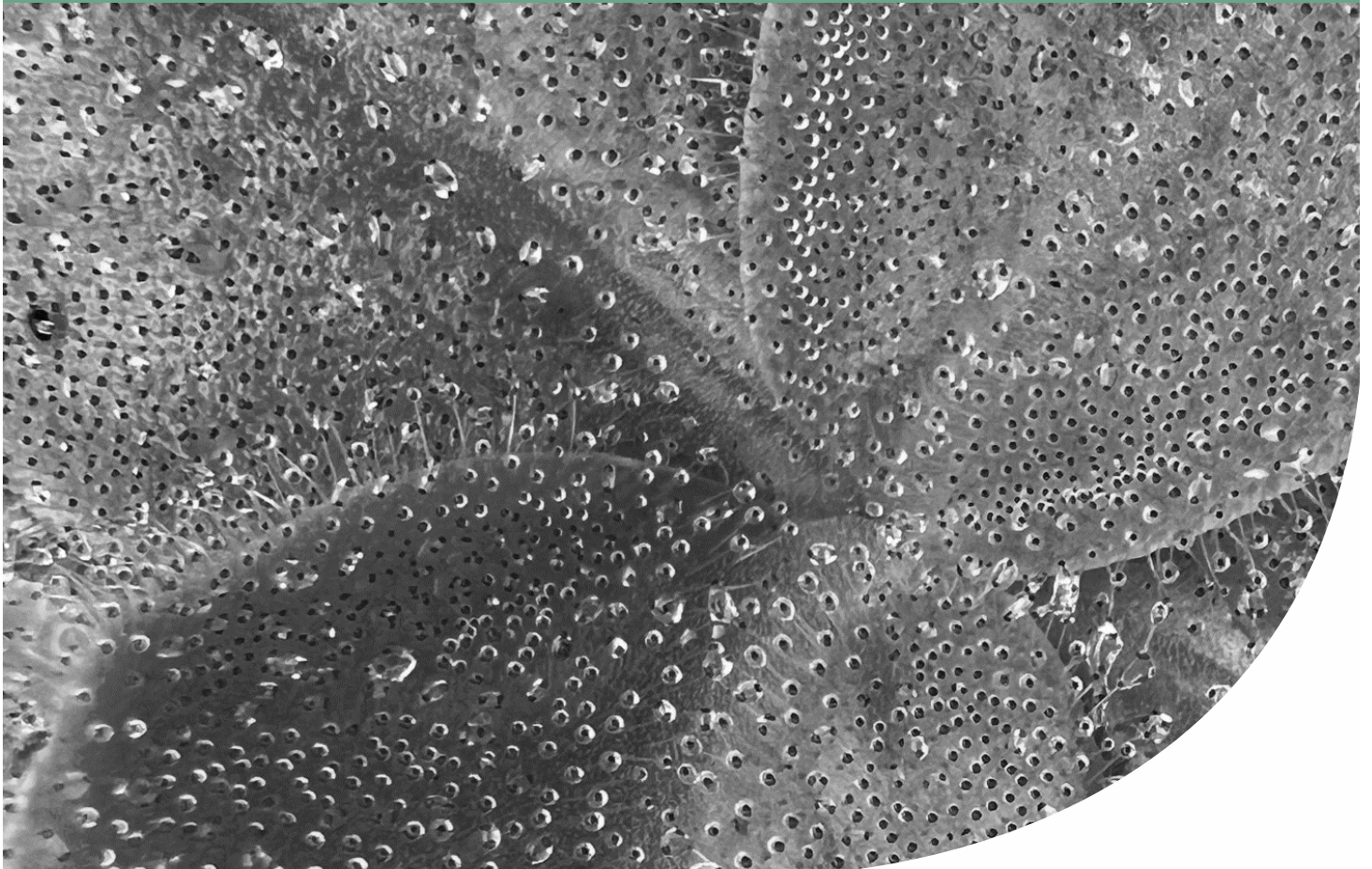


# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick

Project No: EP21-094(05)

**Prepared for Hesperia Property Pty Ltd  
December 2023**



# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



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# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



## Executive Summary

Hesperia Property Pty Ltd engaged Emerge Associates to conduct a detailed flora and vegetation assessment within Lots 25, 16 and 988 Victoria Rd in Kenwick (the 'site').

The assessment included a desktop study of the environmental context of the site and the likelihood of occurrence of threatened and priority flora and ecological communities. Field surveys were conducted on 10 August 2022, 11 August 2022, 18 October 2022 and 23 February 2023 during which the composition and condition of vegetation was recorded. Flora and vegetation values were characterised to the standard required of a detailed survey with reference to (EPA 2016b).

Outcomes of the assessment include the following:

- Vegetation in the site is predominately non-native and weedy or planted. However, remnant native vegetation occurs in scattered locations.
- No threatened or priority flora occur.
- Approximately 0.46 ha of remnant native vegetation occurs in degraded condition.
- No threatened or priority flora or ecological communities occur.
- Vegetation in the site provides habitat for native fauna including threatened species of black cockatoo.

# Detailed Flora and Vegetation Assessment

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# Detailed Flora and Vegetation Assessment

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## Appendices

### **Appendix A**

Additional Information

### **Appendix B**

Conservation Significant Flora Species and likelihood of Occurrence Assessment

### **Appendix C**

Conservation Significant Communities and Likelihood of Occurrence Assessment

### **Appendix D**

Species List

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## Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
EPA	Environmental Protection Authority
DBCA	Department of Biodiversity, Conservation and Attractions
DoW	Department of Water (now DWER)
DWER	Department of Water and Environmental Regulation
DPaW	Department of Parks and Wildlife (now DBCA)
WALGA	Western Australia Local Government Association

Table A2: Abbreviations – General terms

General terms	
A	Annual
CR	Critically endangered
EN	Endangered
ESA	Environmentally sensitive area
FCT	Floristic community type
IBRA	Interim Biogeographic Regionalisation for Australia
NVIS	National Vegetation Information System (ESCAVI 2003)
P1	Priority 1
P2	Priority 2
P3	Priority 3
P4	Priority 4
P5	Priority 5
PEC	Priority ecological community
P	Perennial
PG	Perennial geophyte
T	Threatened
TEC	Threatened ecological community
UFI	Unique feature identifier
VU	Vulnerable

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*Table A3: Abbreviations – Legislation*

Legislation	
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
EP Act	<i>Environmental Protection Act 1986</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
BC Act	<i>Biodiversity Conservation Act 2016</i>
BC Regs	<i>Biodiversity Conservation Regulations 2018</i>

*Table A5: Abbreviations – Units of measurement*

Units of measurement	
cm	Centimetre
ha	Hectare
km	Kilometre
m	Metre
m <sup>2</sup>	Square metre
m AHD	m in relation to the Australian height datum
mm	Millimetre

# Detailed Flora and Vegetation Assessment

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## 1 Introduction

### 1.1 Purpose

Emerge Associates (Emerge) were engaged by Hesperia Property Pty Ltd to conduct a flora and vegetation assessment within lots 25, 16 and 988 of Victoria Road in Kenwick as shown in **Figure 1** (referred to herein as the 'site').

The purpose of a flora and vegetation assessment is broadly to characterise the values of vegetation at a location. When undertaken to inform an environmental approvals process, assessments necessarily need to focus on values that confer legislative or policy requirements. In Western Australia, these values generally include 'native vegetation', 'threatened' or 'priority' flora, 'threatened ecological communities' (TECs), 'priority ecological communities' (PECs) and, to a lesser extent, weeds.

### 1.2 Relevant legislation and policy

'Native vegetation' is defined by the *Environmental Protection Act 1986* (EP Act) as indigenous aquatic or terrestrial flora. In the *Environmental Factor Guideline – Flora and Vegetation* the EPA further clarifies the definition to include native vascular flora and defines vegetation as groupings of flora (EPA 2016a). Native vegetation is protected in Western Australia and can't be cleared without a permit or valid exemption. Biological diversity, habitat function, scarcity, association with wetlands and other ecosystem services influence the value placed on native vegetation (DWER 2018a). Planted flora and vegetation is generally not regarded as native vegetation unless it was required to be established under the EP Act or other written law or regulation.

Flora and ecological communities may be listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2021) and the State *Biodiversity Conservation Act 2016* (BC Act) (DBCA 2022c, 2023d). Threatened flora and TECs are classified as either 'critically endangered' (CR), 'endangered' (EN) and 'vulnerable' (VU) (DCCEEW 2021). Commonwealth and/or State ministerial approval is required to impact threatened flora or TECs.

Native flora and ecological communities that are not listed as threatened, but are otherwise considered rare or under threat, may be added to a Department of Biodiversity, Conservation and Attractions (DBCA) priority list (DBCA 2022b, c). 'Priority flora' and PECs are classified as either 'priority 1' (P1), 'priority 2' (P2), 'priority 3' (P3) or 'priority 4' (P4). Priority listing does not confer direct statutory protection. However, priority classifications may be taken into account during State and Local government approvals.

Flora that are regarded as having negative environmental or economic impacts are often referred to as weeds (DBCA 2023f). Particularly detrimental weed species may be listed as a 'declared pest' pursuant to the State *Biosecurity and Agriculture Management Act 2007* (BAM Act) or as a 'weed of national significance' (WoNS) (DAWE 2021). Management of weeds, declared pests and WoNS may be required during government approval processes.

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Further information on legislation and policy relevant to flora and vegetation assessments is provided in **Appendix A**.

## 1.3 Scope of work

The Environmental Protection Authority (EPA) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* establishes standards for the assessment of flora and vegetation in Western Australia (EPA 2016b).

The scope of work was to undertake a detailed survey with reference to (EPA 2016b).

As part of this scope of work, the following tasks were undertaken:

- Desktop study to provide contextual information and determine the likelihood of occurrence of threatened and priority flora or ecological communities.
- Field survey(s) to record flora, vegetation units and vegetation condition.
- Analysis and mapping of contextual information, vegetation units, vegetation condition and threatened and priority flora or ecological communities (if present).
- Documentation of the desktop study, methods, results, discussion and conclusions.

# Detailed Flora and Vegetation Assessment

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## 2 Desktop Study

### 2.1 Site context

#### 2.1.1 Location and extent

The site is located in the City of Gosnells within the greater Perth Metropolitan Area and South West Region of Western Australia. The site is bounded by Tonkin Highway to the east, Victoria Road to the north and industrial lots to the west and south and extends over 8.99 hectares (ha) as shown in **Figure 1**.

#### 2.1.2 Climate

The South West region of Western Australia experiences a Mediterranean climate of hot dry summers and cool wet winters (BoM 2023). Rainfall preceding the most recent survey at the closest weather station to the site was inconsistent with long term averages **Plate 1** (BoM 2023). Flora and vegetation surveys should be undertaken during the season that is most suitable for detection and identification of the range of flora likely to occur in the area (EPA 2016b). For the 'south-west' botanical province in which the site lies, the primary survey time is spring (September to November) (EPA 2016b).

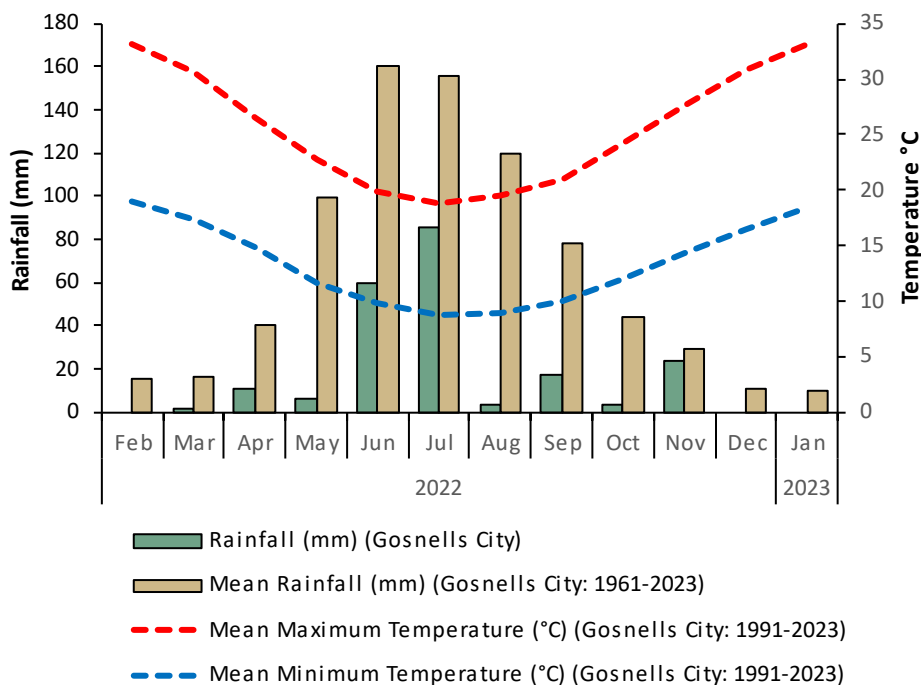


Plate 1: Recent rainfall and long-term mean temperature and rainfall

#### 2.1.3 Geomorphology and soils

Landform and soils influence fauna habitat and species at regional and local scales. The site occurs on the Swan Coastal Plain, which is the geomorphic unit that characterises much of the Perth

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Metropolitan Area. The Swan Coastal Plain is approximately 500 km long and 20 to 30 km wide and is roughly bound by the Indian Ocean to the west and the Darling Scarp to the east. Broadly the Swan Coastal Plain consists of two sedimentary belts of different origin. Its eastern side comprises the Pinjarra Plain which formed from the deposition of alluvial material washed down from the Darling Scarp, while its western side comprises three dune systems that run roughly parallel to the Indian Ocean coastline (Seddon 2004). These dune systems, referred to as Quindalup, Spearwood and Bassendean associations, represent a succession of coastal deposition that has occurred since the late Quaternary period (approximately two million years ago) (Kendrick *et al.* 1991) and, as a result, they contain soils at different stages of leaching and formation.

Examination of physiographic region mapping by (Gozzard 2011) places the site in the Pinjarra Plain which was later confirmed during the field survey. The Pinjarra Plain consists of grey and brown clays and silts that were deposited from the Darling Scarp as alluvial fans, combined with sands and conglomerates (Churchward and McArthur 1980). The physiographic regions mapped within the site are shown in **Figure 2**.

Fine scale soil landscape mapping by (DPIRD 2022) shows four units as occurring within the site, as described in **Table 1** and shown in **Figure 2**.

Table 1: Soil landscape mapping units within the site (DPIRD 2022)

Soil landscape unit	Location within site	Description
S8	Small area in the north	Sand - white to pale grey at surface, yellow at depth, fine to mediumgrained, moderately sorted, subangular to subrounded, minor heavy minerals, of eolian origin
S10	Majority of site	Sand - white to pale grey at surface, yellow at depth, fine to mediumgrained, moderately sorted, subangular to subrounded, minor heavy minerals, of eolian origin

The site is not known to contain any restricted landforms or unique geological features.

## 2.1.4 Topography

The elevation of the site ranges from 24 m in relation to the Australian height datum (mAHD) on the western side to 28 mAHD on the eastern side (DoW 2008) (**Figure 2**).

## 2.1.5 Hydrology and wetlands

Wetlands are areas of seasonally, intermittently or permanently waterlogged land such as poorly drained soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries (Wetlands Advisory Committee 1977). Many wetlands provide important fauna habitat and support high levels of fauna biodiversity and endemism.

Wetlands of national or international significance may be afforded special protection under Commonwealth or international agreements. Review of the *Ramsar List of Wetlands of International Importance* (DBCA 2017) and *A Directory of Important Wetlands in Australia – Western Australia* (DBCA 2018) indicates that no Ramsar or listed 'important wetlands' are located within or near the site.

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Examination of the Department of Water and Environmental Regulation (DWER) hydrography linear dataset (DWER 2018b) shows the following no wetland or water related features occur within the site.

The *Geomorphic Wetlands of the Swan Coastal Plain* dataset maps geomorphic wetland features and classifies them based on their landform shape and water permanence (DBCA 2023a). Each wetland feature is assigned to one of three management categories: 'conservation', 'resource enhancement' and 'multiple use'.

A review of the *Geomorphic Wetlands, Swan Coastal Plain* dataset indicated that no wetland features occurs within the site (DBCA 2021) as shown in **Figure 2**.

## 2.1.1 Regional vegetation

Vegetation types and resulting fauna habitats strongly influence the diversity and composition of fauna taxa present within an area. Native vegetation is described and mapped at different scales in order to illustrate patterns in its distribution. At a continental scale the *Interim Biogeographic Regionalisation of Australia* (IBRA) divides the Swan Coastal Plain into two floristic subregions (Environment Australia 2000).

The site is contained within the 'SWA02' or Perth subregion, which is characterised as mainly containing *Banksia* low woodland on leached sands with *Melaleuca* swamps where ill-drained; and woodland of *Eucalyptus gomphocephala* (tuart), *E. marginata* (jarrah) and *Corymbia calophylla* (marri) on less leached soils (Beard 1990). This subregion is recognised as a biodiversity hotspot and contains a wide variety of endemic fauna species.

Variations in native vegetation can be further classified based on regional vegetation mapping.

Hedde *et al.* (1980) mapping shows the site as comprising the 'Guildford complex', which is described as vegetation ranging from open forest to tall open forest of *E. calophylla* - *E. wandoo* - *E. marginata* and woodland of *E. wandoo* (with rare occurrences of *E. lane-poolei*). Minor components include *E. rudis* - *M. raphiophylla*.

The Guildford complex was determined to have 5.09% of its pre-European extent remaining on the Swan Coastal Plain, with 0.26% protected for conservation purposes<sup>1</sup> (Government of Western Australia 2019).

## 2.1.2 Threatened and priority flora

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) has compiled various datasets relating to 'matters of national environmental significance' (MNES) (DCCEEW 2023). The *Protected Matters Search Tool* provides general guidance on threatened flora listed under the EPBC Act that may occur within a location based on validated records and less reliable unvalidated habitat distribution modelling (DCCEEW 2023).

---

<sup>1</sup>Defined as being listed in the DBCA-legislated lands and waters dataset as either Crown reserves or lands managed under Section 8A of the CALM Act that have an IUCN category of I – IV (Government of Western Australia 2019).

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DBCA's *Threatened and Priority Flora Database* and *WA Herbarium Database* contain records of threatened and priority flora in Western Australia (DBCA 2023e). Searches of these databases provide point data for threatened and priority flora within a location, comprising validated and historical unvalidated records.

The *Protected Matters Search Tool* (DCCEEW 2023), *NatureMap* (DBCA 2019) and DBCA's threatened and priority flora databases (reference no. 06-0219FL) identified 35 threatened and 71 priority flora occurring or potentially occurring within a 10 km radius of the site (refer **Appendix B**).

## 2.1.3 TECs and PECs

The *Protected Matters Search Tool* provides general guidance on TECs listed as CR and EN under the EPBC Act that may occur within a location based on reliable records and less reliable habitat distribution modelling (DCCEEW 2023).

DBCA's *Threatened and Priority Ecological Community buffers and boundaries in WA* dataset contains validated records of TECs and PECs. Searches of this dataset provides buffered polygons of TEC and PEC records.

The *Protected Matters Search Tool* (DCCEEW 2023) and DBCA's TEC and PEC database (reference no. 12-0219EC) identified 10 TECs and 5 PECs occurring or potentially occurring within a 10 km radius of the site (refer **Appendix C**).

## 2.1.4 Historical land use

Review of historical images available from 1953 onwards shows that the site was largely cleared of native vegetation prior to 1953, likely for agricultural purposes. From 1961 onwards the site was further cleared of native vegetation, during which several warehouses and residential buildings were constructed within the site. In 1995 a significant number of trees were cleared. In 2000 imagery indicates the site was partially revegetated to reflect the state of the site in present day (WALIA 2023).

## 2.1.5 Bush Forever

The Government of Western Australia's *Bush Forever* policy is a strategic plan for conserving regionally significant bushland within the Swan Coastal Plain portion of the Perth Metropolitan Region. The objective of *Bush Forever* is to protect representations of all original ecological communities by targeting a minimum of 10% of each vegetation complex for protection (Government of WA 2000). *Bush Forever* sites are representative of regional ecosystems and habitat and have a key role in the conservation of Perth's biodiversity.

No *Bush Forever* sites occur within the site.

## 2.1.6 DBCA managed or legislated land

DBCA has tenure of, or interests in, numerous areas of land across the state for a range of purposes. Tenure categories include national parks, nature reserves, conservation parks, marine parks, marine nature reserves, marine management areas, section 5(1)(g) reserves, state forest and timber reserves. These areas are mapped within the *Legislated Lands and Waters* (DBCA 2023b) and *Lands*



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of Interest (DBCA 2022a) datasets. The *Legislated Lands and Waters* (DBCA 2023b) dataset includes lands subject to the *Conservation and Land Management Act 1984* (CALM Act 1984), *Swan and Canning Rivers Management Act 2006* (SCRM Act) and lands identified under the *Land Administration Act 1997* (LA Act). The *Lands of Interest* (DBCA 2022a) dataset includes all other lands of which DBCA is recognised as the manager but is not vested under any act.

No DBCA managed or legislated lands or lands of interest occur within or adjacent to the site.

## 2.1.7 Ecological linkages

Ecological linkages are linear landscape elements that allow the movement of fauna, flora and genetic material between areas of remnant habitat. This exchange of genetic material between vegetation remnants improves the viability of those remnants by allowing greater access to breeding partners and food sources, refuge from disturbances such as fire and maintenance of genetic diversity of plant communities and populations. Ecological linkages are ideally continuous or near-continuous as the more fractured a linkage is, the less ease flora and fauna have in moving within the corridor (Alan Tingay and Associates 1998).

The Perth Biodiversity Project, supported by the Western Australian Local Government Association (WALGA), identified and mapped regional ecological linkages within the Perth Metropolitan Region (WALGA and PBP 2004).

One ecological linkage (No. 43) occurs in the south west portion of the site, running in a north-west to south-east direction as shown in **Figure 3**.

Review of aerial imagery indicates that very little of the vegetation in the site that overlaps with the ecological linkage remains intact and connected to vegetation in the surrounding area.

## 2.1.8 Previous surveys

The site was previously assessed by Tauss and Weston (2010) and Emerge Associates (2018, 2019) as part of wider surveys of the Maddington Kenwick Strategic Employment Area.

Tauss and Weston (2010) reported occurrence of *Conospermum undulatum* (T) and a patch of '*Allocasuarina fraseriana* – *Eucalyptus todtiana* – *Banksia menziesii* low woodland over species rich low shrublands' within lot 25 Victoria Road.

Emerge Associates (2018, 2019) reported a patch of 'Open forest *Banksia attenuata* and *Allocasuarina fraseriana* over occasional *Kingia australis* over closed non-native grassland' in degraded condition within Lot 25 Victoria Road.

## 2.2 Likelihood of occurrence

The distribution and habitat preferences of the threatened and priority flora species and ecological communities listed in **Appendix B** and **Appendix C** was reviewed against site context information described in **Section 2.1**. Likelihood of occurrence of threatened and priority flora species and ecological communities within the site was classified as 'high', 'moderate', 'low' or 'negligible' as outlined in **Table 2**.

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Table 2: Decision matrix for likelihood of occurrence of threatened and priority flora and ecological communities

		Distribution <sup>1</sup>	
		Reliable record within search area	No reliable record within search area
Habitat	Suitable	High	Negligible
	Potentially suitable	Moderate	
	Unsuitable	Low	

<sup>1</sup> Reliable record defined as validated, recent (within the last ~40 years) and spatially accurate (refer DBCA search meta data) in order to exclude unverified range or habitat projections.

## 2.2.1 Threatened and priority flora

Based on previous surveys (Emerge Associates 2018, 2019), no threatened or priority flora were classified as having a 'high' or 'moderate' likelihood of occurrence within the site. The likelihood of occurrence assessment is provided as **Appendix B**.

## 2.2.2 TECs and PECs

Based on previous surveys (Emerge Associates 2018, 2019), no TECs or PECs were classified as having a 'high' or 'moderate' likelihood of occurrence within the site. The likelihood of occurrence assessment is provided as **Appendix C**.

# Detailed Flora and Vegetation Assessment

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## 3 Methods

### 3.1 Field survey

Experienced botanists and ecologists visited the site over several occasions including:

- 10 August 2022
- 11 August 2022
- 18 October 2022
- 23 February 2023.

During the visits the site was traversed on foot and the composition and condition of vegetation was recorded. Plant specimens were collected where the identity of flora required further confirmation. Photographic images and notes were recorded as required.

#### 3.1.1 Targeted searches

Searches were conducted for threatened and priority flora and ecological communities (refer **Section 2.2**). Search extent was recorded using a hand-held GPS receiver ( $\pm 5$  m accuracy).

#### 3.1.2 Vegetation condition

The condition of the vegetation was assessed using the Keighery (1994) scale (**Table 3**). For vegetation in the site containing *Banksia* spp., the condition scale provided in the DoEE (2016) conservation advice for the 'banksia woodlands of the Swan Coastal Plain TEC' was applied in addition to the Keighery scale, as shown in **Table 3**.

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Table 3: Vegetation condition scale applied during the field survey

Category	Definition (Keighery 1994)	Indicator (DoEE 2016)	
		Typical native vegetation composition <sup>^</sup>	Typical weed cover
Pristine	Pristine or nearly so, no obvious signs of disturbance.	Native plant species diversity fully retained or almost so	Zero or close to
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.	High native plant species diversity	Less than 10%
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.	Moderate native plant species diversity	5-20%
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.	Low native plant species diversity	5-50%
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.	Very low native plant species diversity	20-70%
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.	Very low to no native species diversity	Greater than 70%

<sup>^</sup>relative to the expected natural diversity for that vegetation.

## 3.2 Analysis and data preparation

### 3.2.1 Flora identification

Flora were identified through comparison with named material and through the use of taxonomic keys. Plant specimens collected during the field survey were dried, pressed and named in accordance with requirements of the Western Australian Herbarium (2023).

Flora was classified as native if indigenous to the IBRA region in which the site occurs. Non-native flora is denoted by '\*' in text and raw data. The legal or policy status of flora was denoted using codes outlined in **Appendix A**.

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### 3.2.2 Threatened and priority flora confirmation

Threatened and priority flora were confirmed as absent from the site where no significant limitation was identified that could have affected their detection (refer **Section 3.3**).

### 3.2.3 Vegetation unit identification and description

The vegetation units within the site were identified from information collected during the field survey. The vegetation was described according to the dominant species present using the structural formation descriptions of the *National Vegetation Inventory System* (NVIS) (NVIS Technical Working Group 2017).

### 3.2.4 Floristic community type assignment

The identified vegetation units were compared to the regional 'floristic community type' (FCT) dataset *A floristic survey of the southern Swan Coastal Plain* (Gibson *et al.* 1994). As no formal sampling was completed contextual information relating to the soils, landforms and known FCTs within the region was considered in the determination of an FCT for vegetation within the site.

### 3.2.5 TEC and PEC confirmation

Vegetation units were assessed against TEC and PEC diagnostic characteristics and, if available, size and/or vegetation condition thresholds (DBCA 2023c). TECs and PECs were confirmed as absent from the site where no significant limitation was identified that could have affected their detection (refer **Section 3.3**).

### 3.2.6 Mapping

Environmental features, vegetation units, vegetation condition, threatened or priority flora or ecological communities were mapped on aerial photography using notes and data collected in the field.

## 3.3 Limitations

It is important to note constraints imposed on assessments and the degree to which these may have limited outcomes. An evaluation of the desktop study and methods applied in the current assessment against standard constraints outlined in the EPA document *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b) is provided in **Table 4**.

Table 4: Evaluation of assessment against standard constraints outlined in (EPA 2016b)

Constraint	Degree of limitation	Details
Availability of contextual information	No limitation	The broad scale contextual information described in <b>Section 2.1</b> is adequate to place the site and vegetation in context.
		Previous surveys of the site provided reliable characterisation of changes to vegetation in the site over recent time.

## Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



Table 4: Evaluation of assessment against standard constraints outlined in (EPA 2016b)(continued)

Constraint	Degree of limitation	Details
Experience level of personnel	No limitation	This flora and vegetation assessment was undertaken by a qualified botanist with 20 years of botanical experience in Western Australia. Technical review was undertaken by a senior environmental consultant with 13 years' experience in environmental science in Western Australia.
Suitability of timing	No limitation	<p>In Mediterranean climates some flora spend part of their lifecycle as underground storage organs or seed to avoid excessive heat and drought over the summer period. These species, known as 'geophytes' or 'annuals', tend to re-emerge during winter and are often most visible during spring, which is the flowering period for the majority of plant species. Therefore, spring is the optimal time to complete flora and vegetation surveys in the south-west of WA.</p> <p>The survey was conducted in within the main flowering season and also other seasons. Therefore, it is likely that many plant species would have been in flower and/or visible at the time of survey. The degraded nature of the site limits the potential habitat for native geophytic plants such as orchids and the majority of threatened and priority flora species with potential to occur are perennial species. The survey timing was considered adequate to allow the detection of species for which seasonal timing is critical.</p>
Temporal coverage	No limitation / Limitation	<p>Detailed flora and vegetation assessments can require multiple visits, at different times of year, and over a period of a number of years, to enable observation of all species present.</p> <p>The site was visited multiple times in late winter, spring 2022 and summer 2023. The summer visit provided an insight into the vegetation condition and composition out of the main flowering period. Therefore, according to the EPA guidelines this survey would be considered to meet the requirements of a 'detailed' survey.</p>
Spatial coverage and access	No limitation	Site coverage was comprehensive (track logged).
	No limitation	All parts of the site could be accessed as required.
Sampling intensity	No limitation	A total of 47 species were recorded. While formal sampling was not conducted the inventory of species is considered near comprehensive.
Influence of disturbance	No limitation	Historical ground disturbance was evident. Some native vegetation in the site is remnant and some is regrowth. Most vegetation in the site comprises non-native species. The disturbance history of the site was considered when undertaking field sampling.
Adequacy of resources	No limitation	All resources required to perform the survey were available.

# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



## 4 Results

### 4.1 Flora

#### 4.1.1 Species inventory

A total of 47 were recorded during the field survey. A summary of legal and policy status of flora records is provided in **Table 5**. A complete species list is provided in **Appendix D**.

*Table 5: Summary of legal and policy status of taxa recorded in the site*

Status	Unlisted	Threatened	Priority	Declared Pest	Planted	Total
Native	10	-	-	-	-	<b>10</b>
Non-native	10	-	-	-	27	<b>37</b>
Total	20	-	-	-	27	<b>47</b>

### 4.2 Vegetation

#### 4.2.1 Vegetation units



Seven vegetation units were identified within the site. A description and the area of each vegetation unit is provided in **Table 6**. The location of each vegetation unit is shown in **Figure 4**.



## Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick

Table 6: Description and extent of vegetation units identified within the site



Code	Description	Total area (ha)	Proportion of site (%)	Representative photograph
BAf	Low open woodland of <i>Banksia menziesii</i> and <i>Allocasuarina fraseriana</i> over <i>Xanthorrhoea preissii</i> occasional <i>Kingia australis</i> over low grassland and herbland of non-native species.	0.88	9.76%	
Cc	Scattered <i>Corymbia calophylla</i> trees over low grassland and herbland of non-native species.	0.04	0.44%	



# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



Table 7: Description and extent of Vegetation units identified within the site (continued)

Code	Description	Total area (ha)	Proportion of site (%)	Representative photograph
Er	Scattered <i>Eucalyptus rudis</i> trees over low grassland and herbland of non-native species.	0.01	0.11%	
Et	Scattered <i>Eucalyptus tottiana</i> trees over low grassland and herbland of non-native species.	0.04	0.44%	

## Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick

Table 8: Description and extent of Vegetation units identified within the site (continued)

Code	Description	Total area (ha)	Proportion of site (%)	Representative photograph
Non-native	Low grassland and herbland of non-native species.	5.54	61.49%	
Non-native eucalypts	Non-native predominantly eucalypt trees over low grassland and herbland of non-native species.	2.5	27.75%	

## Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



### 4.2.2 Vegetation condition

The extent of vegetation by condition category is detailed in **Table 10** and shown in **Figure 5**.

*Table 9: Extent of vegetation condition categories within the site*

Condition category (Keighery 1994)	Total area (ha)	Proportion of site (%)
Pristine	0	0
Excellent	0	0
Very good	0	0
Good	0	0
Degraded	0.46	5.1
Completely degraded	8.55	94.9

## Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



### 5 Discussion

Vegetation in the site is primarily non-native and weedy or with respect to trees planted. Remnant native trees of *Banksia menziesii*, *Allocasuarina fraseriana*, *Corymbia calophylla* and *Eucalyptus todtiana* occur in western portion and scattered locations along with very occasional understory of *Acacia saligna*, *Xanthorrhoea preissii*, *Kingia austalis* and *Hibbertia hypericoides*.

No occurrences of threatened or priority flora species were recorded and none of the threatened and priority flora species identified in as **Appendix B** are considered to occur as, had they been present, there was no limitation affecting their detection (refer **Section 3.3**).

Vegetation condition was mapped as degraded where native canopy occurs (0.46 ha) and completely degraded otherwise. Being degraded the native vegetation in the site is not considered representative of any of the threatened or priority ecological communities identified in **Appendix C**.

Native and non-native vegetation in the site provides foraging habitat for threatened species of black cockatoo and other fauna, along with other ecosystem services.

## Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



## 6 Conclusions

Outcomes of the assessment include the following:

- Vegetation in the site is predominately non-native and weedy or planted. Remnant native vegetation occurs in scattered locations.
- No threatened or priority flora occur.
- Approximately 0.46 ha of remnant native vegetation occurs in degraded condition.
- No threatened or priority flora or ecological communities occur.
- Vegetation in the site provides habitat for native fauna including threatened species of black cockatoo.

# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



## 7 References

### 7.1 General references

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# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



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## 7.2 Online references

The online resources that have been utilised in the preparation of this report are referenced in **Section 7.1**, with access date information provided in **Table R 1**.

*Table R 1 Access dates for online references*

# Detailed Flora and Vegetation Assessment

Lots 25, 16 and 988 Victoria Rd Kenwick



Reference	Date accessed	Website or dataset name
(BoM 2023)	13 November 2023	Climate Data Online
(DBCA 2023d)	13 November 2023	Threatened Ecological Communities
(DAWE 2021)	13 November 2023	Weeds of National Significance (WoNS)
DCCEEW (2023)	13 November 2023	Protected Matters Search Tool
DBCA (2019)	31 January 2019	NatureMap
WALIA (2023)	13 November 2023	Landgate Map Viewer
Western Australian Herbarium (2023)	13 November 2023	Florabase



# Figures



*Figure 1: Site Location*

*Figure 2: Hydrography, Soils Figure 2: and Topography*

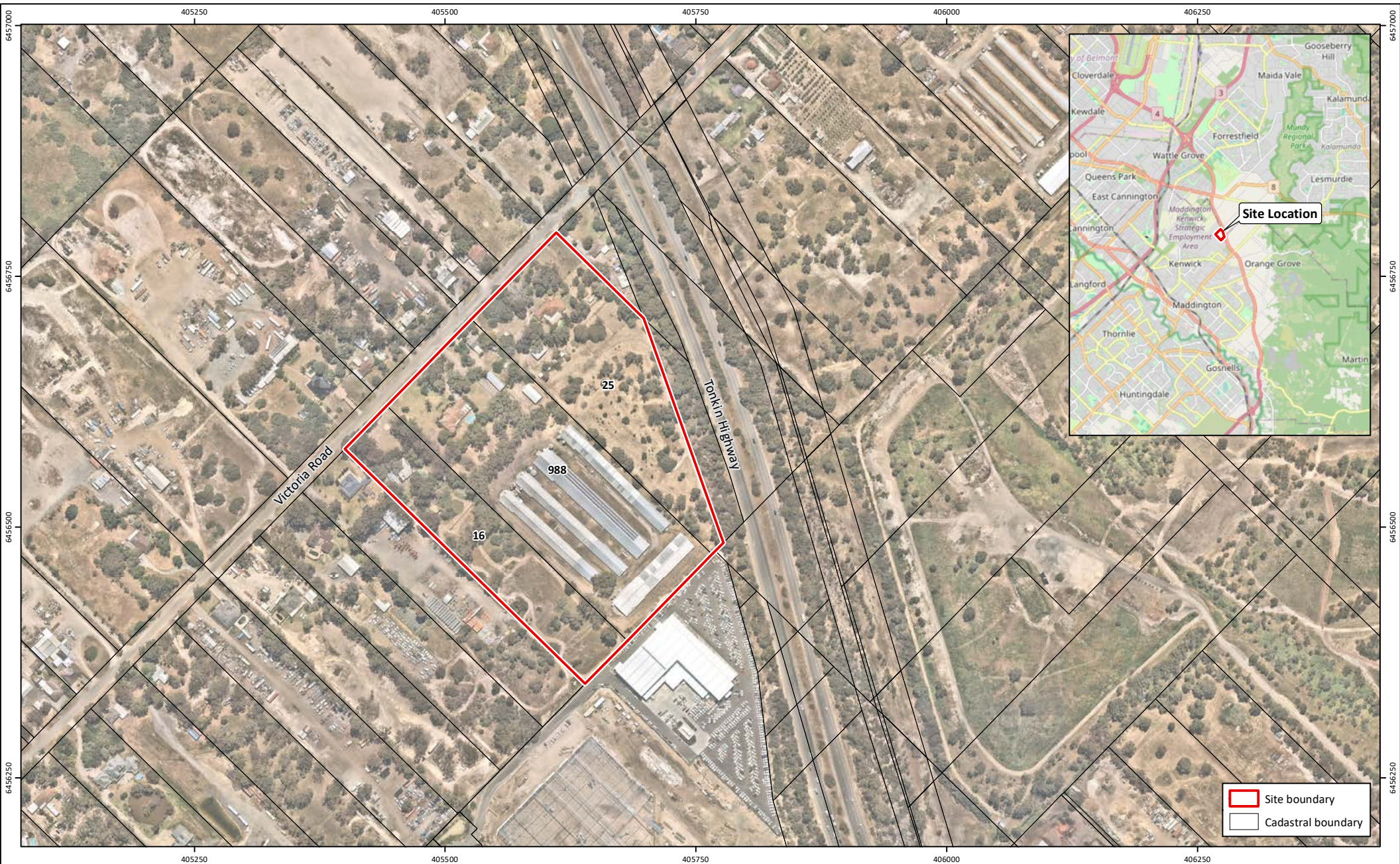
*Figure 3: Environmental Features*

*Figure 4: Vegetation Units*

*Figure 5: Vegetation Condition*



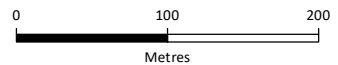




**Figure 1: Site Location**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 25, 16 and 988 Victoria Rd, Kenwick  
**Client:** Hesperia Property Pty Ltd

**Plan Number:**  
 EP21-094(05)--F29  
**Drawn:** GAR  
**Date:** 14/11/2023  
**Checked:** TAA  
**Approved:** TAA  
**Date:** 15/12/2023

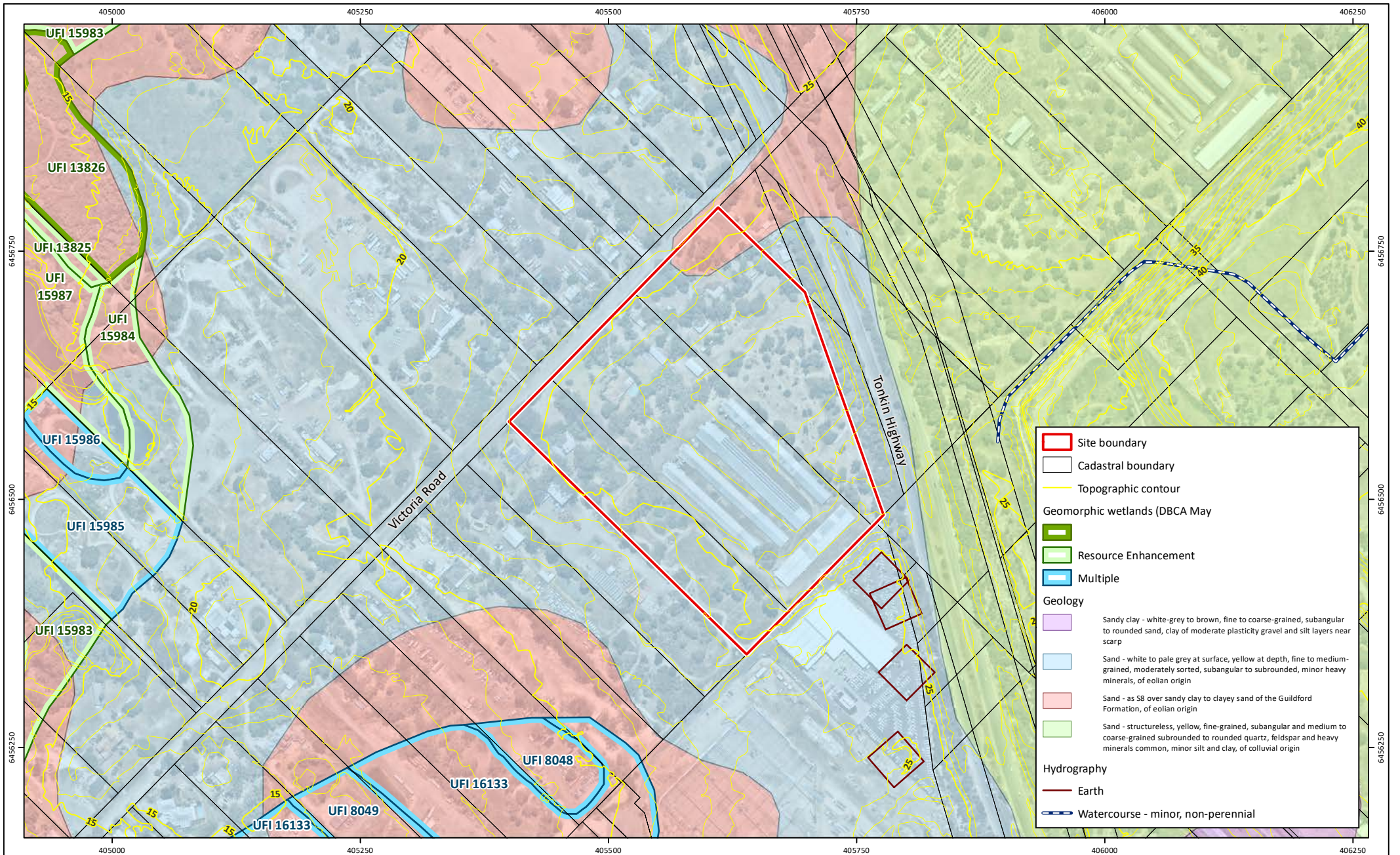


Scale: 1:5,000@A4  
 GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used  
 ©Landgate (2023). Nearmap Imagery date: 30/09/2022





**Figure 2: Hydrography, Soils and Topography**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 25, 16 and 988 Victoria Rd, Kenwick  
**Client:** Hesperia Property Pty Ltd

**Plan Number:**  
 EP21-094(05)-F30  
**Drawn:** GAR  
**Date:** 14/11/2023  
**Checked:** TAA  
**Approved:** TAA  
**Date:** 15/12/2023

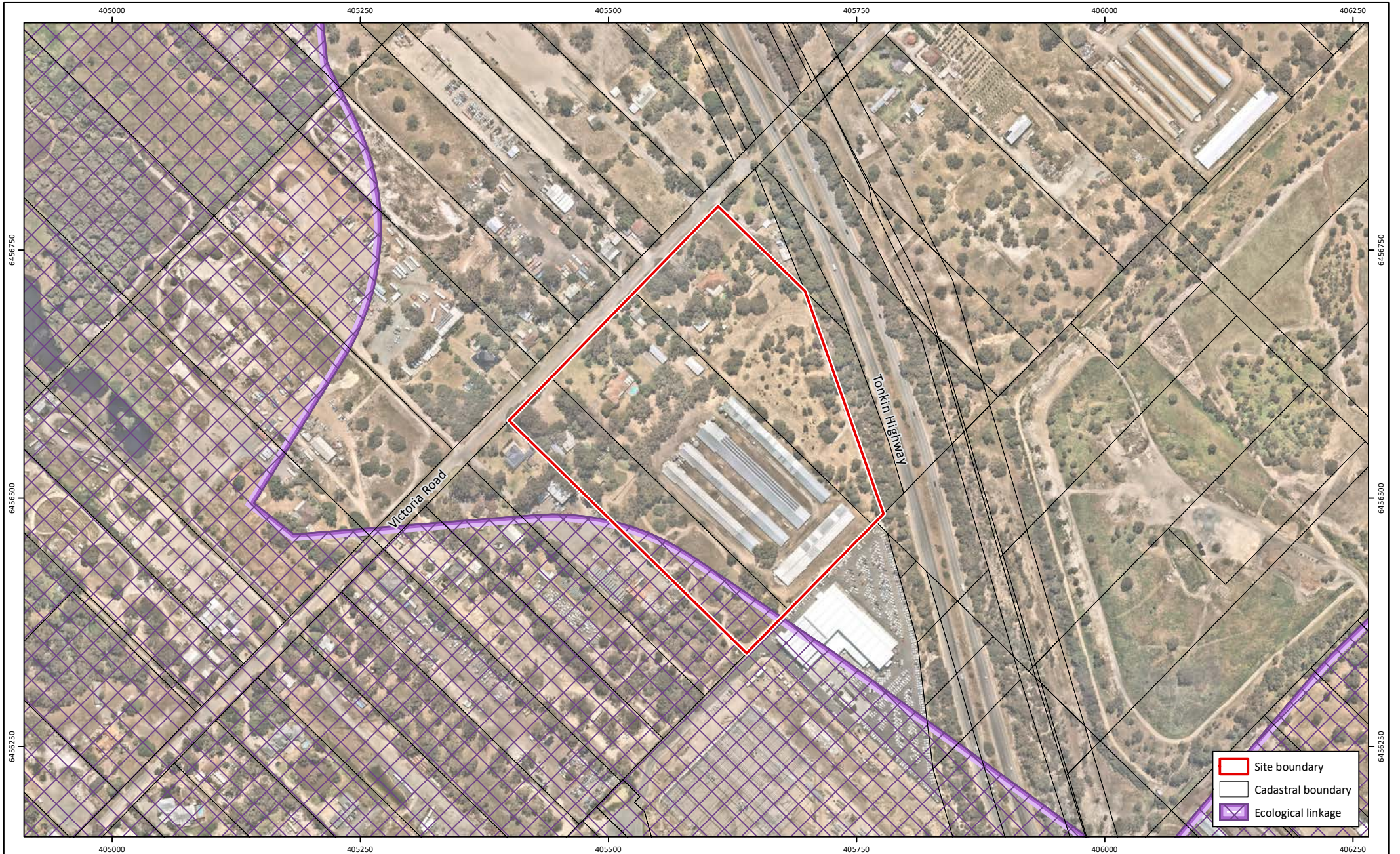


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 GDA 1994 MGA Zone 50



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used  
 ©Landgate (2023). Nearmap Imagery date: 30/09/2022





**Figure 3: Environmental Features**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 25, 16 and 988 Victoria Rd, Kenwick  
**Client:** Hesperia Property Pty Ltd

**Plan Number:**  
 EP21-094(05)--F31  
**Drawn:** GAR  
**Date:** 14/11/2023  
**Checked:** TAA  
**Approved:** TAA  
**Date:** 15/12/2023



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 Scale: 1:5,000@A4  
 GDA 1994 MGA Zone 50



While Emmerge Associates makes every attempt to ensure the accuracy and completeness of data, Emmerge accepts no responsibility for externally sourced data used ©Landgate (2023). Nearmap Imagery date: 30/09/2022



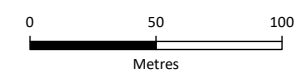


Site boundary  
 Cadastral boundary  
 Vegetation unit  
 BAF  
 Cc  
 Er  
 Et  
 Non-native  
 Non-native eucalypts

**Figure 4: Vegetation Units**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 25, 16 and 988 Victoria Rd, Kenwick  
**Client:** Hesperia Property Pty Ltd

**Plan Number:**  
 EP21-094(05)--F32  
**Drawn:** GAR  
**Date:** 14/11/2023  
**Checked:** TAA  
**Approved:** TAA  
**Date:** 15/12/2023

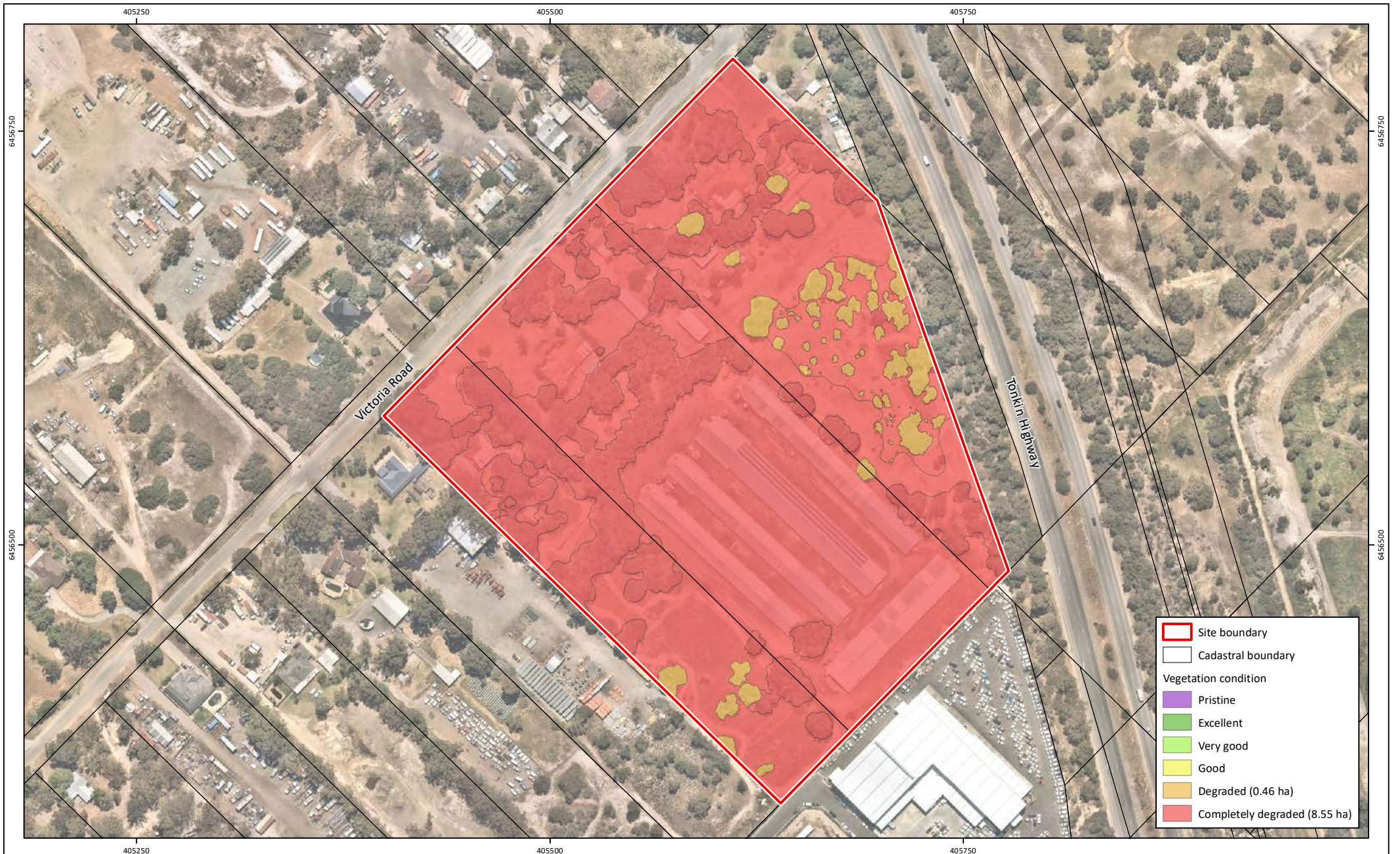


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 GDA 1994 MGA Zone 50



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**Figure 5: Vegetation Condition**

**Project:** Detailed Flora and Vegetation Assessment  
 Lots 25, 16 and 988 Victoria Rd, Kenwick

**Client:** Hesperia Property Pty Ltd

**Plan Number:**  
 EP21-094(05)-F33

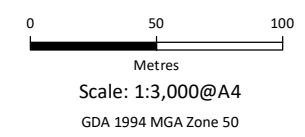
**Drawn:** GAR

**Date:** 14/11/2023

**Checked:** TAA

**Approved:** TAA

**Date:** 15/12/2023



While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used  
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# Appendix A

Additional Information





## Conservation Significant Flora and Vegetation

### Threatened and priority flora

Flora species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, flora species can be listed as ‘threatened’ pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In Western Australia, plant taxa may be classed as ‘threatened’ under the *Biodiversity Conservation Act 2016* (BC Act) which is enforced by Department of Biodiversity Conservation and Attractions (DBCA). Threatened flora species are listed under sections 19(1) and 26(2) of the BC Act and published in the Biodiversity Conservation (Species) Order 2022. It is an offence to ‘take’ or disturb threatened flora without Ministerial approval. Section 5(1)1 of the Act defines to take as including “... to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means” or to cause or permit the same to be done.

Threatened flora are assigned categories under the EPBC Act and BC Act according to their conservation status, as outlined in **Table 1**.

Flora species that may be threatened or near threatened but lack sufficient information to be listed under the BC Act may be added to the DBCA’s *Priority Flora List* (DBCA 2018b). Priority flora species are considered during State approval processes. Priority flora are assigned categories as listed in **Table 1**.

## Additional Background Information

Table 1: Definitions of threatened and priority flora species pursuant to the EPBC Act and BC Act and on DBCA's Priority Flora List (DBCA 2023b)

Conservation code	Description
EX <sup>†</sup>	Threatened Flora – Presumed Extinct Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.
T <sup>†</sup>	Threatened Flora – Extant Taxa which are declared to be likely to become extinct or is rare, or otherwise in need of special protection.
CR <sup>^</sup>	Threatened Flora – Critically Endangered Taxa which are considered to be facing an extremely high risk of extinction in the wild.
EN <sup>^</sup>	Threatened Flora – Endangered Taxa which are considered to be facing a very high risk of extinction in the wild.
VU <sup>^</sup>	Threatened Flora – Vulnerable Taxa which are considered to be facing a high risk of extinction in the wild.
P1 <sup>□</sup>	Priority One – Poorly Known Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat e.g. road verges, urban areas, farmland, active mineral leases etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2 <sup>□</sup>	Priority Two – Poorly Known Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey.
P3 <sup>□</sup>	Priority Three – Poorly Known Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but needs further survey.
P4 <sup>□</sup>	Priority Four – Rare Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

<sup>^</sup>pursuant to the EPBC Act, <sup>†</sup>pursuant to the BC Act, <sup>□</sup>on DBCA's Priority Flora List

## Threatened and priority ecological communities

'Threatened ecological communities' (TECs) are ecological communities that are rare or under threat and therefore warrant special protection. Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. TECs nominated for listing under the EPBC Act are considered by the Threatened Species Scientific Committee and a final decision is made by the Commonwealth Minister for the Environment. Once listed under the EPBC Act, communities are categorised as either 'critically endangered', 'endangered' or 'vulnerable' as defined in **Table 2**. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Minister for the Environment.

## Additional Background Information

In Western Australia TECs are listed under sections 27(1), 31 and 33 of the BC Act. TECs are determined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee (WATECSAC) and endorsed by the State Minister for the Environment. The WATECSAC is an independent group comprised of representatives from organisations including tertiary institutions, the Western Australian Museum and DBCA. The TECs listed under the BC Act are defined in Schedule 1 of the Biodiversity Conservation (Threatened Ecological Communities) Order 2023. State TECs are also acknowledged through other environmental approval processes such as 'environmental impact assessment' pursuant to Part IV of the *Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

TECs are assigned to one of the categories outlined in **Table 2** according to their level of threat.

*Table 2: Categories of threatened ecological communities (English and Blyth 1997; DEC 2009)*

Conservation code	Description
PD	Presumably Totally Destroyed An ecological community that has been adequately searched for but for which no representative occurrences have been located.
CE	Critically Endangered An ecological community that has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
E	Endangered An ecological community that has been adequately surveyed and is not critically endangered but is facing a very high risk of total destruction in the near future.
V	Vulnerable An ecological community that has been adequately surveyed and is not critically endangered or endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

An ecological community with insufficient information available to be considered a TEC or which are rare but not currently threatened may be listed as a 'priority ecological community' (PEC). PECs are categorised based on a variety of criteria, as described in **Table 3**. Listed PECs are published by DBCA (DBCA 2023a).

## Additional Background Information

Table 3: Categories of priority ecological communities (DEC 2013)

Priority code	Description
P1	<p>Priority One: Poorly known ecological communities</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally <math>\leq 5</math> occurrences or a total area of <math>\leq 100</math>ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
P2	<p>Priority Two: Poorly known ecological communities</p> <p>Communities that are known from few occurrences with a restricted distribution (generally <math>\leq 10</math> occurrences or a total area of <math>\leq 200</math>ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>
P3	<p>Priority Three: Poorly known ecological communities</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4	<p>Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
P5	<p>Priority Five: Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

## Reporting

Section 43 of the BC Act requires that an occurrence of a threatened species or threatened ecological community is reported to DBCA where the occurrence has been identified as part of field work completed:

- as part of an assessment under Part IV of the *Environmental Protection Act 1986*; or
- in relation to an application for a clearing permit under the *Environmental Protection Act 1986* section 51E(1)(d).

Penalties apply to individuals and organisations that fail to provide accurate reports of threatened species or communities.

The *Biodiversity Conservation Regulations 2018* (BC Regulations 2018) came into effect on January 1 2019. The BC Regulations include provisions for licencing, charges, penalties and other provisions associated with the BC Act.

## Weeds

A number of legislative and policy documents exist in relation to weed management at state and national levels. The *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the principle legislation guiding weed management in Western Australia and lists declared pest species. At a national level, the Australian government has compiled a list of 32 Weeds of National Significance (WoNS) (DoEE 2018), of which many are also listed under the BAM Act.

## Declared Pests

Part 2.3.23 of the BAM Act requires a person must not; “a) keep, breed or cultivate the declared pest; b) keep, breed or cultivate an animal, plant or other thing that is infected or infested with the declared pest; c) release into the environment the declared pest, or an animal, plant or other thing that is infected or infested with the declared pest; or d) intentionally infect or infest, or expose to infection or infestation, a plant, animal or other thing with a declared pest”.

Under the BAM Act, all declared pests are assigned a legal status, as described in **Table 7**. Species assigned to the ‘declared pest, prohibited - s12’ category are placed in one of three control categories, as described in **Table 8**.

The *Biosecurity and Agriculture Management Regulations 2013* specify keeping categories for species assigned to the ‘declared pest - s22(2)’ category, which relate to the purposes of which species can be kept, as well as the entities that can keep them. The categories are described in **Table 9**.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act (DPIRD 2020).

Table 4: Legal status of declared pest species listed under the BAM Act (DPIRD 2020)

Category	Description
Declared Pest Prohibited - s12	May only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.
Declared Pest s22(2)	Must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia



## Additional Background Information

*Table 5: Control categories of declared pest species listed under the BAM Act (DPIRD 2020)*

Category	Description
C1	<p>Exclusion</p> <p>Not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.</p>
C2	<p>Eradication</p> <p>Present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.</p>
C3	<p>Management</p> <p>Established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.</p>

*Table 6: Keeping categories of declared pest species listed under the BAM Act (DPIRD 2020)*

Category	Description
Prohibited	Can only be kept under a permit for public display and education purposes, and/or genuine scientific research, by entities approved by the state authority.
Exempt	No permit or conditions are required for keeping.
Restricted	Organisms which, relative to other species, have a low risk of becoming a problem for the environment, primary industry or public safety and can be kept under a permit by private individuals.

## Wetland Habitat

### Geomorphic wetland types

On the Swan Coastal Plain DBCA (2017) have used the geomorphic wetland classification system developed by Semeniuk (1987) and Semeniuk and Semeniuk (1995) to classify wetlands based on the landform shape and water permanence (hydro-period) as outlined in **Table 10**.

Table 7: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017)

Level of inundation	Geomorphology			
	Basin	Flat	Channel	Slope
Permanently inundated	Lake	-	River	-
Seasonally inundated	Sumpland	Floodplain	Creek	-
Seasonally waterlogged	Dampland	Palusplain	-	Paluslope

### Wetland management categories

DBCA maintains the *Geomorphic Wetland of the Swan Coastal Plain* dataset (DBCA 2018a), which also categorises individual wetlands into specific management categories as described in **Table 11**.

Table 8: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017)

Management category	Description of wetland	Management objectives
Conservation (CCW)	Support high levels of attributes	Preserve wetland attributes and functions through reservation in national parks, crown reserves and state owned land. Protection provided under environmental protection policies.
Resource enhancement (REW)	Partly modified but still supporting substantial functions and attributes	Restore wetland through maintenance and enhancement of wetland functions and attributes. Protection via crown reserves, state or local government owned land, environmental protection policies and sustainable management on private properties.
Multiple use (MUW)	Few wetland attributes but still provide important hydrological functions	Use, development and management considered in the context of water, town and environmental planning through land care.

The management categories of wetland features are determined based on hydrological, biological and human use features. The DBCA document *A methodology for the evaluation of specific wetland types on the Swan Coastal Plain, Western Australia* (DBCA 2017) details the methodology by which wetlands on the Swan Coastal Plain are assigned management categories based on a two tiered evaluation system, with preliminary and secondary evaluation stages. The preliminary evaluation aims to identify any features of conservation significance that would immediately place the wetland within the CCW management category. Examples of these significant features include presence on significant wetland lists, presence of TECs or PECs (Priority 1 and 2), presence of threatened flora and

over 90% of vegetation in good or better condition based on the Keighery (1994) scale. If such environmental values are identified the wetland would be categorised as CCW without further evaluation.

Should the preliminary evaluation indicate that no such features occur, the secondary evaluation and site assessment are then applied. In the secondary evaluation, an appropriate management category is determined through the assessment of a range of environmental attributes, functions and values.

#### Wetland reclassification

DBCA have a protocol for proposing changes to the wetland boundaries and management categories of the existing geomorphic wetland dataset (DEC 2007). The procedure involves a wetland desktop evaluation and site assessment which culminates in a recommended management category.

Relevant information should be obtained in the optimal season for vegetation condition and water levels, which is usually spring (DEC 2007). In the case of larger wetlands that have undergone a degree of disturbance, a separate management category may be assigned to parts of the wetland in order to reflect the current values.

## References

### General references

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Semeniuk, C. A. and Semeniuk, V. 1995, *A Geomorphic Approach to Global Classification for Inland Wetlands*, Vegetatio, 118(1/2): 103-124.

### Online references

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Department of Primary Industries and Regional Development (DPIRD) 2020, The Western Australian Organism List (WAOL), <<https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol>>.

# Appendix B

Conservation Significant Flora Species and likelihood of  
Occurrence Assessment





Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Calectasia cyanea</i>	T	CE	P	Heathland on white sand or laterite gravel over laterite.	Jun-Oct	Low
<i>Ptilotus pyramidatus</i>	T	CE	P	Seasonally inundated, flat floodplain on pale grey muddy sand.	early Oct	Low
<i>Synaphea sp. Fairbridge Farm</i>	T	CE	P	Low woodland on grey, clayey sand with lateritic pebbles (Pinjarra Plain) near winter wet flats.	Sep - Nov	Low
<i>Andersonia gracilis</i>	T	E	P	Seasonally damp, black sandy clay flats near or on the margins of swamps.	Sep - Nov	Low
<i>Banksia mimica</i>	T	E	P	Flat to gentle slopes in grey and white sand in open woodlands.	Dec-Jan	Low
<i>Caladenia huegelii</i>	T	E	PG	Well-drained, deep sandy soils in lush undergrowth in a variety of moisture levels.	Sep-early Nov	Low
<i>Calytrix breviseta subsp. breviseta</i>	T	E	P	Seasonally wet sandy-clay soil on swampy flats	Oct-Nov	Low
<i>Darwinia apiculata</i>	T	E	P	Open jarrah-marri woodland on shallow gravelly soil over laterite, or open heathland over sandy loams with granite boulders.	Oct-Nov	Low
<i>Diplolaena andrewsii</i>	T	E	P	Granite outcrops & hillsides.	Jul-Oct	Negligible
<i>Diuris purdiei</i>	T	E	PG	Sand to sandy clay soils in areas subject to winter inundation.	late September to mid-October, but only after a summer or early autumn fire (Brown et al., 1998)	Low

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
					Flowers are first seen in late September and continue flowering until late October or more rarely early November. Individual plants may not flower every year. The best time to look for the plant is in July and August when the leaves are relatively conspicuous	
<i>Drakaea elastica</i>	T	E	PG	Bare patches of sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps.		Low
<i>Eucalyptus x balanites</i>	T	E	P	Light coloured sandy soils over laterite. Habitat consists of gently sloping heathlands; open mallee woodland over shrubland (Population 2) or heathland with emergent mallees (population 1)	Oct - Feb	Negligible
<i>Grevillea curviloba subsp. incurva</i>	T	E	P	Sand, sandy loam. Winter-wet heath.	Aug to Sep.	Low
<i>Lasiopetalum pterocarpum</i>	T	E	P	Riparian community with species such as Flooden Gum, Marri and Swamp Peppermint.	Aug-Nov	Negligible



Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Lepidosperma rostratum</i>	T	E	P	Peaty sand and clay amongst low heath, in winter-wet swamps.	May to June and the distinctive fruits are beaked toward the base of the style, and generally appear between late June and August	Low
<i>Macarthuria keigheryi</i>	T	E	P	Low-lying winter-wet damp gey/white sands in open patches.	Sep-Dec/Fel	Low
<i>Thelymitra dedmaniarum</i>	T	E	PG	Red brown sandy loam with dolerite and granite outcrops.	Oct-Nov	Negligible
<i>Thelymitra stellata</i>	T	E	PG	Sandy loam, clay or gravel over laterite or gravel.	Sep-Nov	Low
<i>Acacia anomala</i>	T	V	P	Shallow sand, loam, clay or gravel	Aug-Sep	Low
<i>Acacia aphylla</i>	T	V	P	Laterite and granite outcrops on hillsides.	Aug-Oct	Low
<i>Anigozanthos viridis subsp. terraspectans</i>	T	V	P	Grey sand, clay loam. Winter-wet depressions.	Aug-Sep	Negligible
<i>Anthocercis gracilis</i>	T	V	P	Steep granite slopes along the Darling Scarp in shallow, humic-rich sandy or loamy soils.	Sep-Oct, Ap	Low
<i>Chamelaucium sp. Gingin</i>	T	V	P	White yellow sand in low woodland.	Sep-Dec	Negligible
<i>Conospermum undulatum</i>	T	V	P	Sand and sandy clay soils, on flat or gently sloping sites between the Swan and Canning Rivers	May-Oct	Low
<i>Diuris drummondii</i>	T	V	PG	In low-lying depressions in peaty and sandy clay swamps.	Nov-Jan	Negligible
<i>Diuris micrantha</i>	T	V	PG	Dark grey-black sandy clay-loam in winter wet depressions or swamps. Often in shallow standing water.	August/September to early October	Negligible

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Drakaea micrantha</i>	T	V	PG	Open sandy patches often adjacent to winter-wet swamps.	September	Low
<i>Eleocharis keigheryi</i>	T	V	P	Clay or sandy loam in freshwater creeks and transient waterbodies such as seasonally wet clay pans.	Aug-Dec	Low
<i>Tetraria australiensis</i>	T	V	P	Sand over clay, winter wet depressions and drainage lines.	Nov-Dec	Low
<i>Austrostipa bronwenae</i>	T		P	Low lying winter wet areas.	Sep-Nov	Low
<i>Austrostipa jacobiana</i>	T		P	Grey sandy clay.	Nov-Jan	Negligible
<i>Eremophila glabra subsp. chlorella</i>	T		P	Sandy clay. Winter-wet depressions.	Jul-Nov	Low
<i>Goodenia arthrotricha</i>	T		P	Granite rocks, slopes	Oct-Nov	Low
<i>Grevillea thelemanniana</i>	T		P	Seasonal clay/sand based depressions.	Sep-Nov	Low
<i>Synaphea sp. Serpentine</i>	T		P	Seasonally damp areas, loam - sand.	Sep-Oct	Negligible
<i>Acacia lasiocarpa var. bracteolata long peduncle variant</i>	P1		P	Grey or black sand over clay in winter wet areas.	May-Aug	Low
<i>Bolboschoenus fluviatilis</i>	P1		P	Floodplain with grey/brown wet sand.	Nov	Low
<i>Boronia humifusa</i>	P1		P	Gravelly clay loam over laterite.	Jun or Sep	Low
<i>Calandrinia sp. Piawaning</i>	P1		A	Brown/grey silty sandy loam over granite.	Oct	Low
<i>Haloragis scoparia</i>	P1		P	Clay in winter-wet areas.	May	Low
<i>Hydrocotyle striata subsp. roseus</i>	P1		P	creeklines. associated with wetlands/rivers.	Nov	Low
<i>Schoenus sp. Beaufort</i>	P1		A	Mud in winter-wet clay pans.	Sep-Oct	Low
<i>Senecio gilbertii</i>	P1		P	slopes.	Sep-Nov	Low
<i>Thelymitra magnifica</i>	P1		PG	Gravelly soil on stony ridges.	Sep-Oct	Low
<i>Acacia benthamii</i>	P2		P	breakaways	Aug - sept	Low
<i>Andersonia sp. Blepharifolia</i>	P2		P	Sandy clay with gravel.	Sep-Nov	Low
<i>Comesperma griffinii</i>	P2		A/P	Yellow or grey sand on plains.	Oct	Low
<i>Comesperma rhadinocarpum</i>	P2		P	Sandy soils.	Oct-Nov	Low
<i>Isotropis cuneifolia subsp. glabra</i>	P2		P	Sand, clay loam in winter-wet flats.	Sep	Low

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Johnsonia pubescens</i> <i>subsp. cygnorum</i>	P2		P	Grey white yellow sands on flats and seasonally wet areas.	September	Low
<i>Lepyrodia curvescens</i>	P2		P	Sand and laterite in seasonally inundated swampland.	Sep-Nov	Low
<i>Melaleuca viminalis</i>	P2		P	Sand, clay in creeklines and wetlands.	Oct-Dec	Low
<i>Schoenus loliaceus</i>	P2		A	Sandy soils in winter-wet depressions.	Aug-Nov	Low
<i>Stenanthemum sublineare</i>	P2		P	White sand on coastal plains.	Oct-Dec	Low
<i>Thysanotus sp.</i> <i>Badgingarra</i>	P2		P	Grey sand with lateritic gravel.	December	Low
<i>Acacia horridula</i>	P3		P	Gravelly soils over granite, sand, rocky hillsides.	May-Aug	Low
<i>Allocasuarina grevilleoides</i>	P3		P	Sand over laterite, gravel.	Sep-Nov	Low
<i>Angianthus micropodioides</i>	P3		A	Saline sandy soils on edge of rivers, depressions and clay pans.	Nov-Dec/Jan	Low
<i>Asteridea gracilis</i>	P3		A	Sand, clay, gravelly soils.	Sep-Dec	Low
<i>Babingtonia urbana</i>	P3		P	Grey sand, lateritic gravel.	Jan-Mar	Low
<i>Banksia kippistiana</i> var. <i>paenepeccata</i>	P3		P	Lateritic gravelly soils.	Oct-Nov	Low
<i>Banksia pteridifolia</i> <i>subsp. vernalis</i>	P3		P	White/grey sand over laterite.	Sep-Oct	Low
<i>Beaufortia purpurea</i>	P3		P	Lateritic or granitic soils on rocky slopes.	Oct-Feb	Low
<i>Byblis gigantea</i>	P3		P	Sandy-peat swamps. Seasonally wet areas.	Sep-Jan	Low
<i>Carex tereticaulis</i>	P3		P	Black peaty sand.	Sep-Oct	Low
<i>Chamaescilla gibsonii</i>	P3		P	Clay to sandy clay in winter-wet flats, shallow water-filled claypans.	Sep	Low
<i>Eryngium pinnatifidum</i> <i>subsp. Palustre</i>	P3		P	Grey brown sand or clay in winter wet flats.	Sep-Nov	Low
<i>Eryngium sp.</i> <i>Subdecumbens</i>	P3		A	Clay in seasonal wetlands.	Sep-Nov	Low
<i>Haemodorum loratum</i>	P3		P	Grey or yellow sand, gravel.	Nov	Low
<i>Halgania corymbosa</i>	P3		P	Gravelly soils, soils over granite.	Aug-Nov	Low
<i>Isopogon drummondii</i>	P3		P	Yellow-grey sand.	Feb, March, A	Low
<i>Jacksonia gracillima</i>	P3		P	Sand, often adjacent to winter wet areas	Sep-Dec	Low

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i>	P3		P	Brown clay loam on slopes	Sep-Dec	Low
<i>Meionectes tenuifolia</i>	P3		P	Clay loam in seasonally wet areas.	Oct-Dec	Low
<i>Myriophyllum echinatum</i>	P3		A	Clay in winter-wet flats.	Nov	Low
<i>Pithocarpa corymbulosa</i>	P3		P	Gravelly or sandy loam, amongst granite outcrops.	Jan-Apr	Low
<i>Platysace ramosissima</i>	P3			Sandy soils.	Oct-Nov	Low
<i>Schoenus benthamii</i>	P3		P	White, grey ands, sandy clay in winter wet flats and swamps	Oct-Nov	Low
<i>Schoenus capillifolius</i>	P3		A	Brown mud in claypans	Oct-Nov	Low
<i>Schoenus pennisetis</i>	P3		A	Grey or peaty sand in swamps and winter-wet depressions.	Aug-Sep	Low
<i>Schoenus</i> sp. <i>Waroona</i>	P3		A	Clay or sandy clay. Winter-wet flats.	Oct-Nov	Low
<i>Stackhousia</i> sp. <i>Red-blotched corolla</i>	P3		P	Granitic soils on slopes.	Sep-Nov	Low
<i>Stylidium aceratum</i>	P3		A	Sandy soils in swamp heathland.	Oct-Nov	Low
<i>Stylidium periscelianthum</i>	P3		P	Loamy clay, moist soils pockets on wet flats and low granitic hills.	Sep-Oct	Low
<i>Styphelia filifolia</i>	P3		P	Brown over pale yellow sand.	Feb-April	Low
<i>Thysanotus anceps</i>	P3		P	White or grey sand, lateritic gravel, laterite.	Oct-Dec	Low
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>	P4		P	Granitic soils, occasionally on laterite.	Aug-Nov/Dec	Low
<i>Aponogeton hexatepalus</i>	P4		P	Mud. Freshwater: ponds, rivers, claypans.	Jul-Oct	Low
<i>Boronia tenuis</i>	P4		P	Laterite, stony soils, granite.	Aug-Nov	Low
<i>Calothamnus accedens</i>	P4		P	Sandy soils over laterite.	Sep-Jan	Low
<i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>	P4		P	Clay over granite, lateritic soils. Hillsides.	Jun-Aug	Low
<i>Cyanicula ixioides</i> subsp. <i>ixioides</i>	P4		PG	Laterite, gravel.	Aug-Oct	Low
<i>Dodoniaea hackettiana</i>	P4		P	Sand, outcropping limestone.	Jul-Oct	Low
<i>Drosera occidentalis</i>	P4		P	Sandy & clayey soils in swamps	Nov-Dec	Low
<i>Hibbertia montana</i>	P4		P	Loam over granite, lateritic soils, with granite rocks, lateritic ridges.	Jul-Oct	Low
<i>Hydrocotyle lemnoides</i>	P4		A	Floating in swamps.	Aug-Oct	Low

Species name	Level of significance		Life strategy	Habitat	Flowering period	Likelihood of occurrence
	WA	EPBC Act				
<i>Lasiopetalum bracteatum</i>	P4		P	Sandy clay, clay, lateritic gravel along drainage lines, creeks, gullies, granite outcrops.	Aug-Nov	Low
<i>Ornduffia submersa</i>	P4		A	Sandy clay in inundated wetland/creek.	Aug-Nov	Low
<i>Pimelea rara</i>	P4		P	Lateritic soils.	Dec-Jan	Low
<i>Schoenus natans</i>	P4		A	Aquatic, in winter-wet depressions.	Oct	Low
<i>Senecio leucoglossus</i>	P4		A	Gravelly lateritic or granitic soils on outcrops or slopes.	Aug-Dec	Low
<i>Stylidium longitubum</i>	P4		A	Sandy clay, clay. Seasonal wetlands.	Oct-Dec	Low
<i>Stylidium striatum</i>	P4		P	Brown clay over laterite on hill slopes.	Oct-Nov	Low
<i>Tripterococcus sp. Brachylobus</i>	P4		P	Winter-wet areas on grey sand.	Oct-Feb	Low
<i>Verticordia lindleyi subsp. lindleyi</i>	P4		P	Sand and sandy clay in winter wet areas.	May or Nov	Low



# Appendix C

Conservation Significant Communities and Likelihood of  
Occurrence Assessment







Code	Community name	TEC/PE C	Level of significance		Likelihood of occurrence
			State	EPBC Act	
SCP20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain	TEC	Critically Endangered	Endangered (Banksia Woodlands of the Swan Coastal Plain)	Low
SCP20b	Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain	TEC	Endangered	Endangered (Banksia Woodlands of the Swan Coastal Plain)	Low
SCP20a	Banksia attenuata woodlands over species rich dense shrublands	TEC	Endangered	Endangered (Banksia Woodlands of the Swan Coastal Plain)	Low
SCP21c	Low lying Banksia attenuata woodlands or shrublands	PEC/TEC	Priority 3	Endangered (Banksia Woodlands of the Swan Coastal Plain)	Low
-	Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	PEC/TEC	Priority 3	Endangered (Banksia Woodlands of the Swan Coastal Plain)	Low
SCP3a	Corymbia calophylla - Kingia australis woodlands on heavy soils, Swan Coastal Plain	TEC	Critically Endangered	Endangered	Low
SCP3c	Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain	TEC	Critically Endangered	Endangered	Low
SCP3b	Corymbia calophylla - Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain	TEC	Vulnerable	-	Low
SCP10a	Shrublands on dry clay flats	TEC	Endangered	Critically Endangered (Clay Pans of the Swan Coastal Plain)	Low
SCP07	Herb rich saline shrublands in clay pans	TEC	Vulnerable	Critically Endangered (Clay Pans of the Swan Coastal Plain)	Low
SCP08	Herb rich shrublands in clay pans	TEC	Vulnerable	Critically Endangered (Clay Pans of the Swan Coastal Plain)	Low
MUCHEA LIMESTONE	Shrublands and woodlands on Muchea Limestone	TEC	Endangered	Endangered	Low
-	Claypans with mid dense shrublands of Melaleuca lateritia over herbs	PEC/TEC	Priority 1	Critically Endangered	Low
SCP02	Southern wet shrublands, Swan Coastal Plain	TEC	Endangered	-	Low
-	Subtropical and Temperate Coastal Saltmarsh	PEC/TEC	Priority 3	Vulnerable	Low
-	Central Northern Darling Scarp Granite Shrubland Community	PEC	Priority 4	-	Low

Note: TEC=threatened ecological community, PEC=priority ecological community, CR=critically endangered, EN=endangered, VU=vulnerable, P3=priority 3

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# Appendix D

Species List





Family	Status	Species
<b>Altingiaceae</b>		
	*, PI	<i>Liquidambar styraciflua</i>
<b>Arecaceae</b>		
	*, PI	<i>Washingtonia filifera</i>
<b>Asteraceae</b>		
	*	<i>Arctotheca calendula</i>
	*, PI	<i>Hypochaeris galbra</i>
<b>Bignoniaceae</b>		
	*, PI	<i>Jacaranda mimosifolia</i>
<b>Casuarinaceae</b>		
	*, PI	<i>Casuarina obesa</i> <i>Allocasuarina fraseriana</i>
<b>Cupressaceae</b>		
	*, PI	<i>Erythrina x sykesii</i>
<b>Dasypogonaceae</b>		
		<i>Kingia australis</i>
<b>Dilleniaceae</b>		
		<i>Hibbertia hypericoides</i>
<b>Fabaceae</b>		
	*	<i>Acacia saligna</i> <i>lotus subbiflorus</i>
<b>Fagaceae</b>		
	*, PI	<i>Quercus robur</i>
<b>Iridaceae</b>		
	*	<i>Romulea rosea</i>
<b>Malvaceae</b>		
	*, PI	<i>Brachychiton acerifolius</i>
<b>Meliaceae</b>		
	*, PI	<i>Melia azedarach</i>
<b>Moraceae</b>		
	*, PI	<i>Ficus elastica</i>
<b>Myrtaceae</b>		
	*, PI	<i>Agonis flexuosa</i> <i>Corymbia calophylla</i>
	*, PI	<i>Corymbia ficifolia</i>
	*, PI	<i>Corymbia maculata</i> <i>Eucalyptus rudis</i>
	*, PI	<i>Eucalyptus ?victrix</i>
	*, PI	<i>Eucalyptus ?wandoo</i>
	*, PI	<i>Eucalyptus botryoides</i>
	*, PI	<i>Eucalyptus camaldulensis</i>
	*, PI	<i>Eucalyptus grandis</i>
	*, PI	<i>Eucalyptus leucoxylon</i>
	*, PI	<i>Eucalyptus sp.</i> <i>Eucalyptus todtiana</i>
	*	<i>Leptospermum laevigatum</i>
	*, PI	<i>Lophostemon confertus</i> <i>Melaleuca ?seriata</i>

	* , PI	<i>Syzygium sp.</i>
<b>Oleaceae</b>		
	* , PI	<i>Olea europaea</i>
<b>Oxalidaceae</b>		
	*	<i>Oxalis pes caprae</i>
<b>Poaceae</b>		
	*	<i>Avena sp.</i>
	* , PI	<i>Bromus diandrus</i>
	* , PI	<i>Cenchrus clandestinus</i>
	* , PI	<i>Cynodon dactylon</i>
	*	<i>Ehrharta calycina</i>
	*	<i>Ehrharta longifolia</i>
	* , PI	<i>Eragrostis curvula</i>
	*	<i>Lolium sp.</i>
	*	<i>Vulpia sp.</i>
<b>Proteaceae</b>		
		<i>Banksia menziesii</i>
<b>Xanthorrhoeaceae</b>		
		<i>Xanthorrhoea preissii</i>

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\*=non-native, PI=planted