingsway Road, Landsdale WA	2012/6412	Not Controlled Action	Completed	In buffer area only
Residential subdivision - Lots 156 and 157 Landsdale Road Landsdale WA	2012/6407	Not Controlled Action	Completed	In buffer area only
Telstra PITC O3B Clearing Application	2011/6147	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Tonkin Highway Upgrade, Guildford Road to Great Eastern Highway, WA	2019/8545	Not Controlled Action	Completed	In buffer area only
Urban Development Project, Lot 55 and 56 Cottonwood Crescent, Dianella, WA	2017/8031	Not Controlled Action	Completed	In buffer area only
Wangara Industrial Extension Area, WA	2012/6501	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Ocean Reef Road Extension Works in Wangara	2010/5388	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
South West Metropolitan Railway Project	2003/1175	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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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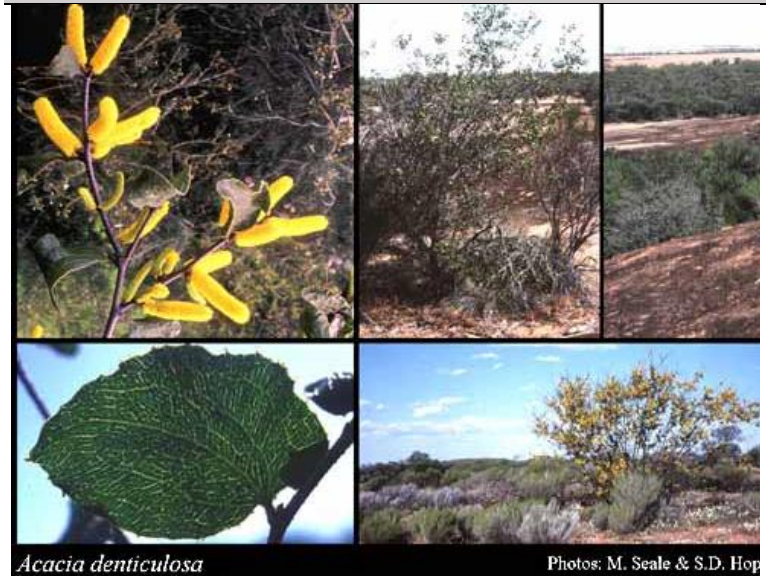
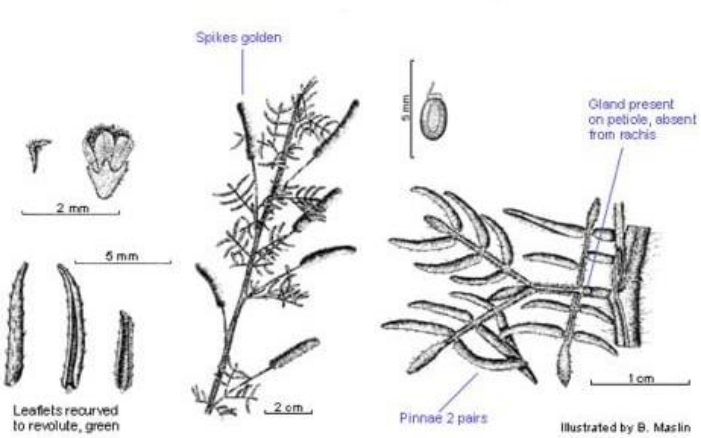
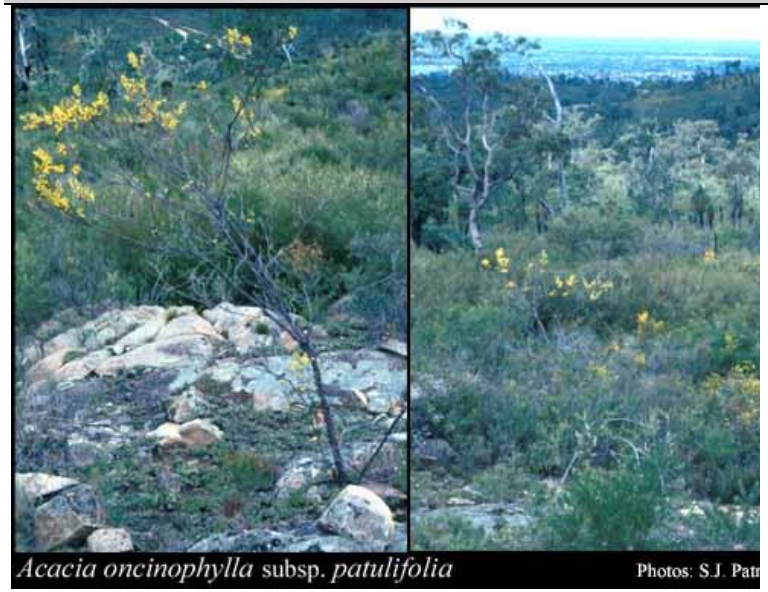
Appendix 2: Significant Species

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Leafless Rock Wattle	Divaricately branched, spinescent, glaucous shrub, 0.9-2.5 m high. Fl. Yellow.	Aug to Oct.	Sand, loam, clay loam. Granite outcrops, hills.	T	N	Habitat not suitable

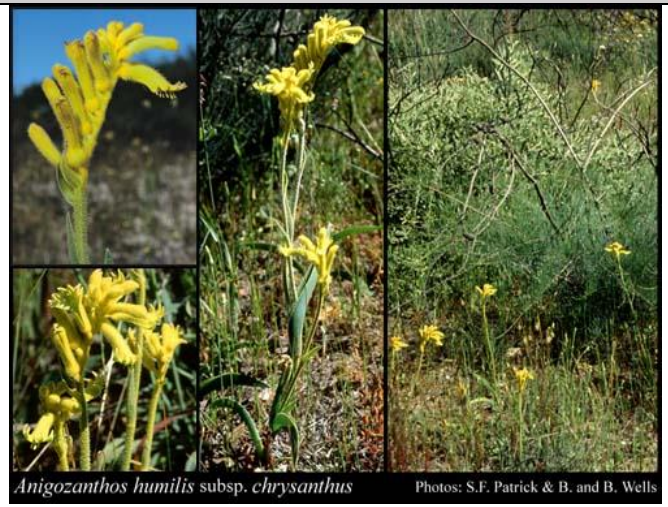
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Shrub, ca 1 m high. Fl. Yellow.	Aug to Sep.	Sand. Typically on limestone breakaways.	P2	N	Habitat not suitable

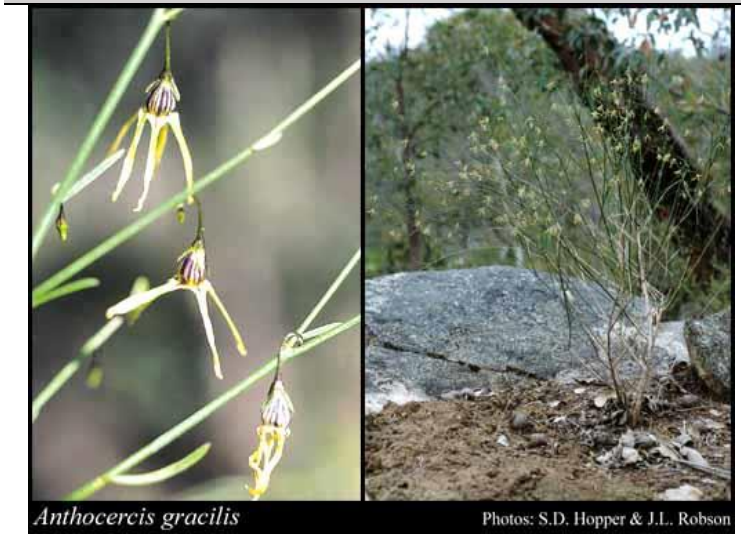
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Sandpaper Wattle	Erect, diffuse, spindly shrub, 1-4 m high. Fl. yellow	Sep to Oct.	Sand, loam, clay. Granite outcrops, rarely on sandplains.	T	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Acacia drummondii subsp. affinis 		Erect shrub, 0.3-1 m high. Fl. yellow	Jul to Aug.	Lateritic gravelly soils.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Shrub, 0.5-2.5(-3) m high, 'minni-ritchi' bark, phyllodes 4-9 cm long, 3-6 mm wide. Fl. Yellow.	Aug to Nov or Nov to Dec.	Granitic soils, occasionally on laterite.	P4	N	Habitat not suitable
Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)					P3	N	Geographic range not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple.	Sep to Nov.	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	T	Y	Habitat suitable
Angianthus micropodioides		Erect or decumbent annual, herb, 0.03-0.15 m high. Fl. yellow-white.	Nov to Dec or Jan to Feb	Saline sandy soils. River edges, saline depressions, claypans.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Golden Catspaw	Rhizomatous, perennial, herb, 0.2-0.4(-0.8) m high. Fl. yellow	Jul to Oct.	Grey or yellow sand.	P4	N	Habitat not suitable
	Dwarf Green Kangaroo Paw	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. green/yellow-green	Aug to Sep.	Grey sand, clay loam. Winter-wet depressions.	T	N	Geographic range not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Slender Tailflower	Erect, spindly shrub, to 0.6(-1) m high. Fl. yellow-green.	Sep to Oct.	Sandy or loamy soils. Granite outcrops.	T	N	Habitat not suitable
	Summer Honeypot	Prostrate, lignotuberous shrub, 0.15-0.4 m high. Fl. yellow-brown.	Jan to Feb.	White or grey sand over laterite, sandy loam.	T	N	Soil type not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Prostrate, lignotuberous shrub, to 0.4 m high. Fl. cream-white/yellow.	Sep to Oct	White/grey sand over laterite	P3	N	Soil type not suitable
	Purple Beaufortia	Erect or spreading shrub, 0.3-1.5 m high. Fl. red-purple.	Oct to Dec or Jan to Feb.	Lateritic or granitic soils. Rocky slopes.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Bolboschoenus fluviatilis		No info.			P1		No Info
	Rainbow Plant	Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Fl. pink-purple/white.	Sep to Dec or Jan.	Sandy-peat swamps. Seasonally wet areas.	P3	Y	Habitat suitable

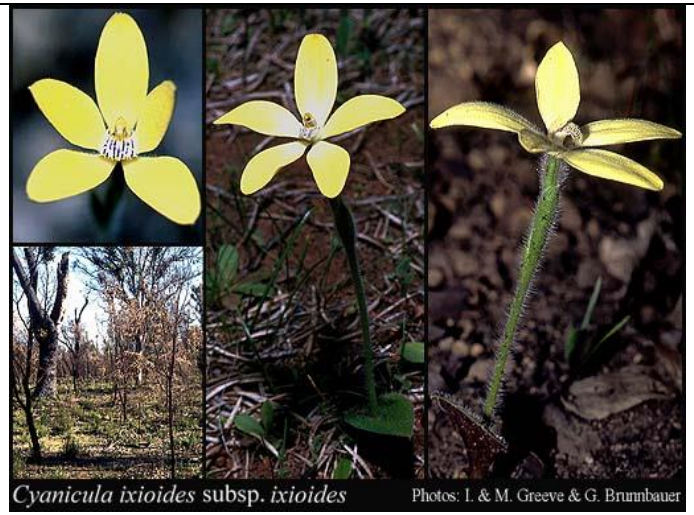
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Grand Spider Orchid	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red.	Sep to Oct.	Grey or brown sand, clay loam.	T	N	Habitat not suitable
Calandrinia sp. Bayswater (C. Andrews s.n. 11/1902)							No Info
Calectasia elegans	Elegant Tinsel Lily				P2		No Info
Calothamnus accedens		Erect & slender shrub, to 1.8 m high. Fl. pink-red.	No info.	Sandy soils over laterite. Road verge.	P4	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect, multi-stemmed shrub, 1-2 m high. Fl. Red.	Jun to Aug.	Clay over granite, lateritic soils. Hillsides.	P4	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect shrub, 0.4-2(-3) m high. Fl. red	Feb or Apr or Aug to Dec.	Rocky quartzite soils, sand. Slopes.	P2	N	Habitat not suitable

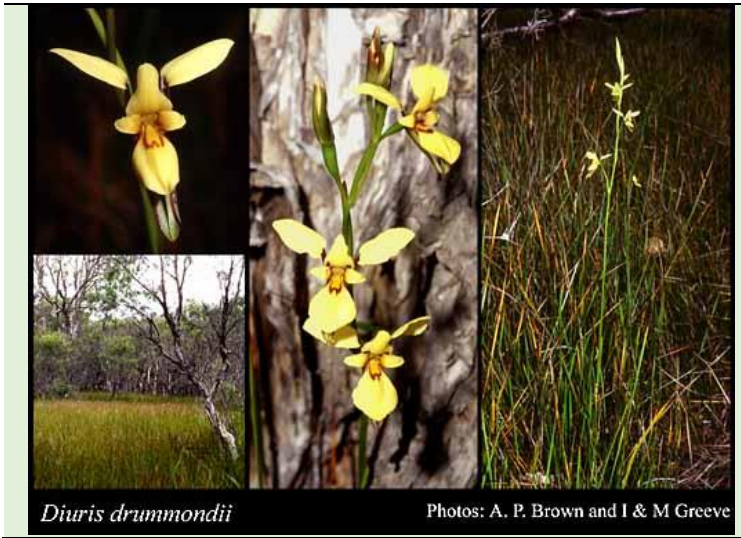
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Shrub, 0.4-1 m high. Fl. purple-blue.	Oct to Nov.	Sandy clay. Swampy flats	T	Y	Habitat suitable
Carex tereticaulis 		Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Fl. Brown.	Sep to Oct.	Black peaty sand.	P3	N	Soil type not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect, open, straggly shrub, to 2 m high. Fl. white	Sep to Dec.	White or yellow sand, leaf litter. Plains, hilltops, crests and lower slopes of scarp, rises, road verges.	T	N	Geographic range not suitable
		Erect, compact shrub, 0.6-2 m high. Fl. white-other.	May to Oct.	Grey or yellow-orange clayey sand.	T	N	Soil type not suitable

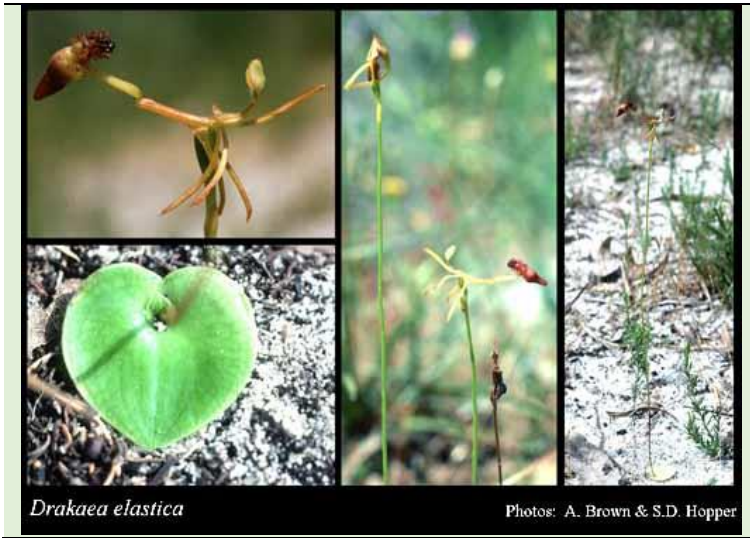
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Conostylis bracteata		Rhizomatous, tufted or shortly proliferous perennial, grass-like or herb	Fl. yellow Aug to Sep.	Sand, limestone. Consolidated sand dunes.	P3	N	Habitat not suitable
	Yellow China Orchid	Tuberous, perennial, herb, 0.05-0.15 m high. Fl. yellow	Aug to Oct.	Laterite, gravel.	P4	N	Habitat not suitable
Cyathochaeta teretifolia		Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown.		Grey sand, sandy clay. Swamps, creek edges.	P3	Y	Habitat suitable
Dampiera triloba		Erect perennial, herb or shrub,	Aug to Dec				No Info

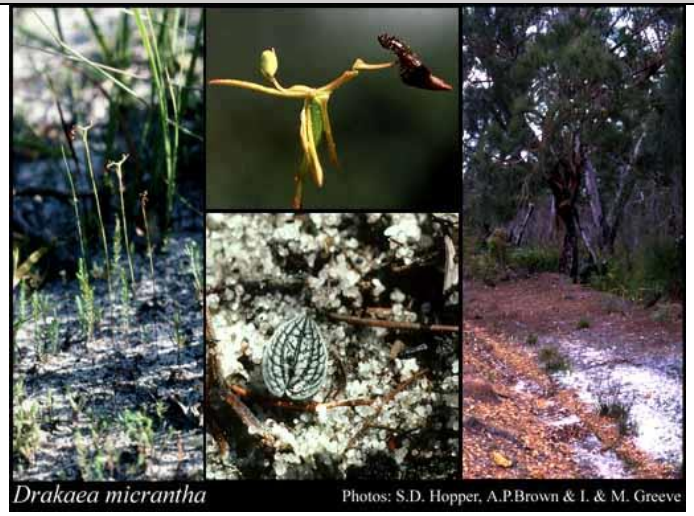
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		to 0.5 m high. Fl. blue					
		Erect shrub, 0.25-0.5(-1) m high. Fl. red/pink & green,	Sep to Oct.	Loam, sandy loam. Granite outcrops.	P4	N	Habitat not suitable

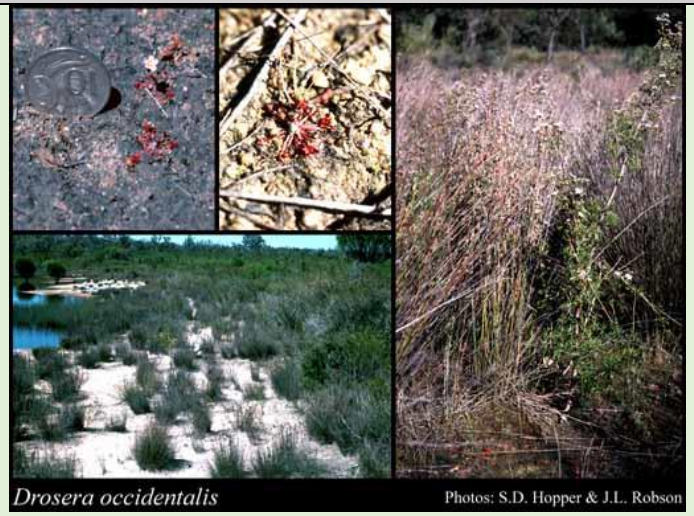
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Spreading shrub, 0.4-1 m high, stem hairs dentritic, to 1.3 mm long, with a single terminal gland and sub-basal whorl of branches. Fl. white,	Sep to Dec.	Red sand. Sandplains.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect shrub, 0.5-1 m high, inner involucral bracts glabrous, leaves broadly cordate. Fl. Red.	Jul to Oct.	Loam, clay. Granite outcrops & hillsides.	T	N	Habitat not suitable
	Tall Donkey Orchid	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. Yellow.	Nov to Dec or Jan.	Low-lying depressions, swamps.	T	Y	Habitat suitable

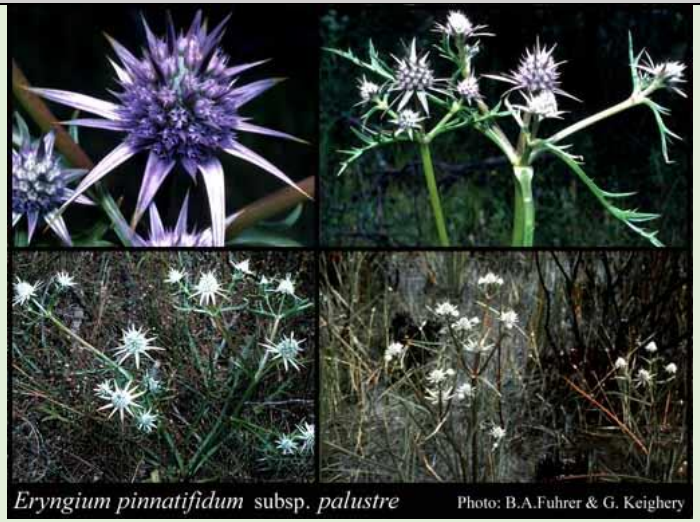
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown.	Sep to Oct.	Brown loamy clay. Winter-wet swamps, in shallow water.	T	Y	Habitat suitable
	Purdie's Donkey Orchid	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. Yellow.	Sep to Oct.	Grey-black sand, moist. Winter-wet swamps.	T	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Hackett's Hopbush	Erect shrub or tree, 1-5 m high. Fl. yellow-green/red.	Mainly Jul to Oct.	Sand. Outcropping limestone.	P4	N	Habitat not suitable
	Glossy-leaved Hammer Orchid	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.	T	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow.	Sep to Oct.	White-grey sand.	T	N	Habitat not suitable
Drosera micra						P1	No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Western Sundew	Fibrous-rooted, rosetted perennial, herb, to 0.025 m high. Fl. pink/white.	Oct to Dec or Jan.		P4	Y	Habitat suitable
Drosera patens		Fibrous-rooted, rosetted perennial, herb, to 0.05 m high. Fl. white,	Dec or Feb	Sandy soils. Margins of winter-wet depressions, swamps and lakes.	P1	Y	Habitat suitable
Drosera x badgerupii		Rosetted, short-lived perennial, herb. Fl. yellow-green.			P2		No Info
Drosera x sidjamesii		Fibrous-rooted perennial, herb, to 0.06 m high. Fl. green-pink,	Nov to Dec or Jan to Mar.	Peaty sand. Along lake margins, close	P1	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
				to winter high-water line.			
 *Eleocharis keigheryi* Photo: G.J. Keighery		Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. Green.	Aug to Nov.	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	T	N	Habitat not suitable

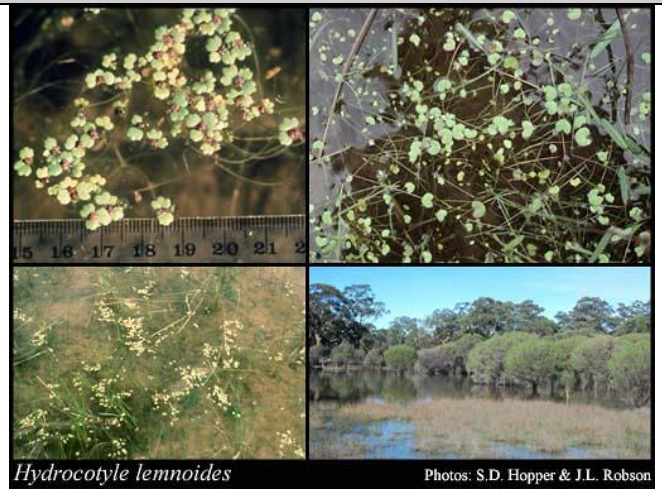
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect perennial, herb, 0.15-0.5 m high. Fl. white/blue,	Oct to Nov.	Clay, sandy clay. Claypans, seasonally wet flats.	P3	Y	Habitat suitable
Eryngium sp. Subdecumbens (G.J. Keighery 5390)					P3		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Wabling Hill Mallee	(Mallee), 1.5-4 m high, bark smooth. Fl. white,	Mar to Apr..	Shallow soils over limestone. Slopes or gullies of limestone ridges, outcrops	T	N	Geographic range not suitable
Eucalyptus educta		spreading mallee, 3-5 m high, bark rough, 'minni-ritchi'. Fl. cream-yellow,	Apr. Shallow soils.	Granite rocks.	P2	N	Habitat not suitable
Eucalyptus foecunda subsp. *foecunda*					P4		No Info

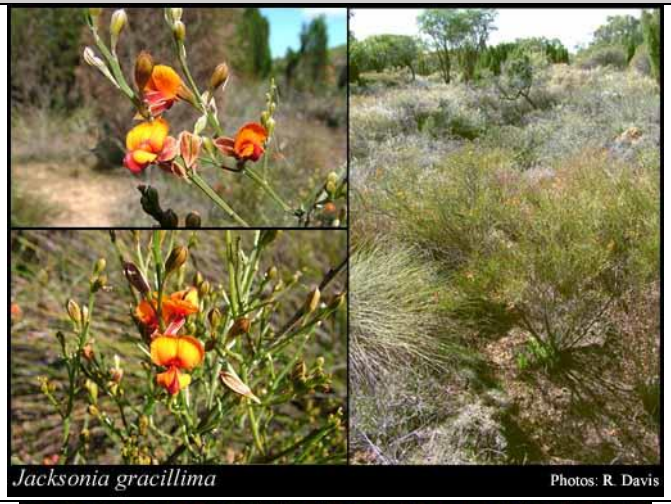
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Cadda Road Mallee	(Mallee), to 5 m high, bark rough, flaky. Fl. White.	Oct to Dec or Jan to Feb.	Sandy soils with lateritic gravel.	T	N	Habitat not suitable
		Erect, wiry shrub, 0.5-0.6 m high. Fl. white-cream.	Aug to Sep.	Clay loam, sandy clay, often moist	T	N	Geographic range not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Grevillea curviloba 		Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream.	Aug to Oct.	Grey sand, sandy loam. Winter-wet heath.	T	Y	Habitat suitable
Grevillea dissectifolia					P3		No Info
Grevillea ornithopoda					P2		No Info
Haemodorum loratum		Bulbaceous, perennial, herb, 0.45-1.2(-2) m high. Fl. black/brown-black/green,	Nov.	Grey or yellow sand, gravel.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect shrub, 0.35-1 m high. Fl. blue-purple.	Aug to Nov.	Gravelly soils, soils over granite.	P3	N	Habitat not suitable
Hibbertia leptotheca					P3		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Aquatic Pennywort	Aquatic, floating annual, herb. Fl. purple,	Aug to Oct.	Swamps	P4	N	Habitat not suitable
Hydrocotyle striata		Herb. Clay. Springs			P1	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Dioecious rhizomatous, perennial, herb, ca 0.5 m high.	Fl. Sep to Oct.	White sand. Sandplains	P4	Y	Habitat suitable
Isopogon autumnalis	Autumn Isopogon				P3		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
					P3		No Info
		Low spreading shrub, to 0.6 m high. Fl. Orange.	Usually Dec or Jan to Feb.	Calcareous & sandy soils.	P4	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Johnsonia pubescens subsp. *cygnorum*		Tufted perennial, herb, 0.15-0.25 m high. Fl. white-green.	Sep.	Grey-white-yellow sand. Flats, seasonally-wet sites.	P2	Y	Habitat suitable
	Helena Velvet Bush	Erect, open shrub, 0.4-1.5 m high. Fl. pink-purple,	Aug to Nov.	Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops.	P4	N	Habitat not suitable
Lasiopetalum glutinosum subsp. *glutinosum*					P3		No Info
Lasiopetalum membranaceum		Multi-stemmed shrub, 0.2-1 m high. Fl. pink-blue-purple,	Sep to Dec.	Sand over limestone.	P3	N	Habitat not suitable
Lepidium pseudohyssopifolium		Erect annual or perennial, herb,	Fl. Jun to Sep.	Swampy ground.	P1	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		to 0.4(-0.6) m high.					
Lepyrodia curvescens		Dioecious, shortly creeping, tufted rhizomatous, herb, 0.24-0.4 m high, rhizomes on surface or to 1 cm deep.	Fl. Sep to Nov.	Sand, laterite. Seasonally inundated swampland.	P2	Y	Habitat suitable
	Preiss's Stylewort	Annual (ephemeral), herb, 0.03-0.17 m high. Fl. pink-red.	Sep to Dec or Jan.	Grey or black, peaty sand. Swamps.	P1	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect or spreading perennial, herb or shrub, 0.2-0.4 m high, 0.3-0.6 m wide.	Sep to Dec or Feb to Mar.	White or grey sand.	T	Y	Habitat suitable
Meionectes tenuifolia					P3		No Info
Melaleuca viminalis					P2		No Info
Millotia tenuifolia var. laevis		Ascending to erect annual, herb, 0.02-0.1 m high.	Fl. yellow, Sep to Oct.	Granite or laterite soils.	P2	N	Habitat not suitable
Myriophyllum echinatum		Erect annual, herb, 0.02-0.03 m high.	Fl. red, Nov.	Clay. Winter-wet flats.	P3	Y	Habitat suitable
Netrostylis sp. Chandala (G.J. Keighery 17055)					P2		No Info
Ornduffia submersa					P4		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Persoonia sulcata		Erect, spreading to decumbent shrub, 0.2-1 m high. Fl. yellow,	Sep to Nov.	Lateritic or granitic soils.	P4	N	Habitat not suitable
		Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white,	Aug to Oct.	White or grey sand, lateritic gravel.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect, succulent annual, herb, ca 0.02 m high. Fl. white	Oct to Nov.	Clay. Winter-wet claypans, low-lying seasonal wetlands	P2	Y	Habitat suitable
	Corymbose Pithocarpa	Erect to scrambling perennial, herb, 0.5-1 m high. Fl. white,	Jan to Apr.	Gravelly or sandy loam. Amongst granite outcrops	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Platysace ramosissima		Perennial, herb, to 0.3 m high. Fl. white-cream,	Oct to Nov.	Sandy soils.	P3	N	Habitat not suitable
Poranthera moorokatta 					P2		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Schoenus benthamii 		Tufted perennial, grass-like or herb (sedge), 0.15-0.45 m high. Fl. Brown.	Oct to Nov.	White, grey sand, sandy clay. Winter-wet flats, swamps.	P3	Y	Habitat suitable
Schoenus capillifolius		Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. Green.	Oct to Nov.	Brown mud. Claypans.	P3	N	Habitat not suitable
Schoenus griffinianus		Small, tufted perennial, grass-like or herb	Fl. Sep to Oct.	White sand	P4	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		(sedge), to 0.1 m high.					
Schoenus pennisetis 		Tufted annual, grass-like or herb (sedge), 0.05-0.15 m high. Fl. purple-black.	Aug to Sep.	Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.	P3	Y	Habitat suitable
Schoenus sp. Waroona (G.J. Keighery 12235)		Tufted annual, grass-like or herb (sedge), 0.02-0.06 m high.	Fl. brown-red-green, Oct to Nov.	Clay or sandy clay. Winter-wet flats	P3	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Erect, slender perennial, herb, to 1.5 m high. Fl. yellow,	Sep to Nov	Peaty sand. Swamps, slopes.	P1	Y	Habitat suitable
Senecio leucoglossus		Erect annual, herb, to 1.3 m high.	Fl. white, Aug to Dec.	Gravelly lateritic or granitic soils. Granite outcrops, slopes.	P4	N	Habitat not suitable
Stachystemon exilis	Slender Stachystemon				P1		No Info

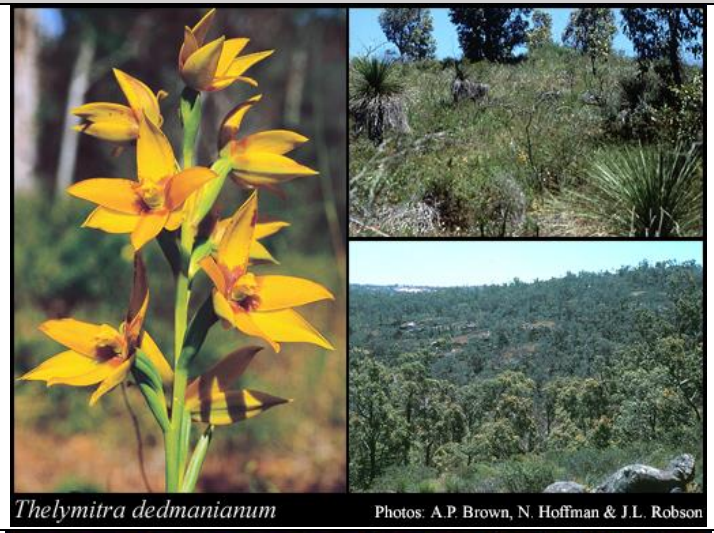
Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Jumping Jacks	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. Pink.	Oct to Dec.	Sandy clay, clay. Seasonal wetlands.	P4	Y	Habitat suitable
Stylidium paludicola		Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous.	Oct to Dec.	Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	P3	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. Pink.					
	Fan-leaved Triggerplant	Rosetted perennial, herb, 0.15-0.55 m high, Leaves erect, oblanceolate to spathulate, 1.5-4 cm long, 1.5-6 mm wide, apex acute to acuminate, margin entire, glabrous, striate. Scape sparingly glandular on inflorescence axis, glabrous below.	Fl. yellow, Oct to Nov.	Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland.	P4	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Stylidium trudgenii		Caespitose perennial, herb, 0.05-0.5 m high.		Grey sand, dark grey to black sandy peat. Margins of winter-wet swamps, depressions.	P3	Y	Habitat suitable
Styphelia filifolia 					P3		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. Yellow.	Oct.	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	T	Y	Habitat suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
		Spreading shrub, 0.1-0.3 m high. Fl. purple,	Aug to Oct.	Gravelly soils.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Cinnamon Sun Orchid	Tuberous, perennial, herb, to 0.8 m high.	Fl. yellow, Nov to Dec or Jan.	Granite.	T	N	Habitat not suitable
	Crystal Brook Star Orchid	Perennial, herb.		Stony ridges.	T	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Star Orchid	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown.	Oct to Nov.	Sand, gravel, lateritic loam.	T	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Queen of Sheba	Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink,	Jun to Sep.	Sandy clay, sand, laterite.	P2	N	Habitat not suitable
		Rhizomatous, leafless perennial, herb, to 0.4 m high	Fl. purple, Oct to Dec.	White or grey sand, lateritic gravel, laterite.	P3	N	Habitat not suitable

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
Thysanotus brachiatus		Rhizomatous, leafless perennial, herb, to 0.3 m high.	Fl. purple Nov to Dec.	Grey sand.	P2	N	Geographic range not suitable
 *Thysanotus glaucus* Photos: N.H. Brittan		Caespitose, glaucose perennial, herb, 0.1-0.2 m high. Fl. purple	Oct to Dec or Jan to Mar.	White, grey or yellow sand, sandy gravel.	P4	N	Habitat not suitable
Tricostularia drummondii	Drummond's Tricostularia				P3		No Info

Species Name	Common Name	Description	Flowering Period	Habitat Type	Cons code	Likelihood (Y/N)	Comment
	Swan Hydatella				T		No Info
		Erect shrub, 0.2-0.75 m high. Fl. Pink.	May or Nov to Dec or Jan.	Sand, sandy clay. Winter-wet depressions.	P4	Y	Habitat suitable

Appendix 3: Conservation Codes

Western Australia

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

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

(Source: DBCA, 2020)

Commonwealth

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

(Source: DBCA, 2020)

Appendix 4: Quadrat Data

Quadrat No.:	Q1
Survey Date:	23/06/2023
Personnel:	KG, JVS
Latitude:	-31.855825
Longitude:	115.924475
Topography:	Slight Slope
Aspect:	Southwest
Slope:	1-3%
Soil:	Brown- grey sand
Gravel:	0%
Rock:	0%
Leaf Litter:	5%
Bare Ground:	5%
Drainage:	Well
Condition:	Degraded

Notes: *Adenanthos cygnorum* Shrubland

Species	Cover (%)	Height (m)
**Acacia longifolia* subsp. *sophorae*	5	2.5
**Ehrharta calycina*	10	0.3
**Ehrharta longiflora*	1	0.2
**Euphorbia terracina*	1	0.1
**Gladiolus caryophyllaceus*	1	0.1
**Sonchus oleraceus*	0.1	0.1
Acacia stenoptera	1	0.1
Adenanthos cygnorum	30	2
Bossiaea eriocarpa	1	0.2
Calytrix fraseri	5	1
Daviesia triflora	1	0.5
Desmocladus flexuosus	30	0.1
Hibbertia hypericoides	1	0.2
Jacksonia floribunda	1	0.5

Species	Cover (%)	Height (m)
Laxmannia squarrosa	1	0.1
Patersonia occidentalis	1	0.3
Phlebocarya ciliata	30	0.2
Stirlingia latifolia	1	0.2

Note: *denotes introduced species.

Quadrat No.:	Q2
Survey Date:	23/06/2023
Personnel:	KG, JVS
Latitude:	-31.856248
Longitude:	115.924555
Topography:	Slight Slope
Aspect:	Southwest
Slope:	1-3%
Soil:	Brown- grey sand
Gravel:	0%
Rock:	0%
Leaf Litter:	0%
Bare Ground:	5%
Drainage:	Well
Condition:	Degraded

Notes: *Xanthorrhoea preissi* Shrubland

Species	Cover (%)	Height (m)
**Ehrharta calycina*	10	0.3
**Erigeron bonariensis*	1	0.2
**Euphorbia terracina*	1	0.1
**Gladiolus caryophyllaceus*	1	0.1
**Sonchus oleraceus*	1	0.1
Bossiaea eriocarpa	1	0.1
Calytrix fraseri	10	1
Desmocladus flexuosus	30	0.1
Eremaea pauciflora	20	0.3
Gompholobium tomentosum	1	0.2
Hibbertia hypericoides	1	0.2
Jacksonia floribunda	1	1
Lechenaultia floribunda	2	0.2
Lyginia imberbis	1	0.3
Xanthorrhoea preissii	15	0.7

Quadrat No.:	Q3
Survey Date:	23/06/2023
Personnel:	KG, JVS
Latitude:	-31.856879
Longitude:	115.924608
Topography:	Slight Slope
Aspect:	Southwest
Slope:	1-3%
Soil:	Brown sand
Gravel:	0%
Rock:	0%
Leaf Litter:	50%
Bare Ground:	50%
Drainage:	Well
Condition:	Degraded

Notes: Mixed *Eucalyptus* spp. Open Woodland (Landscaped, Mulching understorey)

Species	Cover (%)	Height (m)
**Brassica tournefortii*	0.1	0.1
**Ehrharta longiflora*	0.1	0.1
**Euphorbia terracina*	0.1	0.1
**Gladiolus undulatus*	0.2	0.2
**Sonchus oleraceus*	0.1	0.1
Agonis flexuosa	1	3
Corymbia calophylla	10	10
Eremophila glabra	0.2	0.2
Eucalyptus rudis	15	15
Eucalyptus sp. 2	3.5	5

Appendix 5: Species List

The complete flora list for the site is provided in the table below with flora listed by species, and vegetation type they occurred within indicated. *Denotes introduced species

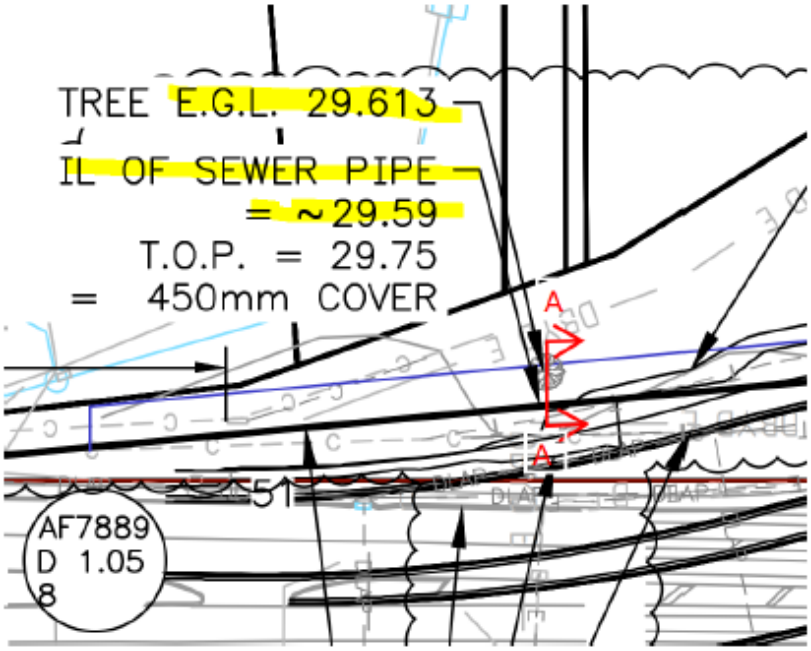
Family	Species Name	Common Name
Brassicaceae	**Brassica tournefortii*	Mediterranean Turnip
Poaceae	**Ehrharta calycina*	Perennial Veldt Grass
Poaceae	**Ehrharta longiflora*	Annual Veldt Grass
Poaceae	**Eragrostis curvula*	African Lovegrass
Asteraceae	**Erigeron bonariensis*	
Geraniaceae	**Erodium botrys*	Long Storksbill
Euphorbiaceae	**Euphorbia terracina*	Geraldton Carnation Weed
Papaveraceae	**Fumaria capreolata*	Whiteflower Fumitory
Iridaceae	**Gladiolus caryophyllaceus*	Wild Gladiolus
Iridaceae	**Gladiolus undulatus*	Wild Gladiolus
Oxalidaceae	**Oxalis pes-caprae*	Soursob
Geraniaceae	**Pelargonium capitatum*	Rose Pelargonium
Poaceae	**Poa annua*	Winter Grass
Asteraceae	**Sonchus oleraceus*	Common Sowthistle
Asteraceae	**Ursinia anthemoides*	Ursinia
Fabaceae	**Vicia sativa*	Common Vetch
Fabaceae	*Acacia applanata*	
Fabaceae	*Acacia pulchella*	Prickly Moses
Fabaceae	*Acacia saligna*	Orange Wattle
Fabaceae	*Acacia stenoptera*	Narrow Winged Wattle
Proteaceae	*Adenanthos cygnorum*	Common Woollybush
Myrtaceae	*Agonis flexuosa*	Peppermint
Restionaceae	*Alexgeorgea nitens*	
Casuarinaceae	*Allocasuarina humilis*	Dwarf Sheoak
Proteaceae	*Banksia littoralis*	Swamp Banksia
Fabaceae	*Bossiaea eriocarpa*	Common Brown Pea
Myrtaceae	*Calytrix fraseri*	Pink Summer Calytrix
Myrtaceae	*Corymbia calophylla*	Marri
Fabaceae	*Daviesia triflora*	

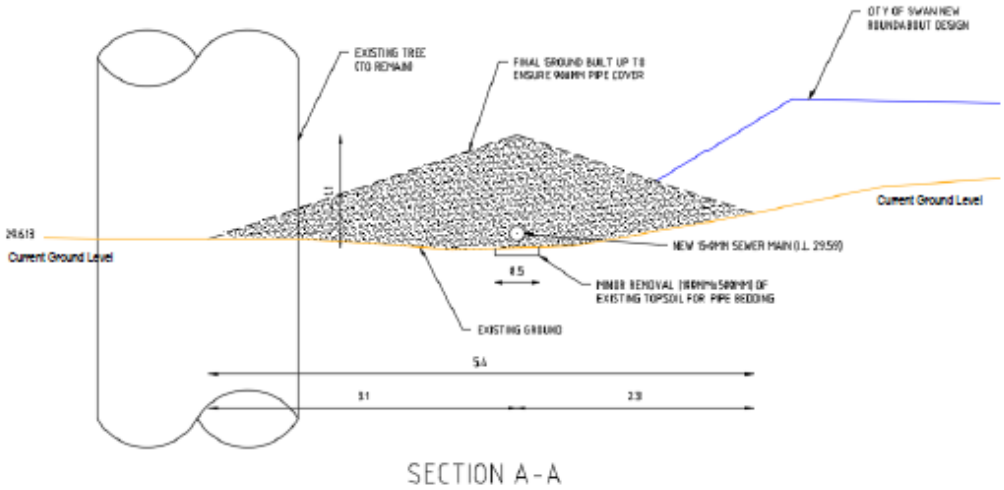
Family	Species Name	Common Name
Restionaceae	*Desmocladus flexuosus*	
Myrtaceae	*Eremaea pauciflora*	
Scrophulariaceae	*Eremophila glabra*	Tar Bush
Myrtaceae	*Eucalyptus rudis*	Flooded Gum
Myrtaceae	*Eucalyptus* sp. 1	
Myrtaceae	*Eucalyptus* sp. 2	
Fabaceae	*Gompholobium tomentosum*	Hairy Yellow Pea
Dilleniaceae	*Hibbertia hypericoides*	Yellow Buttercups
Restionaceae	*Hypolaena exsulca*	
Fabaceae	*Jacksonia floribunda*	Holly Pea
Asparagaceae	*Laxmannia squarrosa*	Paper Lily
Goodeniaceae	*Lechenaultia floribunda*	Free-flowering Leschenaultia
Anarthriaceae	*Lyginia imberbis*	
Myrtaceae	*Melaleuca rhaphiophylla*	Swamp Paperbark
Iridaceae	*Patersonia occidentalis*	Purple Flag
Haemodoraceae	*Phlebocarya ciliata*	
Myrtaceae	*Regelia ciliata*	
Proteaceae	*Stirlingia latifolia*	Blueboy
Ericaceae	*Styphelia pallida*	Kick Bush
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass tree

Appendix 6: Malaga Sewer Methodology – Adjacent Tree

MALAGA SEWER METHODOLOGY – ADJACENT TREE

- The identified tree will be flagged and demarcated during works
- Remove existing vegetation along the proposed alignment will be completed using a 14T excavator. An arborist will be used as required for minor trimming. (Refer image on 2nd page).
- The sewer pipe has been moved to its extreme point in the design. To its most easterly location to avoid the tree.
- Remove topsoil (approx 5.4m width) with 14T excavator.
- Carry out minor topsoil disturbance for leveling (~100mm D x 500mm W) under the proposed sewer pipe for the placement of bedding material and leveling ground.
- Install new pipe at current ground level.
- The new pipe will be backfill as per Section A-A (below) using 14T. Placing and compacting the fill material.





SECTION A-A

MALAGA SEWER METHODOLOGY – ADJACENT TREE

The planned works propose to leave the large old growth tree, with no damage to the roots or system.

Page 2 of 2