

Stati Group
Reconnaissance Flora and Vegetation Survey and
Wetland Assessment

Lot 400 Wigg Road
Keysbrook

13 December 2021

JBS&G59738 / 131423 (Rev A)

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

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Appendices

Appendix A	Conservation significant flora and ecological community definitions
Appendix B	Desktop assessment results
Appendix C	Conservation significant flora likelihood assessment
Appendix D	Native plant taxa recorded within the Survey Area
Appendix E	Flora taxa recorded within the Survey Area

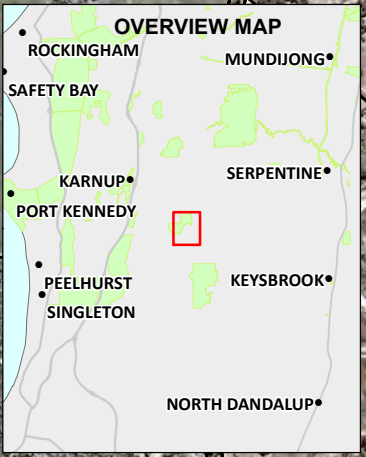
1. Introduction

Stati Group is proposing to develop the Keysbrook Motorsport Facility (the Proposal), comprising a motorsport facility and associated infrastructure occupying up to 50.3 ha within a 95.7 ha development envelope at Lot 78 Punrak Road, Keysbrook, and off-site flood storage, drainage and overflow car parking occupying up to 45.4 ha within a 95.7 ha development envelope at Lot 400 Wigg Road, Keysbrook. This report presents the findings of a Reconnaissance flora and vegetation survey and wetland assessment conducted during August 2020.

1.1 Scope

The scope was to undertake a desktop assessment and field assessment within the Survey Area. The objectives were to:

- undertake a Reconnaissance flora and vegetation survey of areas of native vegetation within Lot 400 Wigg Road
- record species, vegetation types, vegetation condition and any other observations of (1) areas of vegetation within adjacent properties connected to vegetation within Lot 400 and (2) areas of nearby wetland vegetation, where possible to do so from within Lot 400 and road verges
- prepare a survey report incorporating the results of the above.



- Legend**
- Survey area
 - Cadastral boundaries
 - Roads (MRWA)

Scale 1:10,000 at A4

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 59738

Client: Stati Group

Version: A Date: 12-Aug-2020

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**Lot 400 Wigg Road
Keysbrook**

SURVEY AREA

FIGURE 1.1



2. Context

2.1 Legislative context

Flora and fauna in WA are protected formally and informally by various legislative and non-legislative measures, which are as follows:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) – Australian Government
- *Biodiversity Conservation Act 2016* (BC Act) – State
- *Environmental Protection Act 1986* (EP Act) – State
- *Biosecurity and Agriculture Management Act 2007* (BAM Act) – State.

Non-legislative measures:

- WA Department of Biodiversity, Conservation and Attractions (DBCA) Priority lists for flora, ecological communities and fauna
- Weeds of National Significance
- Recognition of locally significant populations by the DBCA.

A short description of each legislative measure is given below. Other definitions, including species conservation categories, are provided in Appendix A.

2.1.1 EPBC Act

The EPBC Act aims to protect matters of national environmental significance, which are detailed in Appendix A. Under the EPBC Act, the Commonwealth Department of Agriculture, Water and the Environment (DAWE) lists protected species and Threatened Ecological Communities (TECs) by criteria set out in the Act. Species are conservation significant if they are listed as Threatened (i.e. Critically Endangered, Endangered and Vulnerable) or Migratory.

2.1.2 BC Act

DBCA lists taxa (flora and fauna) under the provisions of the BC Act as protected and are classified as according to their need for protection (see Appendix A). The BC Act makes it an offence to 'take' threatened species without an appropriate licence. There are financial penalties for contravening the BC Act.

2.1.3 EP Act

Threatened flora, fauna (and significant habitat necessary for the maintenance of indigenous fauna) and Threatened Ecological Communities (TECs) are given special consideration in environmental impact assessments and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Exemptions for a clearing permit do not apply in an ESA.

2.1.4 BAM Act

The BAM Act provides for management and control of listed organisms, including introduced flora species (weeds). Species listed as declared pests under the BAM Act are classified under three categories:

- C1 Exclusion: Pests assigned under this category are not established in Western Australia, and control measures are to be taken to prevent them entering and establishing in the State.
- C2 Eradication: Pests assigned under this category are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.

- C3 Management: Pests assigned under this category are 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 that is currently free of that pest.

Under the BAM Act, land managers are required to manage populations of declared pests as outlined under the relevant category.

2.2 Environmental setting

2.2.1 Soils and topography

The Survey Area is located within the Swan Coastal Plain 1 (SWA02 – Perth subregion) of Western Australia (Mitchell et al. 2002). The Swan Coastal Plain comprises five major geomorphologic systems that lie parallel to the coast, namely (from west to east) the Quindalup Dunes, Spearwood Dunes, Bassendean Dunes, Pinjarra Plain and Ridge Hill Shelf (Churchward & McArthur 1980; Gibson *et al.* 1994). Each major system is composed of further subdivisions in the form of detailed geomorphologic units (Churchward & McArthur 1980; Semeniuk 1990; Gibson *et al.* 1994). Beard (1990) describes the Swan Coastal Plain as a low-lying coastal plain, often swampy, with sandhills also containing dissected country rising to the duricrusted Dandaragan plateau on Mesozoic, mainly sandy, yellow soils.

Specifically, the Survey Area is located within the Bassendean Dune landform units. The Bassendean Dune system forms a gently undulating aeolian sandplain about 20 km wide with the dunes to the north of Perth generally having greater topographic relief than those to the south (McPherson & Jones, 2005).

2.2.2 Climate

The Swan Coastal Plain Region has a Mediterranean climate consisting of hot, dry summers and cool, wet winters. The nearest weather station which records both temperature and rainfall data is at Karnet (station 009111), approximately 9 km from the Survey Area. The average monthly rainfall from 1963-2020 was 1154.9 mm with the highest monthly rainfall occurring in July (Figure 2.1). Rainfall for the twelve months prior to survey was 949.4 mm, below the long term average for the area.

The average maximum temperatures range from 15.5°C in July to 30.6°C in January. The average minimum temperatures range from 6.3°C in July / August to 15.8°C in February.

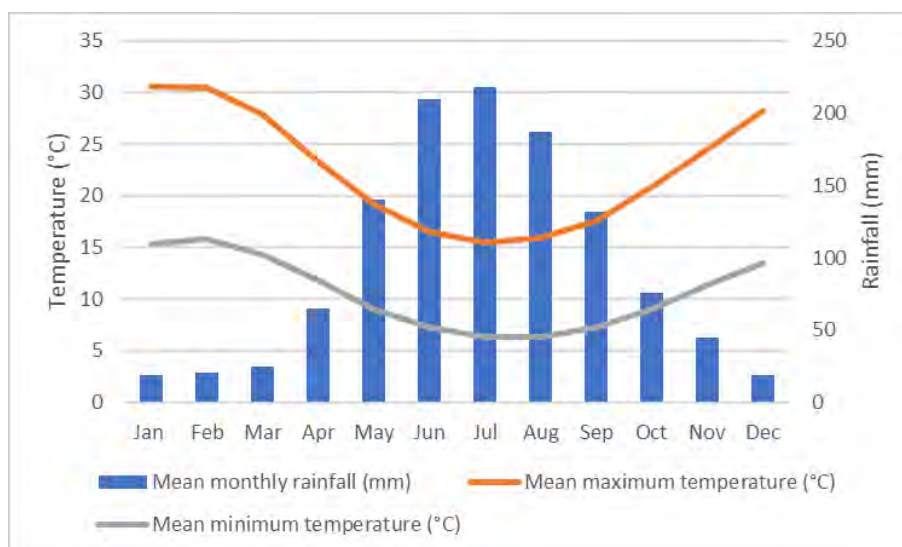


Figure 2.1: Monthly average rainfall and temperature at Karnet (Station 009111)

2.2.3 Hydrology

Mapping of the geomorphic wetlands of the Swan Coastal Plain indicates a number of wetlands are present within and immediately adjacent to the Survey Area (Table 2.1).

Table 2.1: Wetlands within and adjacent to Lot 400 Wigg Rd

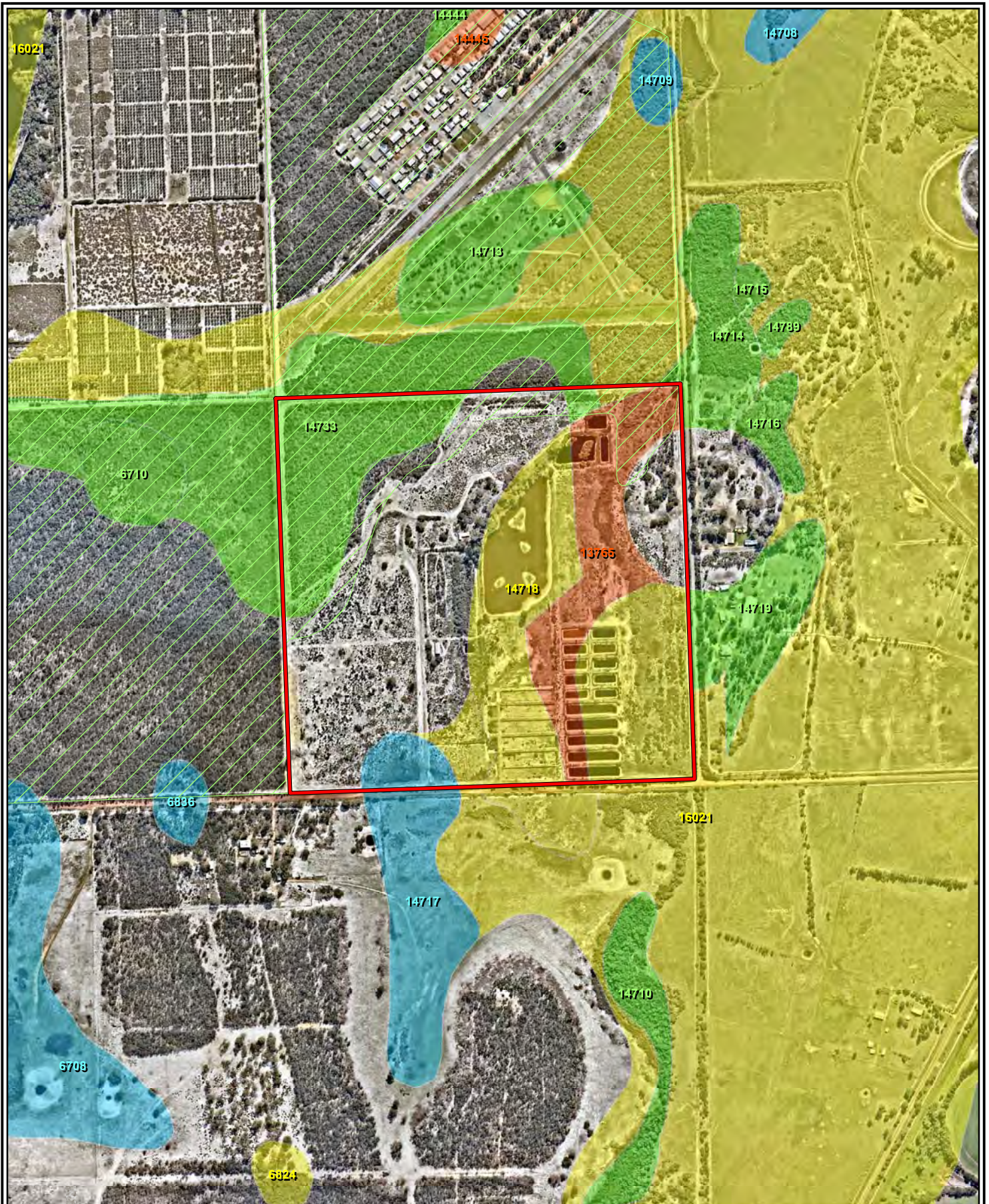
Wetland UFI number	Category
Within Lot 400	
14733	Conservation
14717	Resource Enhancement
Immediately adjacent to Lot 400	
14714	Conservation
14719	Conservation
14710	Conservation

2.2.4 Conservation areas

No nature reserves, national parks or DBCA managed lands occur within the Survey Area (Figure 2.2). Bush Forever site 378 (Henderson Road Bushland, Peel Estate) occurs across Lots 400, 399 and Lot 164 Yangedi Road North (Figure 2.2).

2.2.5 Land use

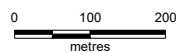
The primary land uses within the Swan Coastal Plain region are agriculture, conservation, Unallocated Crown Land and Crown Reserves, urban, rural residential, forestry and infrastructure. Within the Survey Area, historical land uses principally include agriculture, aquaculture and conservation.



Legend

- Survey area
- Bush Forever site (DOP)
- Geomorphic Wetlands (DBCA)
 - Conservation
 - Resource Enhancement
 - Multiple Use
 - Not Applicable

Scale 1:10,000 at A4



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Keysbrook**

**WETLANDS AND OTHER
CONSERVATION AREAS**

FIGURE 2.2



2.2.6 Regional vegetation

2.2.6.1 Beard (1990) Botanical Subdistrict

The Survey Area occurs within the Drummond Botanical Subdistrict which is characterised by low *Banksia* woodlands on leached sands; *Melaleuca* swamps on poorly-drained depressions; and *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) woodlands on less leached soils (Beard 1990).

2.2.6.2 IBRA subregion

IBRA describes a system of 89 'biogeographic regions' (bioregions) and 419 subregions covering the entirety of the Australian continent (Department of the Environment and Energy, 2019). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna.

The Survey Area occurs within the Swan Coastal Plain 2 IBRA subregion which is dominated by *Banksia* or Tuart on sandy soils, *Casuarina obesa* on outwash plains and paperbark (*Melaleuca*) in swampy areas (Mitchell et al. 2002).

2.2.6.3 Vegetation system association and System 6 mapping

Vegetation occurring within the region was initially mapped at a broad scale (1: 1 000 000) by Beard during the 1970s. This dataset formed the basis of several regional mapping systems, including the biogeographical region dataset (Interim Biogeographic Regionalisation for Australia) for Western Australia (DAWE 2020a), physiographic regions defined by Beard (1981), and System 6 Vegetation Complex mapping undertaken by Heddle et al. (1980).

The Survey Area comprises one Beard (1981) vegetation association (Table 2.2, Figure 2.3). Percentage remaining of each vegetation association is provided in Table 2.2 (GoWA 2019a).

Table 2.2: Beard (1981) vegetation associations within the Survey Area

Vegetation Association	Description	Percent remaining in IBRA Region
1000	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree (<i>Melaleuca</i> spp.)	26.41%

Based on regional vegetation complex mapping (Heddle et al. 1980) the Survey Area comprises two vegetation complexes, (Table 2.3, Figure 2.3). Percentage of original extent remaining in the IBRA bioregion is provided in Table 2.3 (GoWA 2019b).

Table 2.3: Heddle et al. (1980) vegetation complexes within the Survey Area

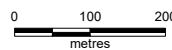
Vegetation Complex	Description	Percent remaining in IBRA Region
Bassendean complex – Central and South	Vegetation ranges from woodland of <i>Eucalyptus marginata</i> (Jarrah) - <i>Allocasuarina fraseriana</i> (Sheoak) - Banksia species to low woodland of <i>Melaleuca</i> species, and sedgelands on the moister sites. This area includes the transition of <i>Eucalyptus marginata</i> (Jarrah) to <i>Eucalyptus todtiana</i> (Pricklybark) in the vicinity of Perth.	26.87%
Southern River Complex	Open woodland of <i>Corymbia calophylla</i> (Marri) - <i>Eucalyptus marginata</i> (Jarrah) - Banksia species with fringing woodland of <i>Eucalyptus rudis</i> (Flooded Gum) - <i>Melaleuca raphiophylla</i> (Swamp Paperbark) along creek beds.	18.43%



Legend

- Survey area
- Pre-European vegetation (DPIRD)
 - Bassendean_1000
 - Pinjarra_968
- Vegetation complexes (DBCAs)
 - Open woodland
 - Woodland to low woodland and sedgelands

Scale 1:10,000 at A4



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REGIONAL VEGETATION MAPPING

FIGURE 2.3



3. Methods

3.1 Desktop assessment

Database searches were undertaken to generate a list of vascular flora and vertebrate fauna, and Threatened and Priority Ecological Communities previously recorded within, and nearby the Survey Area, with an emphasis on species and communities of conservation significance (Table 3.1).

Table 3.1: Database searches conducted for the desktop assessment

Custodian	Database	Taxonomic group	Buffer
DBCA	NatureMap	Flora and Fauna	5 km of central point of Survey Area
DAWE	Protected Matters Search Tool	Flora, Fauna and Communities	2 km buffer of Survey Area boundary

3.2 Field assessment

3.2.1 Flora and vegetation

The field assessment of the Survey was conducted by a Senior Ecologist from Strategen-JBS&G on 4 August 2020. The survey was conducted in accordance with guidelines provided in *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016).

Table 3.2: Personnel

Name	Role	Flora collection permit
Robyn Chesney Senior Ecologist	Planning, fieldwork, plant identification	FB62000123

3.2.1.1 Data collection

Relevés were sampled within the Survey Area to characterise vegetation types and condition and ensure appropriate representation of the flora and vegetation present. Indicative site locations were identified prior to commencement of the field survey using aerial photography, topographic maps and existing vegetation maps, to ensure that all broad vegetation types and landforms within the Survey area were sampled.

At each sample site the following information was recorded:

- name of recorder
- date
- GPS co-ordinates (recorded in GDA94 UTM 50H)
- photograph of the vegetation
- vegetation condition
- brief vegetation description
- vascular flora taxa present (with average height and total percentage foliage cover of each taxon)
- topography
- soil type and colour
- geology (type, size and cover of any rocks, stones, gravel or outcropping)
- average percentage cover of leaf litter and bare ground

- disturbance details including fire history (time since last fire), and physical disturbance including evidence of erosion, grazing and weed invasion.

Any flora taxa observed opportunistically around quadrats or while traversing on foot within the Survey Area were also recorded. For any populations of taxa known to be conservation significant or introduced flora observed, a GPS location and a count of the individuals present, or percentage foliar cover for a given area for the species, were recorded.

Observations were made regarding vegetation immediately adjacent to the Survey Area, from within the Survey Area itself. As such, these should be considered indicative vegetation types only.

3.2.1.2 Conservation significant flora

Prior to the survey, a list of conservation significant flora with the potential to occur within the Survey Area was compiled. Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey and once on the ground systematically searched for them along all proposed clearing areas.

3.2.1.3 Flora identification and nomenclature

All plant specimens collected during the field surveys were identified using appropriate reference material or through comparisons with pressed specimens housed at the Western Australian Herbarium where necessary. Nomenclature of the species recorded is in accordance with Western Australian Herbarium (1998-).

3.2.1.4 Vegetation condition

Vegetation condition was recorded at all relevés, and opportunistically within the Survey Area during the field assessment where required. Vegetation condition was described using the vegetation condition scale for the South West Botanical Province (EPA 2016; Table 3.3). Vegetation condition polygon boundaries were developed using this information in conjunction with aerial photography interpretation and were digitised as for vegetation type mapping polygon boundaries.

Table 3.3: Vegetation condition scale for South West and Interzone Botanical Provinces (EPA 2016)

Vegetation Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
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 and shrubs.

3.2.1.5 Vegetation units

Vegetation types (VT) were delineated using a combination of results and site observations and cluster analysis. Aerial photography interpretation and field notes taken during the survey were then used to develop VT mapping polygon boundaries over the Survey area. These polygon boundaries were then digitised using the Geographic Information System (GIS) software.

VT descriptions (through floristic in origin) have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003), a system of describing structural vegetation units (based on dominant taxa). This model follows nationally-agreed guidelines to describe and represent VTs, so that comparable and consistent data is produced nation-wide. For the purposes of this report, a VT is considered equivalent to a NVIS association as described in ESCAVI (2003).

In addition to the mapping of the survey area, an additional 100m buffer area was mapped by extrapolation of the on-ground data and using aerial imagery to provided context to the proposed clearing.

3.3 Wetland assessment

Areas mapped as wetlands within the Survey Area were traversed on foot to determine the following:

- vegetation type
- vegetation condition
- any areas where vegetation type or condition differed from that mapped in the Geomorphic Wetlands of the Swan Coastal Plain dataset (DBCA 2020b).

Assessment of vegetation type and condition was conducted concurrently with the Reconnaissance Survey. Photographs and notes were taken in any areas where vegetation type or condition as considered to vary from mapping in the Geomorphic Wetlands of the Swan Coastal Plain dataset.

3.4 Survey limitations and constraints

There are possible limitations and constraints that can impinge on the adequacy of vegetation, flora and fauna surveys. The flora and vegetation assessment has been evaluated against a range of potential limitations (Table 3.4). Based on this evaluation, the assessment has been subject to limitations or constraints that have affected the thoroughness of the assessment and the conclusions reached.

Table 3.4: Flora and vegetation survey potential limitations and constraints

Potential Limitation	Impact on assessment	Comment
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	Not a constraint.	The survey has been undertaken in the Drummond Botanical Subdistrict on the Swan Coastal Plain which has been well studied and documented with ample literature available (Beard 1990).
Scope (i.e. what life forms, etc., were sampled).	Not a constraint.	Number of species recorded, number of relevés sampled and timing of the survey were adequate for a Reconnaissance Survey.
Proportion of flora/fauna collected and identified (based on sampling, timing and intensity).	Not a constraint.	The proportion of flora surveyed was adequate. The entire Survey Area was traversed, and flora species were recorded systematically.
Completeness and further work which might be needed (i.e. was the relevant Survey Area fully surveyed).	Not a constraint.	The information collected during the survey was sufficient to assess the vegetation that was present during the time of the survey.
Mapping reliability.	Not a constraint.	Aerial photography of a suitable scale was used to map the survey area. Sites were chosen from these aerials to reflect changes in community structure. Vegetation types were assigned to each site based on topography, soil type and presence/absence and percent foliage cover of vegetation.
Timing, weather, season, cycle.	Not a constraint.	The field survey was conducted in August in fine weather conditions. Rainfall for the 12 months prior to the survey was less than the long-term average, however, conditions were adequate for a Reconnaissance Survey.

Potential Limitation	Impact on assessment	Comment
Disturbances (fire flood, accidental human intervention, etc.).	Not a constraint.	The Survey Area and regional surrounds have been subject to disturbance over a significant period of time. Given the wide range of this disturbance, this is not considered to be a limitation within the survey area.
Intensity (in retrospect, was the intensity adequate).	Not a constraint.	The Survey Area was traversed on foot and all differences in vegetation structure were recorded appropriately.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	Not a constraint.	The available resources were adequate to complete the survey.
Access problems (i.e. ability to access Survey area).	Not a constraint.	Existing tracks enabled adequate access to survey the vegetation within the survey area. Where access was not available by car, the area was easily traversed on foot.
Experience levels (e.g. degree of expertise in species identification to taxon level).	Not a constraint.	All survey personnel have the appropriate training in sampling and identifying the flora of the region.

4. Results

4.1 Desktop assessment

4.1.1 Threatened and Priority flora

A desktop survey for Threatened and Priority flora that may potentially occur within the Survey Area was undertaken using NatureMap (Parks and Wildlife 2007-), the Western Australian Herbarium (Western Australian Herbarium 1998-), the EPBC Protected Matters Search Tool (PMST) (DAWE 2020b) and DBCA database results (Figure 4.1, Appendix A).

The desktop assessment identified nine Threatened flora and five Priority flora species that have been recorded in the local area. Of these, based on general habitat requirements (Appendix C), three Threatened and three Priority flora species were considered to have potential to occur within the Survey Area.

- *Dillwynia dillwynioides* (P3)
- *Diuris drummondii* (Vulnerable [EPBC Act], Threatened [BC Act])
- *Drakaea elastica* (Endangered [EPBC Act], Threatened [BC Act])
- *Drakaea micrantha* (Vulnerable [EPBC Act], Threatened [BC Act])
- *Stachystemon exilis* (P1)
- *Styphelia filifolia* (P3).

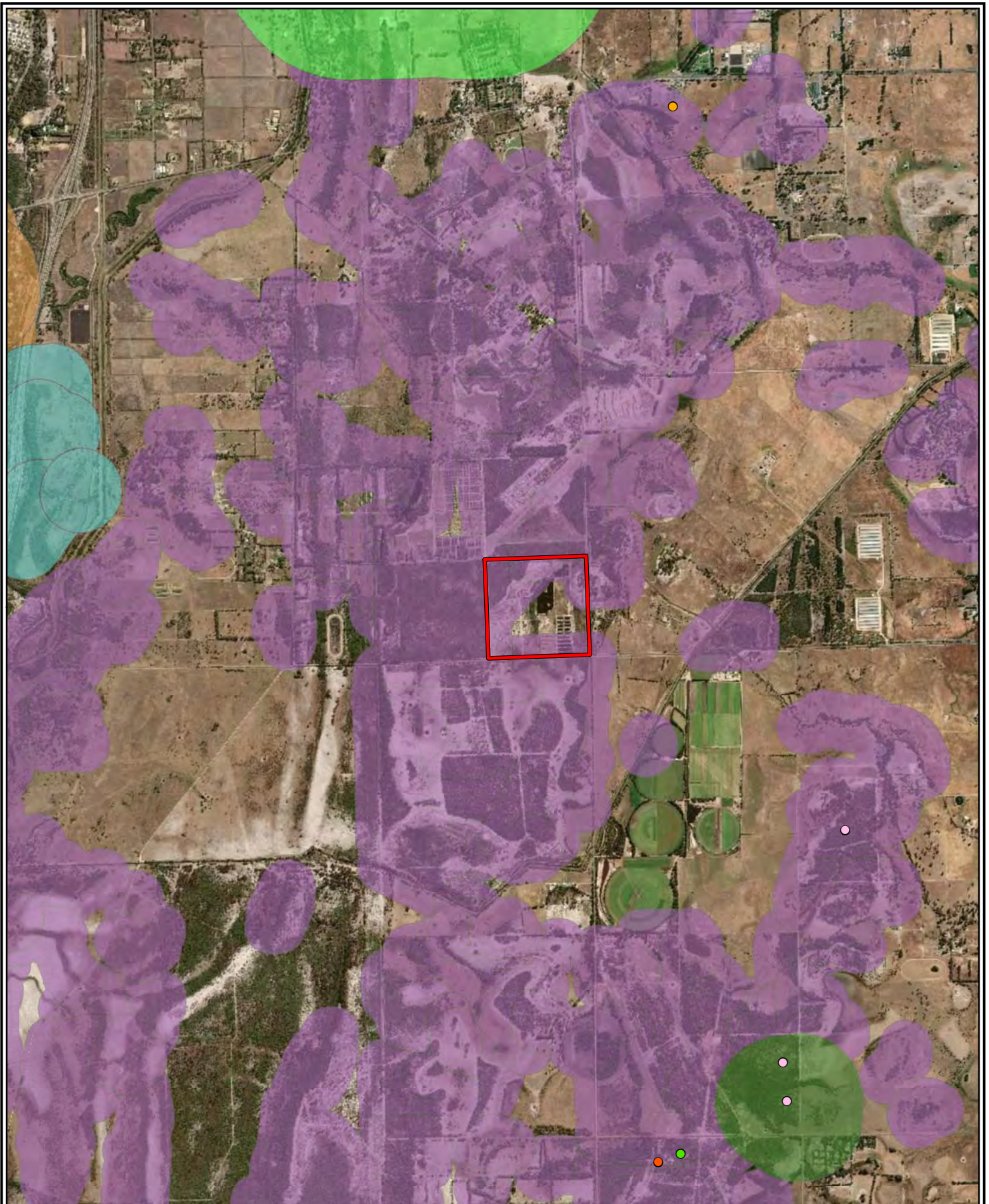
There are no historical records of Threatened or Priority flora within or near the Survey Area. The nearest records of Priority flora are approximately 2.5 km from the Survey Area (Figure 4.1).

4.1.2 Threatened and Priority Ecological Communities

DBCA data identified multiple instances of five Threatened and Priority Ecological Communities occurring within 5 km of the Survey Area. Of these, based on site location and comparison of community descriptions and assessment against diagnostic criteria (DCBA 2018, TSSC 2016, TSSC 2019), one TEC listed under the EPBC Act and BC Act, namely, Banksia woodlands of the Swan Coastal Plain, (listed as a PEC by DBCA), was considered to be potentially present within the Project Area (Table 4.1, Figure 4.1).

Table 4.1: TECs and PECs identified within and near the Survey Area

Community	Conservation Status	
	EPBC Act	BC Act
<i>Banksia</i> woodlands of the Swan Coastal Plain	Endangered	Priority 3
SCP 15 Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain	NA	Vulnerable
SCP21c Low lying <i>Banksia attenuata</i> woodlands or shrublands	Endangered	Priority 3
SCP08 Herb rich shrublands in claypans	Vulnerable	Critically Endangered
Tuart woodlands and forests of the Swan Coastal Plain	Critically Endangered	Priority 3



- Survey area
- Priority flora (DBCFA)
 - *Stachystemon exilis*
 - *Stylidium longitubum*
 - *Styphelia filifolia*
 - *Synaphea* sp. Serpentine (G.R. Brand 103)
- TEC/PEC areas
 - Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region
 - Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain (floristic community type 15 as originally described in Gibson et al. (1994))
 - Herb rich shrublands in clay pans (floristic community type 8 as originally described in Gibson et al. (1994))
 - Low lying *Banksia attenuata* woodlands or shrublands
 - Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain

Scale 1:40,000 at A4

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 59738

Client: Stati Group

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Kilometres

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Date: 02-Sep-2020

Checked By: HS

**Lot 400 Wigg Road
Keysbrook**

**1 THREATENED AND PRIORITY FLORA
AND COMMUNITIES KNOWN FROM
WITHIN 5 KM OF THE SURVEY AREA**

FIGURE 4.1



4.1.3 Field survey

4.1.3.1 Native flora

A total of 32 native vascular plant taxa from 14 plant families were recorded within the Survey Area (Appendix D, Appendix E).

4.1.3.2 Conservation significant flora

No Threatened flora species as listed under section 178 of the EPBC Act or section 19(1) of the BC Act were recorded within the Survey Area.

One potential priority species, *Jacksonia ?sericea*, was recorded throughout the Survey Area, including remnant vegetation and in regrown areas that had previously been heavily cleared. This species was not able to be identified fully as it was not in flower at the time of survey.

4.1.3.3 Introduced (exotic) taxa

A total of five introduced (exotic) taxa were recorded within relevés within the Survey Area, as follows:

- **Carpobrotus edulis*
- **Hypochaeris glabra*
- **Poaceae* sp.
- **Ursinia anthemoides*
- **Zantedeschia aethiopica*.

**Zantedeschia aethiopica* is a Declared Plant species in Western Australia pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM ACT).

4.1.3.4 Vegetation types

Seven vegetation types (VT) were defined and mapped within the Survey Area, with an additional two VTs identified in vegetation surrounding the Survey Area (Figure 4.2, Table 4.2). Vegetation types are illustrated in Figure 4.2 and described in Table 4.3. Vegetation types outside the Survey Area should be considered indicative, as these lots were not accessed at the time of survey. Rather, observations were made from within the Survey Area.

The total area mapped within the Survey Area was approximately 63.07 ha.

Table 4.2: Vegetation types within Survey Area

Vegetation Type	Description	Area (ha)	Percentage of the Survey Area
Within Survey Area			
VT1	Shrubland of <i>Kunzea glabrescens</i> over open heath of <i>Euchilopsis linearis</i> , <i>Phlebocarya ciliata</i> and <i>Jacksonia ?sericea</i> (P4) over mixed introduced species with occasional <i>Banksia ilicifolia</i> , in lower-lying areas	8.60	13.64
VT2	Woodland of <i>Banksia ilicifolia</i> over open shrubland of <i>Adenanthos cygnorum</i> and <i>Kunzea glabrescens</i> over isolated native shrubs and mixed introduced species	1.38	2.19
VT3	Open woodland of <i>Banksia menziesii</i> , <i>Banksia attenuata</i> and <i>Eucalyptus marginata</i> over isolated <i>Macrozamia riedlei</i> and introduced grasses and herbs	0.63	1.01
VT4	Woodland of <i>Melaleuca preissiana</i> , <i>Melaleuca raphiophylla</i> and <i>Eucalyptus</i> sp. over isolated native shrubs and mixed introduced species	1.11	1.77
VT5	Closed shrubland of <i>Kunzea glabrescens</i> , <i>Astartea fascicularis</i> and <i>Hypocalymma angustifolium</i> over sedgeland of <i>Lepidosperma longitudinale</i> and <i>Leptocarpus coangustatus</i> over mixed introduced species	0.43	0.69

Vegetation Type	Description	Area (ha)	Percentage of the Survey Area
VT6	Regrowth of isolated native shrubs including <i>Adenanthos cygnorum</i> , <i>Dasypogon bromeliifolius</i> and <i>Scholtzia involucreta</i> over mixed introduced species in drier areas	15.71	24.91
VT7	Regrowth of isolated native shrubs including <i>Kunzea glabrescens</i> , <i>Lepidosperma longitudinale</i> and <i>Leptocarpus coangustatus</i> over mixed introduced species in lower-lying areas	15.91	25.23
CL	Cleared; non-native vegetation	19.29	30.58
Total		63.07	100

Table 4.3: Indicative vegetation types in vegetation adjacent to Survey Area

Vegetation Type	Description
VT1	Shrubland of <i>Kunzea glabrescens</i> over open heath of <i>Euchilopsis linearis</i> , <i>Phlebocarya ciliata</i> and <i>Jacksonia ?sericea</i> (P4) over mixed introduced species with occasional <i>Banksia ilicifolia</i> , in lower-lying areas
VT3	Open woodland of <i>Banksia menziesii</i> , <i>Banksia attenuata</i> and <i>Eucalyptus marginata</i> over isolated <i>Macrozamia riedlei</i> and introduced grasses and herbs
VT8	Closed shrubland of <i>Regelia</i> sp.
VT9	Open woodland of <i>Eucalyptus rudis</i> over shrubland to isolated shrubs of <i>Kunzea glabrescens</i> and <i>Regelia</i> sp.
VT10	Open woodland of <i>Banksia menziesii</i> , <i>Banksia attenuata</i> and <i>Eucalyptus marginata</i> over mixed native shrubs and herbs
Parkland cleared	Isolated remnant trees including <i>Melaleuca preissiana</i> , <i>Melaleuca raphiophylla</i> and <i>Eucalyptus rudis</i> and planted eucalypts over introduced species in paddocks among farm buildings and infrastructure
CL	Cleared; non-native vegetation

4.1.4 Vegetation condition

The Survey Area shows signs of having been degraded for a long period of time. Historical disturbance from agricultural activities including partial clearing, livestock grazing, excavation for aquaculture ponds and weed invasion are the most prominent disturbances within the Survey Area. As such, vegetation condition within the Survey Area ranged from Completely Degraded to Good (EPA 2016; Figure 4.3).

Table 4.4 provides a numerical breakdown of the area occupied by each vegetation condition rating within the Survey Area.

Table 4.4: Vegetation condition within the Survey Area

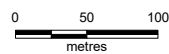
Vegetation Condition	Area (ha)	Percentage of the Survey area
Good	5.20	8.24
Degraded - Good	3.76	5.96
Degraded	3.21	5.09
Completely Degraded	50.91	80.71
Total	63.07	100



Legend

- | | |
|-----------------|---|
| Survey area | Indicative vegetation types in vegetation adjacent to Survey Area |
| Vegetation type | Cleared |
| VT1 | Parkland cleared |
| VT2 | VT1 |
| VT3 | VT10 |
| VT4 | VT3 |
| VT5 | VT7 |
| VT6 | VT8 |
| VT7 | VT9 |
| Cleared | |

Scale 1:5,300 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59738

Client: Stati Group

Version: A

Date: 02-Sep-2020

Drawn By: cthatcher

Checked By: HS

**Lot 400 Wigg Road
Keysbrook**

**VEGETATION TYPE (VT)
MAPPED WITHIN THE SURVEY AREA**

FIGURE 4.2

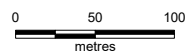




Legend

- Survey area
- Vegetation condition
- Good
- Degraded-good
- Degraded
- Completely degraded

Scale 1:4,750 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59738

Client: Stati Group

Version: A

Date: 02-Sep-2020

Drawn By: cthatcher

Checked By: HS

**Lot 400 Wigg Road
Keysbrook**

**VEGETATION CONDITION
MAPPED WITHIN THE SURVEY AREA**

FIGURE 4.3



4.1.5 Threatened and Priority Ecological Communities

The desktop survey identified five TECs and PECs as having the potential to occur within the Survey Area.

DBCA mapping indicates the presence of Banksia Woodlands of the Swan Coastal Plain TEC within and surrounding the Survey Area (Figure 4.1). This dataset was produced by DBCA using GIS mapping to determine areas of potential occurrences of this TEC, based on known instances of the TEC in the locality and presence of remnant vegetation.

The majority of the mapped TEC area falling within the Survey Area is not consistent with Banksia woodland vegetation, and is largely associated with buffers applied to boundaries of areas of Banksia woodland vegetation external to the Survey Area. Field survey results indicated that Banksia woodland vegetation only occurred in the following areas:

- in VT2 and VT3, within the Survey Area
- in VT3, directly adjacent to the north-eastern boundary of the Survey Area
- in VT3, in a narrow strip of vegetation along the eastern side of Yangedi Rd
- in VT10, directly adjacent to the western boundary of the Survey Area.

Banksia Woodlands of the Swan Coastal Plain TEC

An analysis was undertaken to determine the extent of the Banksia Woodlands of the Swan Coastal Plain TEC (Figure 4.3). The determination of patches was made using the key diagnostic criteria as per the Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community (TSSC 2016). The patch size of the areas mapped as VT2 and VT3 within the Survey Area were approximately 1.44 ha and 0.6 ha respectively, with an additional 0.1 ha of VT3 occurring in remnant roadside vegetation to the east across Yangedi Rd, less than 30 m from the occurrence within the Survey Area. As these areas are below the minimum condition threshold (Table 4.5), neither should be considered to be instances of the Banksia Woodlands of the Swan Coastal Plain TEC.

Banksia Woodlands of the Swan Coastal Plain PEC

As at July 2020, the state-listed PEC Banksia Woodlands of the Swan Coastal Plain was considered to be subject to the same diagnostic criteria as the TEC (DBCA 2020a). Given this, none of the vegetation within the Survey Area forms part of this PEC.

Table 4.5: Banksia woodlands of the Swan Coastal Plain – assessment against key diagnostic criteria (TSSC 2016)

Key diagnostic criteria (TSSC 2016)	VT2	VT3
Area within survey area	1.38 ha	0.63 ha
Total patch size	1.38 ha	0.63 ha
<u>Location:</u> Occurs in the Swan Coastal Plain or Jarrah Forest IBRA bioregions.	Yes	Yes
<u>Soils and landform:</u> Occurs on: <ul style="list-style-type: none"> • well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands • sandy colluviums and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau • transitional substrates and sandflats. 	Yes	Yes
<u>Structure:</u> Low woodland to forest with:	Yes	Yes

<ul style="list-style-type: none"> • a distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the banksia species identified below • emergent trees of medium or tall (>10 m) height. <i>Eucalyptus</i> or <i>Allocasuarina</i> species may sometimes be present above the banksia canopy • an often highly species-rich understorey. 		
<p><u>Composition:</u> Contains at least one of the following species:</p> <ul style="list-style-type: none"> • <i>Banksia attenuata</i> • <i>Banksia menziesii</i> • <i>Banksia prionotes</i> • <i>Banksia ilicifolia</i>. 	Yes – contains <i>Banksia ilicifolia</i>	Yes – contains <i>Banksia attenuata</i> and <i>Banksia menziesii</i>
<p><u>Condition (Keighery 1994):</u> 'Pristine': no minimum patch size 'Excellent': 0.5 ha 'Very Good': 1 ha 'Good': 2 ha.</p>	<p>Degraded.</p> <p>As this patch does not connect with any surrounding Banksia woodland vegetation and is in Degraded condition, it does not meet the minimum size and condition criteria to form part of the Banksia woodlands of the Swan Coastal Plain TEC or PEC.</p>	<p>Degraded.</p> <p>As this patch does not connect with any surrounding Banksia woodland vegetation and is in Degraded condition, it does not meet the minimum size and condition criteria to form part of the Banksia woodlands of the Swan Coastal Plain TEC or PEC.</p>

The analysis of Banksia woodland vegetation within the Survey Area indicated that neither the TEC or PEC occurred within the Survey Area.

4.2 Wetland assessment

Seven areas mapped as CCW by DBCA (2018c) within and adjacent to the Survey Area were considered to warrant further investigation as to their inclusion as CCW within the Geomorphic Wetlands of the Swan Coastal Plain dataset.

UFI 14733 - CCW

Vegetation in the portion of UFI 14733 falling within the Survey Area was mapped as VT1: shrubland of *Kunzea glabrescens* over open heath of *Euchilopsis linearis*, *Phlebocarya ciliata* and *Jacksonia ?sericea* (P4) over mixed introduced species with occasional *Banksia ilicifolia*, in lower-lying areas. The majority of vegetation was rated as Good, with areas along the eastern and northern boundaries mapped as Degraded, due to clearing, weed invasion and dumping of large waste items (Plate 1).



Plate 1: Eastern boundary of UFI 14733

The “core” area of vegetation including the western boundary with the adjacent lot was subject to moderate weed invasion of herbaceous weed species including **Ursinia anthemoides* and **Hypochaeris glabra*.

Vegetation in the portion of UFI 14733 falling within Lot 399 Wigg Road (to the west of the Survey Area) was observed from the boundary of the two lots, and included VT10: Open woodland of *Banksia menziesii*, *Banksia attenuata* and *Eucalyptus marginata*, and closed shrubland of *Regelia* sp. Vegetation within Lot 164 (Serpentine Airfield; observed from the firebreak along the northern boundary of the Survey Area) more closely resembled VT1.

Soil type was loose white-grey sand and was consistent throughout UFI 14733. No standing water or damp areas were noted at the time of survey.

The eastern boundary of UFI 14733 was marked by partially by a firebreak (at the northern and southern extents of the eastern boundary within the Survey Area), as well as a distinct change in vegetation type to VT2: Woodland of *Banksia ilicifolia* over open shrubland of *Adenanthos cygnorum* and *Kunzea glabrescens* over isolated native shrubs and mixed introduced species (Plate 2). This distinction in vegetation type closely followed the mapped boundary of the wetland.



Plate 2: VT2 observed from eastern boundary of UFI 14733

A separate, small area of UFI 14733 occurs along the northern boundary of the Survey Area. This area is separated from other portions of the wetland by two firebreaks (along the northern boundary of the Survey Area and the southern boundary of Serpentine Airfield) and a rabbit-proof electric fence. Vegetation had been cleared to the south of this portion of UFI 14733 and as a result, only a small strip of vegetation remained within the mapped wetland boundary (Figure 4.4).

Areas where the boundary of UFI 14733 as mapped in the Geomorphic Wetlands of the Swan Coastal Plain dataset was considered to be inconsistent with the description of a CCW, based on vegetation type and clearing at the wetland boundary, are illustrated in Figure 4.4.

Wetlands in adjacent lots

UFI 14714 - CCW

UFI 14714 directly abuts the north-eastern corner of the Survey Area and is situated within the Serpentine Airfield to the north and Lot 4 Yangedi Rd to the east. Vegetation within this wetland was observed from the firebreak on the northern boundary of the Survey Area and from Yangedi Road. Vegetation falling within the Serpentine Airfield was most closely aligned with VT3: Open woodland of *Banksia menziesii*, *Banksia attenuata* and *Eucalyptus marginata* over isolated *Macrozamia riedlei* and introduced grasses and herbs.



Plate 3: Banksia woodland vegetation within UFI 14714 at Serpentine Airfield

Vegetation within Lot 4 Yangedi Rd most closely resembled VT1, with an area at the south of the mapped wetland heavily cleared. The heavily cleared area comprised isolated remnant *Melaleuca* sp. trees in paddocks (Plate 4). Vegetation within UFI 14714 on the western side of Yangedi Rd comprised a narrow strip of largely *Kunzea glabrescens* over introduced grasses and weeds (Plate 5).



Plate 4: Vegetation within UFI 14714 on eastern side of Yangedi Rd



Plate 5: Vegetation within UFI 14714 on western side of Yangedi Road

UFI 14719 - CCW

UFI 14719 directly abuts the eastern boundary of the Survey Area and is largely situated within Lot 3 Yangedi Rd. It comprises remnant trees, paddocks, residential housing and rural infrastructure.

Vegetation within UFI 14719 on the western side of Yangedi Rd comprises a narrow strip of largely *Kunzea glabrescens* over introduced grasses and weeds (Plate 6).



Plate 6: Vegetation within UFI 14719 on western side of Yangedi Road



Legend

- Survey area
- Potential wetland areas for further investigation
- Geomorphic Wetlands (DBCAs)
 - Conservation
 - Resource
 - Multiple Use
 - Not

Scale 1:7,000 at A4		
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Version: A	Date: 02-Sep-2020	
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**Lot 400 Wigg Road
Keysbrook**

WETLAND BOUNDARY ASSESSMENT

FIGURE 4.4

5. Discussion

5.1 Flora

A total of 32 native vascular plant taxa from 14 plant families were recorded within the Survey Area.

Based on general habitat requirements, three Threatened and three Priority flora species were considered to have potential to occur within the Survey Area, as follows:

- *Dillwynia dillwynioides* (P3) – potential habitat within VT1
- *Diuris drummondii* (Vulnerable [EPBC Act], Threatened [BC Act]) – potential habitat within VT1
- *Drakaea elastica* (Endangered [EPBC Act], Threatened [BC Act]) – potential habitat within VT1 and VT2
- *Drakaea micrantha* (Vulnerable [EPBC Act], Threatened [BC Act]) – potential habitat throughout Survey Area
- *Stachystemon exilis* (P1) – potential habitat in VT2
- *Styphelia filifolia* (P3) – potential habitat in VT1, VT2 and VT3.

No Threatened flora species as listed under section 178 of the EPBC Act or section 19(1) of the BC Act were recorded within the Survey Area. One potential Priority flora species, *Jacksonia ?sericea* (P4), was recorded within the Survey Area. This species was observed throughout the Survey Area across a range of vegetation types areas in varying vegetation condition. Full identification of this species was not possible at the time of the survey as plants were not bearing identifiable features such as flowers or fruit. Further survey during the species' flowering season (December – January) would be required to confirm this identification.

Five introduced (exotic) taxa were recorded within relevés within the Survey Area, as follows:

- **Carpobrotus edulis*
- **Hypochoeris glabra*
- **Poaceae* sp.
- **Ursinia anthemoides*
- **Zantedeschia aethiopica*.

**Zantedeschia aethiopica* is a Declared Plant species in Western Australia pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM ACT) according to the Western Australian Department of Agriculture and Food (DAFWA 2017).

A full audit of weed species across degraded areas was not undertaken as part of this survey, as such, additional weed species not listed above are likely to occur within the Survey Area.

5.2 Vegetation

Seven vegetation types (VT) were defined and mapped within the Survey Area, with an additional four VTs identified in vegetation in lots surrounding the Survey Area, forming a mosaic of dryland vegetation (*Banksia* woodland [VT2, VT3, VT6]) and wetland / wetland fringing vegetation (*Kunzea glabrescens* shrubland [VT1, VT4, VT5, VT7]).

Vegetation condition varied from Completely Degraded, in areas subject to historical clearing or development (e.g. aquaculture ponds, tracks etc), to Good, in heavily vegetated areas. The majority

of the Survey Area was in Completely Degraded condition, resulting from clearing, development of rural and aquaculture infrastructure as well as rubbish dumping.

Two areas of Banksia woodland vegetation (VT2 and VT3) were assessed against diagnostic criteria for the Banksia Woodlands of the Swan Coastal Plain TEC and PEC; however, both patches were smaller than the threshold sizes to be considered part of either the TEC or PEC. No other TECs or PECs occur within the Survey Area.

5.3 Wetlands

One Conservation Category Wetland (CCW; UFI 14733) occurs within the boundary of the Survey Area. UFI 14733 extends beyond the boundaries of the Survey Area into Serpentine Airfield to the north and Lot 399 Wigg Road to the west. Two additional CCWs (UFI 14714 and 14719) occur directly to the east of the Survey Area, incorporating a narrow strip of roadside vegetation along the eastern boundary of the Survey Area.

5.3.1 Wetlands within the Survey Area

UFI 14733 comprises one vegetation type (VT1, broadly described as *Kunzea glabrescens* shrubland), which ranges from Degraded to Good condition. Two areas mapped within UFI 14733 (labelled 1 and 3 on Figure 4.4) were considered to no longer contain vegetation consistent with the description of a CCW; i.e. comprising high conservation significance with a high level of attributes and functions (DBCA 2017), as a result of clearing and waste dumping. These areas were considered to be more consistent with the description of Resource Enhancement Wetland (REW). One further area (area 4) was also heavily cleared and was more consistent with the adjacent Multiple Use Wetland (MUW).

Vegetation in an area along the central eastern boundary of UFI 14733 (area 2) contained *Banksia ilicifolia* woodland and, as such, was not consistent with the vegetation type found in the core wetland (i.e. VT1, *Kunzea glabrescens* shrubland).

5.3.2 Wetlands adjacent to the Survey Area

Two areas of CCW external to the Survey Area (areas 6 and 7 in UFI 14714 and UFI 14719 respectively) were also considered to be inconsistent with the description of a CCW, due to heavy clearing, development of rural and residential buildings and infrastructure, and grazing. These areas are likely to be more consistent with the REW classification, as vegetation in these areas comprised isolated remnant overstorey species (*Melaleuca* and *Eucalyptus rudis* trees) but appeared to have minimal (if any) mid and understorey remaining. Further survey within the relevant lots would be required to definitively determine vegetation condition in these areas.

Both UFI 14714 and UFI 14719 incorporate a narrow, linear strip of roadside vegetation on the western side of Yangedi Road; as such, both wetlands also incorporate, and are bisected by, Yangedi Road. Area 5 (within UFI 14714) contained *Banksia* woodland vegetation and was thus not consistent with wetland vegetation. Permission to access lots to the east of Yangedi Road would be required to assess areas 5, 6 and 7 more accurately.

6. Summary and conclusion

The key results and outcomes of the flora and vegetation survey and wetland assessment were:

- three Threatened and three Priority flora species have the potential to occur in remnant vegetation within the Survey Area
- one potential Priority flora species, *Jacksonia sericea* (P4), occurs throughout the Survey Area; however, further survey during the species' flowering season (December – January) would be required to confirm the identification
- no historical records of Threatened or Priority flora species are known from within the Survey Area, or within 2.5 km of the Survey Area
- five introduced species were recorded within areas of remnant vegetation within the Survey Area, though it is likely that additional introduced species occur throughout more disturbed areas of the Survey Area
- the majority of vegetation across the Survey Area was in Completely Degraded condition
- seven vegetation types were recorded within the Survey Area including intact areas of *Kunzea glabrescens* shrubland in areas marked as wetlands, to Banksia woodland in more elevated areas
- vegetation condition ranged from Completely Degraded in previously cleared areas to Good in areas of remnant vegetation
- no TECs or PECs occur within the Survey Area
- Banksia Woodlands of the Swan Coastal Plain TEC is likely to occur in the lot directly adjacent to the western boundary of the Survey Area
- four areas of CCW within the Survey Area and three areas outside but adjacent to the Survey Area were considered to be inconsistent with the description of a CCW and are identified as areas for further investigation.

7. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, Strategen-JBS&G reserves the right to review the report in the context of the additional information.

8. References

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Appendix A Conservation significant flora and ecological community definitions



CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora¹ are species² which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T **Threatened species**

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**

Threatened species considered to be “*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*”.

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**

Threatened species considered to be “*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*”.

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**

Threatened species considered to be “*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*”.

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where “*there is no reasonable doubt that the last member of the species has died*”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that “*is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species 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 species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

¹ The definition of flora includes algae, fungi and lichens

² Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix B Desktop assessment results

NatureMap Species Report

Created By Guest user on 28/07/2020

Kingdom Plantae

Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)

Current Names Only Yes

Core Datasets Only Yes

Method 'By Circle'

Centre 115° 52' 16" E, 32° 24' 08" S

Buffer 5km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	3863	<i>Dillwynia dillwynioides</i>		P3	
2.	980	<i>Schoenus capillifolius</i>		P3	
3.	20666	<i>Stachystemon</i> sp. Keysbrook (R. Archer 17/11/99)		P1	
4.	7756	<i>Stylidium longitubum</i> (Jumping Jacks)		P4	
5.	48297	<i>Styphelia filifolia</i>		P3	
6.	28354	<i>Synaphea</i> sp. Serpentine (G.R. Brand 103)		T	

Conservation Codes

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

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



EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 28/07/20 14:50:29

[Summary](#)

[Details](#)

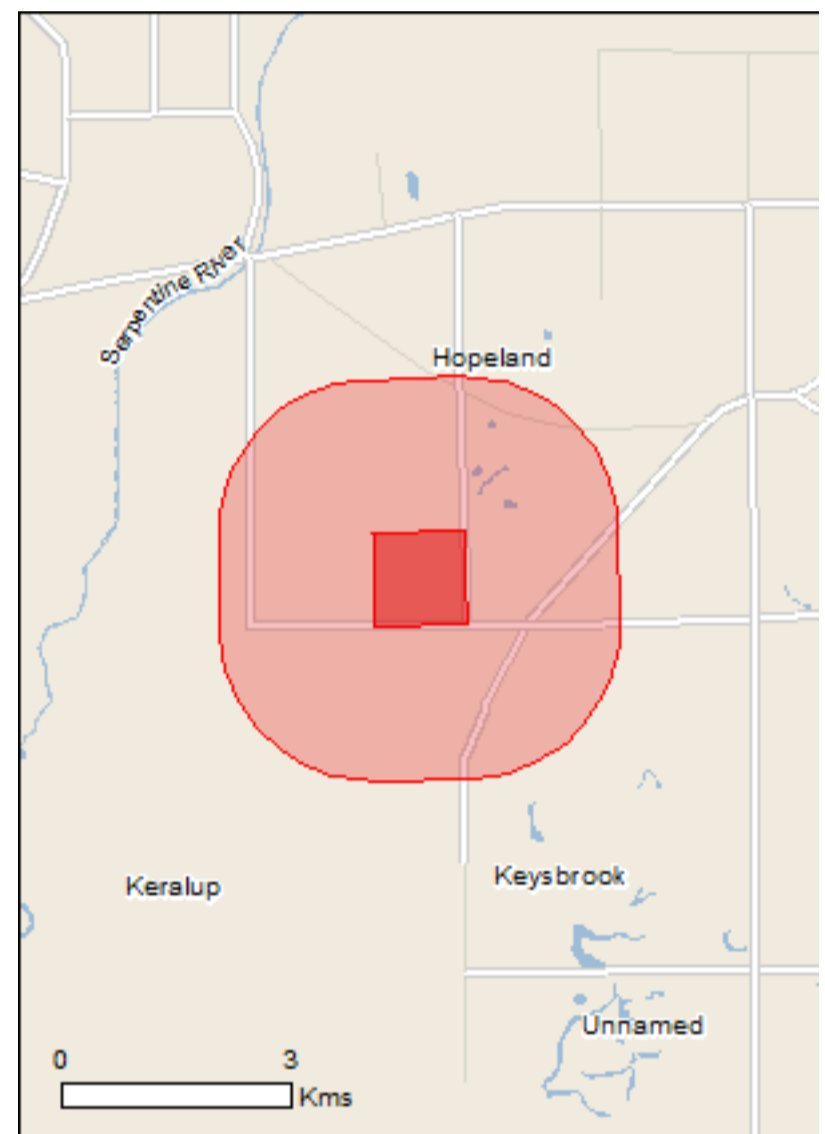
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

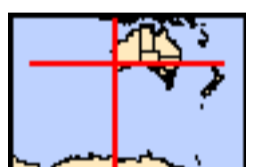
[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 2.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	23
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	35
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)

[[Resource Information](#)]

Name	Proximity
Becher point wetlands	Within 10km of Ramsar
Peel-yalgorup system	10 - 20km upstream

Listed Threatened Ecological Communities

[[Resource Information](#)]

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

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

Listed Threatened Species

[[Resource Information](#)]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leaved Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species

[[Resource Information](#)]

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within

Name	Status	Type of Presence area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-32.396584 115.864831,-32.396294 115.875731,-32.405787 115.875989,-32.406005 115.864917,-32.396584 115.864917,-32.396584 115.864831

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix C Conservation significant flora likelihood assessment

Species FAMILY Common name (if applicable)	Conservation status		Description	Potential to occur (pre-field survey)	Potential to occur (post-field survey)
	EPBC Act	BC Act / DBCA			
<i>Andersonia gracilis</i>	Endangered	Threatened	A slender, erect or open straggly shrub, 10 to 100 cm high. Flowers are white to pink to purple from September to November. Habitat for this species occurs in white/grey sand, sandy clay, gravelly loam within winter-wet areas and near swamps (Western Australian Herbarium 1998-). The species occurs in damp black, sandy clay flats near swamps in open low heath with <i>Calothamnus hirsutus</i> (hairy clawflower), <i>Verticordia densiflora</i> (compact featherflower), <i>Kunzea recurva</i> (recurved kunzea) and <i>Banksia telmatiaea</i> over sedges.	Unlikely due to absence of preferred habitat.	Unlikely due to absence of preferred habitat.
<i>Caladenia huegelii</i>	Endangered	Threatened	A slender orchid with one or two greenish-cream flowers characterised by a lower petal with a maroon tip. Other petals are cream with red or pink suffusions. Habitat for this species occurs within well-drained, deep sandy soils in low mixed <i>Banksia</i> , <i>Allocasuarina</i> and Jarrah woodlands (Western Australian Herbarium 1998-, DAWE 2020c).	Possible due to potential presence of preferred habitat.	Unlikely . Areas of preferred habitat are heavily degraded and fragmented with limited understorey remaining.
<i>Dillwynia dillwynioides</i>	NA	P3	A decumbent or erect, slender shrub between 30-120 cm tall. Flowers are red & yellow/orange and visible from August to December. Habitat for this species occurs on sandy soils in winter-wet depressions (Western Australian Herbarium 1998-).	Possible due to potential presence of preferred habitat.	Possible due to presence of preferred habitat in VT1.
<i>Diuris drummondii</i>	Vulnerable	Threatened	Tuberous perennial orchid flowering yellow between November and December or January. Occurs in low-lying depressions or swamps (Western Australian Herbarium 1998-).	Possible due to potential presence of preferred habitat.	Possible due to presence of preferred habitat in VT1.
<i>Diuris micrantha</i>	Vulnerable	Threatened	A slender orchid to 60 cm tall. Yellow flowers with reddish-brown markings measuring 1.3 cm across. Occurs within clay-loam substrates in winter-wet depressions or swamps (Western Australian Herbarium 1998-).	Possible due to potential presence of preferred habitat.	Unlikely due to absence of preferred soil types. Clay soils were not observed within the Survey Area.
<i>Diuris purdiei</i>	Endangered	Threatened	A slender orchid to 0.35 m tall. Flowers are yellow and visible from September to October. Occurs on grey-black sand substrates in winter-wet swamps which have high moisture (Western Australian Herbarium 1998-). Occurs on sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and dense heath with scattered emergent <i>Melaleuca preissiana</i> , <i>Corymbia calophylla</i> , <i>E. marginata</i> and <i>Nuytsia floribunda</i> (DAWE 2020).	Possible due to potential presence of preferred habitat.	Unlikely due to absence of preferred soil types. The Survey Area was attended in August and soil was dry throughout.

Species FAMILY Common name (if applicable)	Conservation status		Description	Potential to occur (pre-field survey)	Potential to occur (post-field survey)
	EPBC Act	BC Act / DBCA			
<i>Drakaea elastica</i>	Endangered	Threatened	A slender orchid to 30 cm tall with a prostrate, round to heart shaped leaf. Singular, bright green, glossy flower. The species grows on bare patches of sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps, typically in banksia (<i>Banksia menziesii</i> , <i>B. attenuata</i> and <i>B. ilicifolia</i>) woodland or spearwood (<i>Kunzea glabrescens</i>) thicket vegetation. <i>D. elastica</i> often occurs with other orchid species (DAWE 2020).	Possible due to potential presence of preferred habitat.	Possible due to presence of preferred habitat in VT1 and VT2.
<i>Drakaea micrantha</i>	Vulnerable	Threatened	Tuberous perennial orchid flowering red & yellow between September and October. Occurs on white-grey sand (Western Australian Herbarium 1998-).	Possible due to potential presence of preferred habitat.	Possible due to presence of preferred habitat across the Survey Area.
<i>Schoenus capillifolius</i>	NA	P1	Semi-aquatic tufted annual sedge flowering green between October and November. Occurs on brown mud in claypans (Western Australian Herbarium 1998-).	Possible due to potential presence of preferred habitat.	Unlikely due to absence of preferred soil types.
<i>Stachystemon exilis</i>	NA	P1	Erect shrub up to 100 cm in height, flowering greenish yellow between October and November. Currently known from three localities on the Swan Coastal Plain in open, low-lying Banksia woodland in which <i>Banksia ilicifolia</i> is a significant component of the canopy. Associated species include <i>Melaleuca preissiana</i> , <i>M. thymoides</i> , <i>Adenanthos meisneri</i> and <i>Hypocalymma angustifolium</i> (Hislop and Davis 2020).	Possible due to potential presence of preferred habitat.	Possible due to potential presence of preferred habitat in VT2.
<i>Stylidium longitubum</i> (Jumping Jacks)	NA	P4	Erect annual (ephemeral), herb, 0.05-0.12 m high. Flowers pink, between October and December. Occurs on sandy clay, clay in seasonal wetlands (Western Australian Herbarium 1998-).	Possible due to potential presence of preferred habitat.	Unlikely due to absence of preferred soil types.
<i>Styphelia filifolia</i>	NA	P3	Erect shrub to 90 cm in height, flowering between March and May. Occurs on sandy soils of the Swan Coastal Plain, usually in Banksia or Jarrah woodland and in low-lying situations (Hislop and Puente-Lelievre 2017).	Possible due to potential presence of preferred habitat.	Possible due to presence of preferred habitat in VT1, VT2 and VT3.

Species FAMILY Common name (if applicable)	Conservation status		Description	Potential to occur (pre-field survey)	Potential to occur (post-field survey)
	EPBC Act	BC Act / DBCA			
<i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696)	Critically Endangered	Threatened	A dense, clumped shrub from 25 to 65 cm tall. Flowers are erect axillary spikes, yellow in colour, hairy, openly spaced and are angled upwards in the spike (DAWE 2020). Habitat for this species occurs on the Pinjarra Plain, south of Perth from Serpentine to Dardanup. The five known subpopulations of the species are fragmented and exist within scattered patches of remnant vegetation on grey, clayey sand with lateritic pebbles in low woodland areas near winter flats, in areas which have been extensively cleared for agriculture (DAWE 2020).	Possible due to potential presence of preferred habitat.	Unlikely due to absence of preferred soil types.
<i>Synaphea</i> sp. Serpentine (G.R. Brand 103)	Critically Endangered	Threatened	Clumped shrub to 0.6 m in height, with yellow flowers on long spikes occurring between late August and November. Occurs on flat terrain on grey-brown sandy loams to clay in seasonally wet areas (DAWE 2020).	Possible due to potential presence of preferred habitat.	Unlikely due to absence of preferred soil types.

Appendix D Native plant taxa recorded within the Survey Area

FAMILY	Species
Casuarinaceae	<i>Allocasuarina fraseriana</i>
Cyperaceae	<i>Lepidosperma longitudinale</i>
Dasygogonaceae	<i>Dasygogon bromeliifolius</i>
Dilleniaceae	<i>Hibbertia hypericoides</i>
Fabaceae	<i>Acacia pulchella</i>
	<i>Daviesia</i> sp.
	<i>Euchilopsis linearis</i>
	<i>Jacksonia ?sericea</i> (P4)
	<i>Jacksonia furcellata</i>
Haemodoraceae	<i>Phlebocarya ciliata</i>
Iridaceae	<i>Patersonia occidentalis</i>
Loranthaceae	<i>Nuytsia floribunda</i>
Myrtaceae	<i>Astartea fascicularis</i>
	<i>Corymbia calophylla</i>
	<i>Eucalyptus marginata</i>
	<i>Eucalyptus rudis</i>
	<i>Hypocalymma angustifolium</i>
	<i>Kunzea glabrescens</i>
	<i>Melaleuca preissiana</i>
	<i>Melaleuca raphiophylla</i>
	<i>Regelia</i> sp.
	<i>Scholtzia involucrata</i>
Orchidaceae	<i>Caladenia ?flava</i>
Proteaceae	<i>Adenanthos cygnorum</i>
	<i>Banksia attenuata</i>
	<i>Banksia ilicifolia</i>
	<i>Banksia menziesii</i>
	<i>Stirlingia latifolia</i>
Restionaceae	<i>Hypolaena exsulca</i>
	<i>Leptocarpus coangustatus</i>
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>
Zamiaceae	<i>Macrozamia riedlei</i>

Appendix E Flora taxa recorded within the Survey Area

	Species	VT1	VT2	VT3	VT4	VT5	VT6	VT7	VT8	VT9	Opportunistic
^	<i>Eucalyptus</i> sp.				x						
	<i>Acacia pulchella</i>	x									
	<i>Adenanthos cygnorum</i>						x				
	<i>Allocasuarina fraseriana</i>						x				
	<i>Astartea fascicularis</i>					x					
	<i>Banksia attenuata</i>			x							
	<i>Banksia ilicifolia</i>	x	x								
	<i>Banksia menziesii</i>			x							
	<i>Caladenia ?flava</i>										x
*	<i>Carpobrotus edulis</i>	x									
	<i>Corymbia calophylla</i>										
	<i>Dasyogon bromeliifolius</i>	x					x				
	<i>Daviesia</i> sp.										x
	<i>Eucalyptus marginata</i>			x							
	<i>Eucalyptus rudis</i>									x	
	<i>Euchilopsis linearis</i>	x									
	<i>Hibbertia hypericoides</i>	x									
	<i>Hypocalymma angustifolium</i>					x					
*	<i>Hypochaeris glabra</i>	x									
	<i>Hypolaena exsulca</i>	x									
	<i>Jacksonia ?sericea</i>	x			x		x				
	<i>Jacksonia furcellata</i>	x									
	<i>Kunzea glabrescens</i>	x	x		x	x	x	x			
	<i>Leptocarpus coangustatus</i>					x		x		x	
	<i>Macrozamia riedlei</i>			x			x				
	<i>Melaleuca preissiana</i>	x			x						
	<i>Melaleuca rhapsiophylla</i>				x						
	<i>Nuytsia floribunda</i>										x
	<i>Patersonia occidentalis</i>										x
	<i>Phlebocarya ciliata</i>	x									
*	Poaceae sp.	x	x	x		x					
	<i>Regelia</i> sp.	x							x	x	
	<i>Scholtzia involucrata</i>						x				
	<i>Stirlingia latifolia</i>						x				
	<i>Lepidosperma longitudinale</i>					x		x			
*	<i>Ursinia anthemoides</i>	x									
	<i>Xanthorrhoea preissii</i>										x
*	<i>Zantedeschia aethiopica</i>										


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