Natural Area
CONSULTING MANAGEMENT SERVICES

City of Armadale

Skeet Road Reconnaissance Flora Survey

July 2019

Natural Area Holdings Pty Ltd
99C Lord Street, Whiteman, WA, 6076
Ph: (08) 9209 2767
info@naturalarea.com.au
www.naturalarea.com.au

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Executive Summary

Natural Area Consulting Management Services (Natural Area) was commissioned by the City of Armadale to undertake a reconnaissance flora survey within a proposed clearing area along Skeet Road, Harrisdale. The survey area is approximately 4 ha of roadside vegetation, located approximately 20 km from the Perth Central Business District. This survey was undertaken to inform a clearing application for road widening purposes.

A desktop assessment was undertaken to determine habitat suitability for conservation significant flora and fauna and the likelihood of conservation significant ecological communities. The results highlighted:

- a total of 25 conservation significant flora species have been previously recorded within the area; it was determined that the site may be suitable for 17 of these species
- that the site may be utilised by Black Cockatoos and Quenda, and a habitat assessment was required on site to determine if it was suitable for conservation significant invertebrate species
- that the area may contain Banksia Woodland of the Swan Coastal Plain and Clay Pans of the Swan Coastal Plain, both threatened ecological communities
- that the site also contains Conservation Category and Multiple Use Wetlands
- the south-eastern strip of the site within Lot 171 is part of Bush Forever Site 342.

The on-ground reconnaissance survey confirmed:

- the presence of one conservation significant species, a single *Jacksonia gracillima* (P3) plant
- the presence of a predominately Degraded to Completely Degraded wetland vegetation, including *Melaleuca* Woodland and Tall Shrubland
- a small portion of Degraded Banksia Woodland in the south-west, which does not meet the minimum condition or patch size to trigger the *EPBC Act*
- two small areas of Tall *Melaleuca* Shrubland which may have species composition consistent with Clay Pans of the Swan Coastal Plain and be of a good enough condition to trigger the *EPBC Act* requirements
- predominantly poor foraging habitat for Black Cockatoos, with no evidence of feeding, roosting or nesting noted
- poor quality or unsuitable habitat for Quenda and conservation significant invertebrates
- the areas of Conservation Category Wetland within the road reserve are in a Degraded to Completely Degraded condition
- the area of Bush Forever within the survey site is in a Completely Degraded to Good condition, although condition increases quickly further into the remnant vegetation.

Although the area within the survey site was not likely to provide suitable habitat for conservation significant fauna and flora, the area to the south-east was high quality remnant wetland vegetation and may contain suitable habitat for conservation significant species. This area may also be classified as a Clay Pan of the Swan Coastal Plain, a Critically Endangered Ecological Community, with further assessment required to confirm this.

An assessment against the 10 clearing principles was undertaken and it was determined that the proposed clearing may be at variance to four of the principles. The Department of Water and Environmental

Regulations and the Department of Biodiversity, Conservation and Attractions should be consulted to determine the most appropriate course forward; with a detailed spring flora survey recommended to determine if Clay Pans of the Swan Coastal Plains, a Threatened Ecological Community, is within the survey site, and the presence of conservation significant annual flora within these areas. It is recommended that Lot 171 adjacent, DBCA managed land is also surveyed for this Threatened Ecological Community and conservation significant flora.

Contents

1.0 Introduction

Natural Area Consulting Management Services (Natural Area) was commissioned by the City of Armadale to undertake a flora survey within a proposed clearing area along Skeet Road, Harrisdale. The survey area is 4 ha of roadside vegetation, including an area of Multiple Use Wetland and an area of Conservation Category Wetland, approximately 20 km south south-west of the Perth Central Business District (Map 1). This survey was undertaken to inform a clearing proposal for road widening purposes.

1.1 Scope

Activities undertaken by Natural Area personnel included:

- desktop database searches to identify potential conservation significant flora, fauna, and ecological communities that may occur within the proposed clearing area
- desktop study assessing site characteristics to determine the habitat suitability for conservation significant flora, fauna and communities, and other factors that may impact the clearing proposal
- a reconnaissance survey, a low intensity flora survey of the site to assess vegetation type and condition, and habitat suitability and potential presence of conservation significant flora, fauna and communities
- reporting outcomes of the survey.

2.0 Site Characteristics

The survey area is a strip of vegetation on either side of Skeet Road in Forrestdale, approximately 4 ha in size (including the road). The road surveyed is approximate 625 m long, with 15 – 30 metres of vegetation surveyed on either side of the road, as per the maps provided by the City of Armadale (Map 1).

2.1 Regional Context

According to Interim Biogeographical Regionalisation of Australia (IBRA) descriptions, Forrestdale is located in the Perth Swan Coastal Plain subregion (SW02). This area is characterised by Banksia woodlands in sandy soils and paperbark in swampy areas (Mitchell, Williams & Desmond, 2002).

2.2 Land Tenure

The survey site had multiple land tenures including:

- City of Armadale – road reserve
- The Department of Biodiversity, Conservation and Attractions – Lot 171 (south-east of site)
- Private landholders – Lots 200, 201 and 202 (north-west of site; Map 1) (City of Armadale, 2019).

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 (Perth Airport, Station ID 009021, 2019):

- average rainfall is 765.3 mm pa, with the majority falling between May and August
- average maximum temperature ranges from 17.9 °C in winter to 31.9 °C in summer, with the highest recorded maximum being 46.7 °C
- average minimum temperatures range from 8.0 °C in winter to 17.5 °C in summer, with the lowest recorded minimum being -1.3 °C
- predominant wind directions include morning easterlies and westerly sea breezes during summer months, with an average wind speed of 16.6 km/h and gusts of more than 100 km/h.

2.3 Vegetation Complex

The vegetation complex associated with the proposed clearing area is defined as the Southern River Complex, which is characterised by an open woodland of jarrah-marri-banksia in elevated areas and fringing *Eucalyptus rudis* and *Melaleuca rhaphiophylla* along streams and in wetland areas (Heddle, Loneragan & Havel, 1980).

2.4 Topography and soils

Topography across the site ranges from 20 – 22 m AHD. The NRInfo Portal (DPIRD, 2019; Map 2) indicates two distinct soil types:

- Bassendean B1 Phase (212Bs_B1) – Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2m; Banksia dominant
- Bassendean B4 Phase (212Bs_B4) - Broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 m by clay or less frequently a strong iron-organic hardpan.

Map 1: Site Location and Land Tenure
Skeet Road Flora Survey

0 100 200 m

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Client: City of Armadale
Date: 12/07/2019
Created by: Harley Taylor

Image Source: nearmap 2019
Datum: GDA 94

Natural Area
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info@naturalarea.com.au
www.naturalarea.com.au

Map 2: Soil Types
Skeet Road Flora Survey

2.5 Other Factors That May Impact Clearing Application

The survey site contains an area Conservation Category Wetland (CW) (UFI 14880), and an area of Multiple Use Wetland (UFI 13347, 14404 and 14879) (Map 3). The presence of the CCW means the area is of high conservation value and thus clearing and/or development is inappropriate as impacts are likely to be 'significant' (EPA, 2008). The area within the survey site considered CCW has likely been classified as such as it is part of a large wetland; all vegetated areas of wetlands over 70 ha on the Swan Coastal Plain have been classified as CCW (EPA, 2008). Wetlands, and areas within 50 metres of wetlands, are considered environmentally sensitive areas under section 51B of the *Environmental Protection Act 1986* (WA). The area of the survey site that is classified as wetlands has a high potential to be an aquatic groundwater dependant ecosystem (BOM, 2017), however this assessment was beyond the scope of works.

The survey site is located adjacent to and encompasses a small area of the Anstey-Keane Damplands Bush Forever Site (342). Lot 171, located to the south-east is part of this 308 ha Bush Forever Site, with approximately 6,000 m^2 of the survey site within Lot 171 (Map 1). Bush Forever sites are considered environmentally sensitive areas under section 51B of the *Environmental Protection Act 1986* (WA).

Map 3: Geomorphic Wetlands
Skeet Road Flora Survey

0 100 200 m

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3.0 Methodology

3.1 Desktop and Literature Review

The desktop flora survey was undertaken to determine the likely presence of conservation significant flora and threatened ecological communities within the survey area. A NatureMap (State) and Protected Matters Tool Search (PMST, Commonwealth) report for a 3 km buffer around the survey site was generated (DBCA, 2019a; DEE, 2019). A DBCA database search for conservation significant flora, fauna and ecological communities was also reviewed, including a buffer of 1 to 5 km depending on the number of records in the area (DBCA, 2019b). Soil and vegetation type were also determined prior to the site visit to assess the suitability of the area for conservation significant species. Photographs and descriptions of the conservation significant flora were sourced predominantly from FloraBase (DBCA, 2019c) or Natural Area photographs and summarised in a table for ease of reference in the field (Appendix 1).

A review of the available databases (Environmental Protection Tool, National Map, City of Armadale IntraMaps, 2019) was undertaken to determine any other factors that may impact a clearing application, including significant wetlands and Bush Forever areas.

3.2 Field Survey

The survey was undertaken in accordance with the *EPA Technical Guidance – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016). An on-ground reconnaissance flora survey was undertaken to determine vegetation type and condition, habit suitability for conservation significant flora and fauna species, and the presence of any perennial conservation significant flora species, and the likelihood of conservation significant ecological communities on site. Reconnaissance surveys are low-intensity flora sampling which verifies information obtained in the desktop study.

Habitat suitability for conservation significant flora and fauna was assessed on the basis of the dominant soil type, vegetation type, and vegetation condition. Soil type was assessed on-ground to determine the clay-loam-sand consistency, rock type and content (%). Vegetation condition was assessed using the rating scale attributed to Keighery (1994) in Bush Forever Volume 2 (Government of Western Australia, 2000; Table 1). The vegetation type was determined using the structural classes described in Bush Forever Volume 2 (Government of Western Australia, 2000), and records dominant over, middle and understorey species (Table 2). All spatial field data was recorded on a tablet using Mappt software, the outcomes of which were used to provide graphical representation of results. Maps were generated using QGIS (V3.2) GIS software (2019), with aerial imagery sourced from Nearmap (2019).

Table 1: Vegetation condition ratings

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

(Source: Government of Western Australia, 2000)

Table 2: Vegetation structural classes

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

(Source: Government of Western Australia, 2000)

3.3 Limitations

The survey was carried out mid-winter which is not the optimal time for assessing certain flora species, particularly geophytes and annual species. This means that the presence of conservation significant annuals and geophytes could not be assessed; only the presence of habitat suitable for these species. The timing of this survey has implications for assessing the ecological communities present, with some Threatened Ecological Communities characterised by the presence of annuals and geophytes in spring.

Access to one private property (Lot 200) was limited as permission was not given to enter the premises. This may have impacted the suite of species listed in the results, with the area of Very Good vegetation within Lot 200 not able to be assessed for species.

4.0 Flora Survey Results

4.1 Desktop survey

4.1.1 Flora and Ecological Communities

A review of the following databases was undertaken to determine potential conservation significant species that may occur within the survey site:

- NatureMap indicated 16 conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA) as potentially occurring within 3 km of the site (DBCA 2019a)
- Protected Matters Search Tool (PMST) indicated 12 threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) as potentially occurring within a 3 km radius of the site (DEE, 2019).
- The DBCA database search had records of 10 conservation significant flora species occurring within 2 km of the site (DBCA, 2019b, Table 3).

Species information, including description, habitat requirements and photographs (where possible) of the 25 conservation significant species found in the area was summarised into a reference sheet for the field survey; it was determined that the site conditions (soil type, drainage, location) may be suitable for 17 of these species (Table 3, Appendix 1).

Table 3: Conservation significant species that have been recorded in the local area; highlighted species indicate site conditions may be suitable

Species	Common Name	Cons. Code	NM	PMST	DBCA
Andersonia gracilis	Slender Andersonia	EN		X	
Aponogeton hexatepalus	Stalked Water Ribbons	P4	X		X
Austrostipa jacobsiana		T, CR	X	X	X
Byblis gigantea	Rainbow Plant	P3	X		X
Caladenia huegelii	Grand Spider Orchid	T, En	X	X	X*
Diuris micrantha	Dwarf Bee-Orchid	VU		X	
Diuris purdiei	Purdie's Donkey Orchid	T, En	X	X	X
Drosera occidentalis	Western Sundew	P4	X		
Drakaea elastica	Glossy-leaved Hammer Orchid	T, EN		X	
Drakaea micrantha	Dwarf Hammer Orchid	T, VU		X	
Eucalyptus x balanites	Cadda Road Mallee	EN		X	
Grevillea curviloba subsp. incurva	Narrow curved-leaf Grevillea	EN		X	
Jacksonia gracillima		P3	X		X

Jacksonia sericea	Waldjumi	P4	X		
Lepidosperma rostratum	Beaked Lepidosperma	T		X	
Ornduffia submersa		P4	X		X
Schoenus capillifolius		P3	X		
Schoenus pennisetis		P3	X		X
Stylidium aceratum		P3	X		X
Stylidium longitubum	Jumping Jacks	P4	X		X
Synaphea sp. *Fairbridge Farm*	Selena's Synaphea	CR		X	
Synaphea sp. *Serpentine*		CR		X	
Thysanotus glaucus		P4	X		X
Tripterococcus sp. Brachylobus		P4	X		X
Verticordia lindleyi subsp. lindleyi		P4	X		X

*Populations are now extinct

The PMST listed two Threatened Ecological Communities that could potentially occur within the survey site, namely Clay Pans of the Swan Coastal Plain and Banksia Woodland of the Swan Coastal Plain. According to the DBCA database two communities have previously been recorded in the area, Banksia Woodlands of the Swan Coastal Plains and Muchea Limestone Shrublands and Woodlands (DBCA, 2019b). Of the three conservation significant ecological communities listed in the searches it was determined that the site conditions may be suitable for two, Banksia Woodland of the Swan Coastal Plain and Clay Pans of the Swan Coastal Plain. The Banksia Woodlands are listed as Endangered Federally and as a Priority 3 at a State level and is characterised by an overstory of *Banksia* species and a highly diverse shrub and herb layer (DEE, 2016). The Clay Pans of the Swan Coastal Plains are listed as Critically Endangered Federally and both Vulnerable (SCP7, SCP08a, SCP9) and Endangered (SCP10a) at a State level; they are characterised by a highly diverse, mixed shrubland in which a suite of geophytes and annual herbs sequentially emerge and flower as these pans dry out (DEE, 2012).

4.1.2 Fauna

Of the conservation significant fauna species outlined in the NatureMap, PMST and DBCA database searches, it was determined that the site may be suitable for the following species:

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – Endangered/Threatened
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – Vulnerable/Threatened
- Quenda (*Isoodon fusciventer*) – Priority 4.

Additionally, the habitat for the following conservation significant invertebrate species was assessed:

- Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*) – Priority 3
- Short tongued bee (*Leioproctus contrarius*) – Priority 3
- Short tongued bee (*Neopasiphae simplicior*) – Critically Endangered/Threatened.

4.2 Field Survey

A reconnaissance survey was undertaken on the 2nd of July by botanists Harley Taylor and Sharon Hynes. The soil types identified during the desktop survey were confirmed to be accurate, with vegetation types consistent with soils. Three vegetation types were assigned:

- Low Woodland of *Banksia attenuata* and *B. menziesii* over **Ehrharta calycina* and **E. longiflora*, with scattered *Phlebocarya ciliata*, and *Dasypogon bromeliifolius* which was associated with deep bleached grey sands (212Bs_B1) in the south-western end. This area of vegetation was small (<2,500 m^2) and classified as Degraded.
- Low Woodland of *Melaleuca rhaphiophylla and M. viminea*, with scattered emergent *M. preissiana*. Understorey consisting predominately of **Ehrharta calycina*, **Cynodon dactylon and *Cenchrus clandestinus. Astartea scoparia and Regelia ciliata* mid-storey and with *Lepidosperma longitudinale,* sedge layer present in less degraded areas. This vegetation type was associated with the less well drained sand, with some areas of inundation (212Bs_B4).
- Tall Shrubland of *Melaleuca viminea, M. incana* and *M. lateritia* over a weedy layer of *Cynodon dactylon* and *Cenchrus clandestinus* and native rushes and sedges (*Juncus pallidus, Lepidosperma longitudinale, Baumea articulata*) in areas of better condition. This vegetation type was also associated with the less well drained sand, with some areas of inundations (212Bs_B4).
- Cleared/Landscaped areas that did not contain any native vegetation (Figure 1, Map 4).

Vegetation condition ranged from Completely Degraded to Very Good, with the majority of the site in Completely Degraded condition (Map 5). A list of species noted on site is provided in Table 4.

The area of Conservation Category Wetland ranged from Completely Degraded to Very Good condition. At present, the current clearing envelope is within the road reserve and will only encompasses Conservation Category Wetland that is in a Degraded or Completely Degraded condition, however these plans have not been finalised.

Completely Degraded Tall *Melaleuca* Shrubland

Degraded Banksia Woodland

Transition from Degraded (front) to Very Good (back; outside of survey site) Tall *Melaleuca* Shrubland

Very Good *Melaleuca* Woodland

Figure 1: Vegetation types and condition.

Map 4: Vegetation Types
Skeet Road Flora Survey

Map 5: Vegetation Condition
Skeet Road Flora Survey

0 100 200 m

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(08) 9209 2767
info@naturalarea.com.au
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Table 4: Flora species noted during the survey

Weed Species		Native Species	
Species	**Common Name**	**Species**	**Common Name**
Acacia iteaphylla	Flinder's Range Wattle	*Acacia pulchella*	Prickly Moses
Acacia longifolia	Sydney Golden Wattle	*Acacia saligna*	Orange Wattle
**Agonis flexuosus*	Peppermint Tree	*Adenanthos cygnorum*	Woolly Bush
Arctotheca calendula	Cape Weed	*Anigozanthos viridis*	Green Kangaroo Paw
Bougainvillea sp.	Bougainvillea	*Astartea scoparia*	Common Astartea
Brassica tournefortii	Mediterranean Turnip	*Banksia attenuata*	Slender Banksia
Callistemon sp.	Bottlebrush	*Banksia menziesii*	Firewood Banksia
Carpobrotus edulis	Pigface	*Baumea articulata*	Jointed Rush
Casuarina sp.	Sheoak	*Calothamnus quadrifidus*	One-sided Bottlebrush
Cenchrus clandestinus	Kikuyu Grass	*Cassytha racemosa*	Dodder Laurel
Chamaecytisus palmensis	Tagasaste	*Conostephium pendulum*	Pearl Flower
Citrullus lanatus	Afghan Melon	*Dasypogon bromeliifolius*	Pineapple Bush
Conyza sumatrensis	Fleabane	*Eucalyptus rudis*	Flooded Gum
Cortaderia selloana	Pampas Grass	*Eucalyptus todtiana*	Coastal Blackbutt
Cotula turbinatus	Funnel Weed	*Gompholobium tomentosum*	Hairy Yellow Pea
Cucumis myriocarpus	Prickly Paddy Melon	*Hypocalymma angustifolium*	White Myrtle
Cynodon dactylon	Couch Grass	*Jacksonia sternbergiana*	Stinkwood
Ehrharta calycina	Perennial Veldt Grass	*Juncus pallidus*	Pale Rush
Ehrharta longiflora	Annual Veldt Grass	*Kunzea glabrescens*	Spearwood
Eragrostis curvula	African Lovegrass	*Lepidosperma longitudinale*	Pithy Sword-sedge
**Eucalyptus utilis*	Coastal Moort	*Leptocarpus coangustatus*	
Euphorbia terracina	Carnation Weed	*Melaleuca incana* subsp. *incana*	Grey Honeymyrtle
Ferraria crispa	Black Flag	*Melaleuca lateritia*	Robin Red-breast
Foreign *Eucalyptus* sp.	Gum Tree	*Melaleuca preissiana*	Moonah
Fumaria capreolata	Whiteflower Fumitory	*Melaleuca rhaphiophylla*	Swamp Paperbark
Gladiolus caryophyllaceus	Wild Gladiolus	*Melaleuca teretifolia*	Banbar
Gomphocarpus fruticosus	Narrowleaf Cottonbush	*Melaleuca viminea*	Mohan
Ipomoea cairica	Coast Morning Glory	*Nuytsia floribunda*	Christmas Tree
Jacaranda mimosifolia	Jacaranda	*Patersonia occidentalis*	Purple Flag
**Melaleuca nesophila*	Mindiyed	*Phlebocarya ciliata*	
Moraea flaccida	One Leaf Cape Tulip	*Regelia ciliata*	
Oenothera stricta	Evening Primrose	*Xanthorrhoea preissii*	Grass Tree
Oxalis pes-caprae	Soursob		
Pelargonium capitatum	Rose Pelargonium		
Raphanus raphanistrum	Wild Radish		
Ricinus communis	Castor Oil Plant		
Rumex crispus	Curled Dock		
Solanum nigrum	Blackberry Nightshade		
Stenotaphrum secundatum	Buffalo Grass		
Symphyotrichum squamatum	Bushy Starwort		
Trifolium sp.	Clover		

Weed Species		Native Species	
Species	**Common Name**	**Species**	**Common Name**
Tropaeolum majus	Garden Nasturtium		
Typha orientalis	Typha		
Ursinia anthemoides	Ursinia		
Verbesina encelioides	Crownbeard		
Vicia sativa	Vetch		
Washingtonia filifera	Cotton Palm		

* Denotes species native to WA but planted within the survey site.

4.2.2 Conservation Significant Ecological Communities

The Tall *Melaleuca* Shrubland within the survey area had some consistencies with community types associated with Clay Pans of the Swan Coastal Plain (SCP7, SCP8, SCP9 and SCP10a), such as *Melaleuca lateritia, M. viminea, Hypocalymma angustifolium*, *Leptocarpus coangustata* (syn. *Meeboldina coangustata*) and *Lepidosperma longitudinale* (DEE, 2012). Standing water was also noted in some areas (Figure 2). Clay Pans of the Swan Coastal Plain have been recorded in several locations with the same soil (212Bs-B4) type and within 2 km of survey site (DBCA 2019b, DEE, 2012), including Anstey-Keane Damplands, which is part of the south-east strip of vegetation within the survey site.

Impacts to this community type are considered 'significant' if the vegetation is in Good condition as a minimum, with no minimum patch size indicated (DEE, 2012). Within the survey site, two areas of Tall Melaleuca Shrubland were assessed as being in Good condition, with one area of 215 m^2 towards the north-eastern portion of the site and another of 150 m^2 at the south of the site (Map 6). Vegetation condition south-east of the survey site continued to be classified as Tall *Melaleuca* Shrubland and condition quickly improved to Very Good (within <5 m) (Figure 1).

Figure 2: Standing water noted in areas

4.2.2 Conservation Significant Flora

One conservation significant species was found during the site visit, *Jacksonia gracillima,* a Priority 3 species (Figure 3). A single plant was located within a Degraded portion of the *Melaleuca* Woodland, with no other plants noted within or adjacent to the site (Map 6). No other conservation significant flora was observed during the site visit, although annual species such as *Drosera occidentalis* and *Diuris purdiei* (Purdie's Donkey Orchid) would not be presenting yet. Although the soil conditions and vegetation types were suitable for conservation significant species, the degraded nature of the majority of the site indicated that the presence of annual conservation significant flora is not likely. The area to the south-east in which the vegetation condition was higher is likely suitable habitat for conservation significant species; species may be present at this location.

Figure 3: *Jacksonia gracillima* located within the survey area

Map 6: Conservation Significant Flora, Area of Good Tall Melaleuca Shrubland and Potential Tree Retention
Skeet Road Flora Survey

0 100 200 m

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4.2.3 Fauna habitat suitability

The site was also inspected for conservation significant fauna habitat. There was a low density of mature trees with no evidence of feeding, roosting or nesting by black cockatoos noted on the site. The area of Banksia Woodland may represent a small area of potential foraging habitat for Black Cockatoos; however the remainder of the area was of poor quality foraging habitat. Four mature native trees were noted for potential tree retention including two *Melaleuca preissiana*, one *Eucalyptus rudis*, and one *Eucalyptus todtiana* (Figure 4, Map 6). These trees may provide roosting habitat for Black Cockatoos, and likely provide habitat for a host of other species. There was no evidence of quenda diggings or suitable nesting habitat within the survey site; however, the high quality remnant bushland to the south-east likely supports a population, with a dense understorey providing suitable habitat.

Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*) predominantly use Sheoak (*Allocasuarina* and *Casuarina*) needles to form a burrow (Curtin University, 2019); as these species were not found on site it can be concluded that the habitat is not suitable for this species. The conservation significant short tongue bees (*Neopasiphae simplicior* and *Leioproctus contrarius*) have been noted on perennial (*Goodenia filiformis*) and annual (*Lobelia tenuior, Velleia* sp., *Anthotium junciforme*) herbs (DEE, 2008; DEE 2012). *Goodenia filiformis* was not noted on site, and the area is likely too degraded to support the annual herbs outlined; this area of remnant vegetation is likely unsuitable habitat for these conservation significant invertebrate species. The high quality remnant bushland to the south-east may be suitable habitat to support the short-tongued bee species.

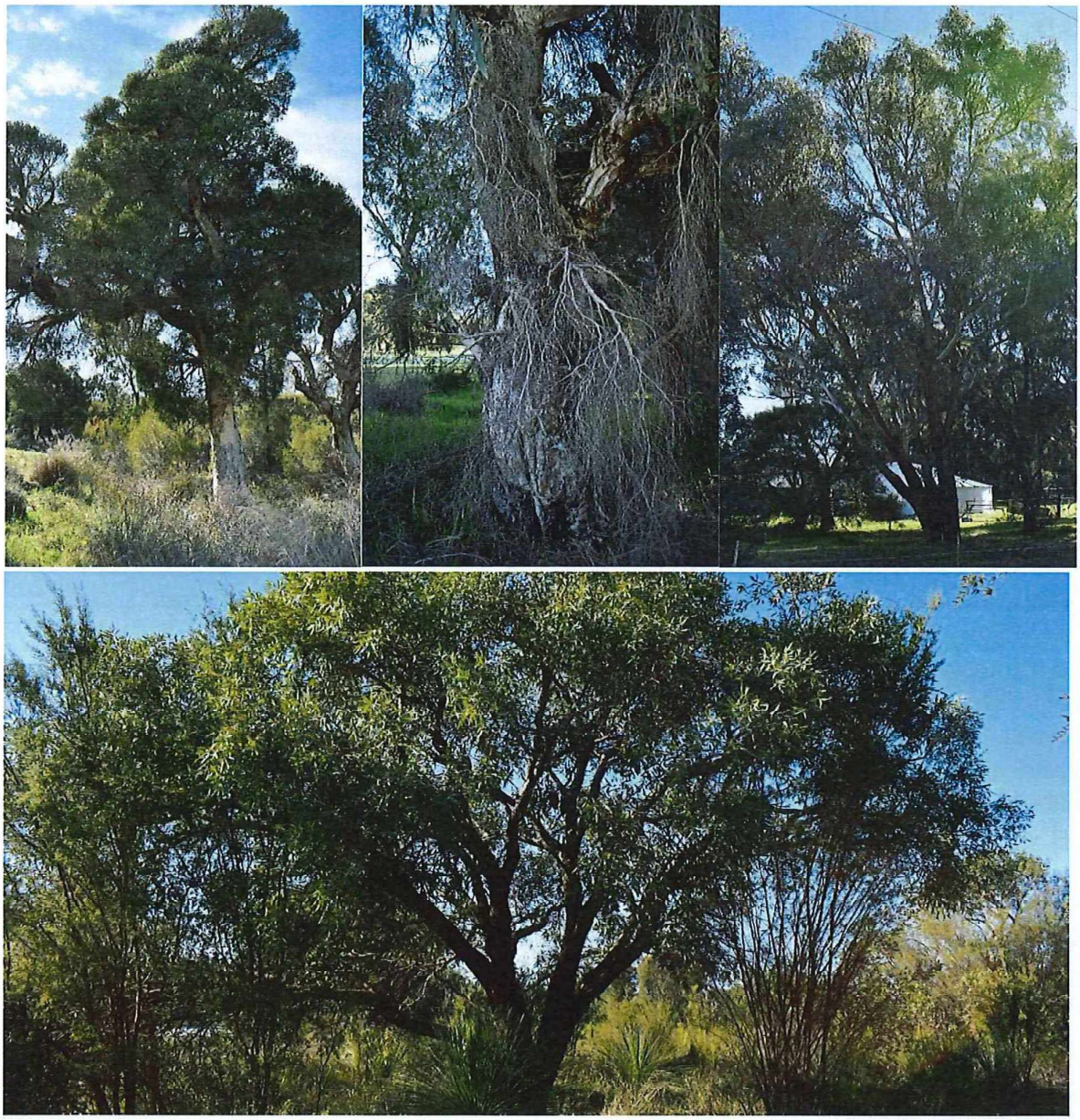

Figure 4: Potential tree retention: *Melaleuca preissiana* (left and centre), *Eucalyptus rudis* (right) and *Eucalyptus todtiana* (bottom)

5.0 Conclusion

The reconnaissance flora survey carried out along Skeet Road in Forrestdale for the City of Armadale recorded a predominately Completely Degraded wetland vegetation. Four vegetation types were recorded, Banksia Woodland, Melaleuca Woodland, Tall Melaleuca Shrubland, and Cleared/Landscaped areas with no native vegetation.

5.1 Conservation significant Flora

One conservation significant species was recorded, a single, mature *Jacksonia gracillima* plant. The local area was inspected, with no other plants noted within 20 m. No other conservation significant species were recorded during the survey period, with the majority of the site likely too degraded to support annual conservation significant flora. The area of vegetation to the south-east was suitable habitat for conservation significant flora and may support rare species.

5.2 Conservation Significant Ecological Communities

5.2.1 Banksia Woodlands of the Swan Coastal Plain

Although the area of Banksia Woodland found within the survey site has the structure and basic species composition consistent with the Banksia Woodlands of the Swan Coastal Plain listing, it is a small area (<2,500 m^2) and has been assigned a Degraded vegetation condition due to the level of weed infestation and lack of native understorey species. The Banksia Woodland of the Swan Coastal Plains conservation advice outlines that vegetation should meet at least a Good vegetation condition, and the minimum patch size (for a patch of vegetation in Good condition) is 20,000 m^2. Accordingly, this area does not satisfy either criteria and will therefore is not considered 'significant' as defined by the *EPBC Act* (DEE, 2016), and referral to the DEE will not be required.

5.2.2 Clay Pans of the Swan Coastal Plains

An area of Tall *Melaleuca* Shrubland was recorded, with some species consistent with Clay Pans of the Swan Coastal Plain, however the majority of this vegetation type was in Degraded to Completely Degraded condition. Several small areas were classified as Tall *Melaleuca* Shrubland in Good condition; the Department of Water and Environmental Regulation (DWER) and the Department of Biodiversity, Conservation and Attractions (DBCA) should be consulted as to how best to proceed with these areas, as the clearing of these areas may trigger the EPBC Act.

As Clay Pans of the Swan Coastal Plain has no minimum patch size (the smallest area assessed is 116m^2), and the buffer area for this community is 500 metres, the clearing of areas within the survey site may trigger the need for a referral under the *EPBC Act* (DEE, 2012). As this was a reconnaissance survey, species composition associated with this vegetation type was not undertaken and the community type cannot be confirmed as a Clay Pan of the Swan Coastal Plain. A detailed (level 2) spring flora survey of the area would be required to determine if this community type is present within the survey area. It is also recommended that consultation with DBCA is undertaken to further investigate the presence of Clay Pans of the Swan Coastal Plain within Lot 171 adjacent to the survey site.

5.3 Other Factors that may Impact the Clearing Proposal

Approximately 6,250 m^2 of the survey site is part of the Anstey-Keane Damplands Bush Forever Site (342); this area is considered environmentally significant by the Environment Protection Authority under section 51B of the *Environmental Protection Act 1986* (WA) (EP Act). If clearing is only undertaken within the road reserve the development envelope will only encompass Degraded or Completely Degraded Conservation Category Wetland, or areas already cleared for Skeet Road.

Although the survey site is part of a Bush Forever Site, has the potential fora Threatened Ecological Community to occur, and contains good quality Conservation Category Wetland these areas do not occur within the road reserve, they are located in adjacent areas. If clearing does not extend beyond the road reserve these environmentally significant impacts may be avoided. The City should consult with DBCA and DWER prior to the submission of a clearing application to determine a suitable course forward.

5.4 Clearing Principles

Under Schedule 5 of the *Environment Protection Act 1986* (WA) there are ten principles for clearing of native vegetation in Western Australia that need to be assessed in order for a clearing permit to be issued. If any of these principles are triggered the Department of Water and Environmental Regulation can refuse to issue a clearing permit. Table 5 shows the survey areas in relation to the clearing principles. Based on the reconnaissance flora survey, clearing within the site may be at variance to four of the 10 clearing principles.

Table 5: The ten clearing principles and assessment the site.

Clearing Principle		Assessment
Native vegetation should not be cleared if:		
a)	it comprises a high level of biological diversity	There was a low native species diversity in the area surveyed.
b)	it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	Poor quality of vegetation indicates a low level of habitat suitability for native fauna; flora species associated with conservation significant invertebrate species were not present within the survey site, however they may be located in adjacent vegetation to the south-east.
c)	it includes, or is necessary for the continued existence of, rare flora	No declared rare flora was recorded within site, and the majority of the site was unsuitable to support annual rare flora species, however rare species may be present in the vegetation to the south-east and the survey site may be within buffers if species are present.
d)	it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community	One Threatened Ecological Community may occur within the survey site, Clay Pans of the Swan Coastal Plain. However, it may not be encompassed by the clearing envelope.
e)	it is significant as a remnant of native vegetation in an area that has been extensively cleared	The proportion of Good or Very Good quality vegetation was low (~0.3 ha), with ~300 ha of vegetation to the south-east (Anstey-Keane Damplands), and other remnant vegetation in the area including Forrestdale Lake, Harrisdale Swamp, and Bush Forever Site 413 north of Ranford Road.

Clearing Principle		Assessment
f)	it is growing in, or in association with, an environment associated with a watercourse or wetland	Desktop research indicated the presence of Conservation Category and Multiple Use Wetlands, site survey confirmed the presence of vegetation types associated with wetlands and standing water on site.
g)	the clearing of the vegetation is likely to cause appreciable land degradation	Due to the small proposed clearing area it is unlikely that will cause appreciable land degradation such as soil erosion, salinity or soil acidity within the area.
h)	the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	Clearing and subsequent use after may cause negative impacts into the remnant vegetation to the south-east, including an increase in unauthorised access, litter and weed invasion. This may have an impact on the environmental values adjacent, including potential fauna habitat, rare flora and threatened ecological communities. However, vegetation appears to be resilient to edge effects, with an increase in condition over a short distance from the firebreak.
i)	the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	Due to the small proposed clearing area there will not be a significant change to the vegetation types of the landscape to affect underground water.
j)	the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	Due to the small proposed clearing area there will not be a significant change to the vegetation types of the landscape to affect flooding.

6.0 References

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Appendix 1: Conservation Significant Flora Summary

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
	*Andersonia gracilis* (Slender Andersonia)	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	EN	Y	Soil type and drainage may be suitable, occurs in adjacent LGA
	*Aponogeton hexatepalus* (Stalked Water Ribbons)	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green-white	Jul to Oct.	Mud. Freshwater: ponds, rivers, claypans.	P4	Y	Within extent, area may be wet enough to support this species

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
  (Natural Area)	*Austrostipa jacobsiana*	Austrostipa jacobsiana is a perennial rhizomatous grass to 1.2 metres tall including flower spikes. The leaves are up to 45cm long, folded and swollen giving a terete appearance. The abaxial surface is strongly ribbed. The inflorescence is 10–20cm long. Flowering occurs in October–November. Fruit matures in November–December (Williams 2011).	Oct- Nov	Low-lying area, fringing wetland vegetation	T, CR	Y	Found on roadside in one population nearby
	*Byblis gigantea* (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	Soil type and drainage suitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
	*Caladenia huegelii* (Grand Spider Orchid)	Tuberous, perennial herb, 0.25 – 0.6m high. Green, cream and red flowers.	September to October.	Grey or brown sand, clay loam.	T, EN	Y	Soil type suitable and site is within the species natural distribution, with population found in Forrestdale, an adjacent suburb. Soil may be too wet.
	*Diuris micrantha* (Dwarf Bee-Orchid)	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown	Sep to Oct	Brown loamy clay. Winter-wet swamps, in shallow water	VU	N	Drainage suitable, but site outside of range and soil type may not be suitable.

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
	*Diuris purdiei* (Purdie's Donkey Orchid)	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow	September to October	Grey-black sand, moist. Winter-wet swamps.	T, EN	Y	Soil type and drainage suitable. Site is near known populations
Not available	*Dosera occidentalis* (Western Sundew)	Fibrous-rooted, rosetted perennial, herb, to 0.01 m high. Fl. pink/white	Nov to Dec.	Sandy & clayey soils. Swamps & wet depressions	P4	Y	Soil types and drainage suitable, found in City of Armadale
	*Drakaea elastica* (Glossy-leaved Hammer Orchid)	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow	October to November	White or grey sand. Low-lying situations adjoining winter-wet swamps	T, EN	Y	Soil type suitable and site is within the species natural distribution.

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
	*Drakaea micrantha* (Dwarf Hammer Orchid)	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow	September to October	White-grey sand	T, VU	N	Soil type may not be suitable
	*Eucalyptus x balanites* (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.	EN	N	Soil type unsuitable, drainage unsuitable.

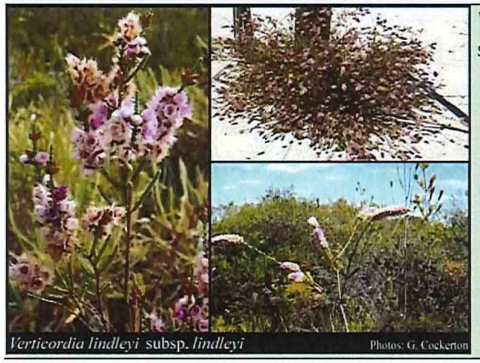
Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
	*Grevillea curviloba* subsp. *incurva* (Narrow curved-leaf Grevillea)	Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream, Aug to Sep	Aug to Sep	Sand, sandy loam. Winter-wet heath.	EN	N	Drainage suitable, but well outside recorded extent.
	*Jacksonia gracillima*	Decumbent shrub, ascending branches to 50 cm, plant to 1.5 m across. Flowers yellow-red.	Oct-Nov	With Melaleuca preissiana, low sedges, damplands	P3	Y	Occurs nearby, soil type suitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 *Jacksonia sericea* Photo: I R. Dixon	*Jacksonia sericea* (Waldjumi)	Low spreading shrub, to 0.6 m high. Fl. orange, usually	Dec or Jan to Feb.	Calcareous & sandy soils.	P4	N	Soil type not suitable, typically occurs towards coast further.
 (Natural Area)	*Lepidosperma rostratum* (Beaked Lepidosperma)	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown		Peaty sand, clay	T	Y	Soil type, drainage and location may be suitable.

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 (Bryony Fremlin)	*Ornduffia submersa*	Small aquatic waterlily-like plant with hairy white flowers and glossy leaves	Oct-Dec	Swamps	P4	Y	Found in Forrestdale and Kenwick, soil type and drainage suitable
Not available	*Schoenus capillifolius*	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green	Oct to Nov	Brown mud. Claypans.	P3	Y	Soil conditions may be suitable, site occurs within extent
 **(Natural Area)**	*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	Soil conditions suitable, found within LGA
Not available	*Stylidium aceratum*	Fibrous rooted annual, herb, 0.05-0.09 m high, leaves spathulate. Fl. pink/white	Oct- Nov	Sandy soils, Swamp heathland	P3	Y	Soil type suitable, occurs within City of Armadale

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 *Stylidium longitubum* Photos: M. Hislop and P.G. Armstrong	*Stylidium longitubum* (Jumping Jacks)	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink,	Oct-Dec	Sandy clay, clay. Seasonal wetlands	P4	Y	Soil type suitable, occurs within the City of Armadale
 *Synaphea* sp. Fairbridge Farm (D. Papenfus 696) Photos R. Butcher	*Synaphea* sp Fairbridge Farm (Selena's Synaphea)	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.	CR	N	Drainage suitable but soil type unsuitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
 *Synaphea* sp. Serpentine (G.R. Brand 103) Photos: R. Butcher	*Synaphea* sp Serpentine	Perennial, erect, clumped shrub to 60cm high by 50cm wide with yellow flowers borne on long spikes well above the leaves.	Aug-Nov	grey-brown sandy-loam or clay in seasonally wet areas	CR	N	Drainage suitable, but occurs further to the south in narrow geographic range
 *Thysanotus glaucus* Photos: N.H. Brittan	*Thysanotus glaucus*	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	Soil type and drainage unsuitable
Not available	*Tripterococcus* sp. Brachylobus	Perennial, herb, to 1 m high. Fl. yellow-green	Oct to Nov.	black or peaty sand; winter wet flats	P4	Y	Found in Armadale LGA, soil type and drainage may be suitable

Picture	Common Name	Description	Flowering Period	Habitat Type	Cons Code	Likelihood (Y/N)	Comment
	*Verticordia lindleyi* subsp. *lindleyi*	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	Occurs in nearby locations, drainage and soil type suitable

Source: Florabase (DBCA 2019c) unless otherwise noted