2015

CITY OF ROCKINGHAM

Reserve Prioritisation Report

city of Rockingham

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Acronyms

DAA	Department of Aboriginal Affairs (formerly DIA – Department of Indigenous Affairs)
DAFWA	Department of Agriculture and Food Western Australia
DEC	Department of Environment and Conservation
DP	Declared Pest under the Biosecurity and Agriculture Management Act 2007
DPaW	Department of Parks and Wildlife
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DotE	Department of the Environment (formerly DSEWPaC – Department of Sustainability, Environment, Water, Population and Communities)
DoW	Department of Water
EIA	Environmental Impact Assessment
EPP	Environmental Protection Policy
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GHD	GHD Pty Ltd
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation of Australia
MRS	Metropolitan Region Scheme
NAIDA	Natural Area Initial Desktop Assessment
NAIA	Natural Area Initial Assessment
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
WC Act	Wildlife Conservation Act 1950
WoNS	Weeds of National Significance

1. Introduction

1.1 Background

The management of native vegetation varies according to its local or regional significance. Vegetation of regional significance is subject to a number of formal state and federal protection mechanisms including; State Conservation Estate, Bush Forever sites and Metropolitan Regional Scheme (MRS) Parks and Reserves. Approximately 3890 ha of the City of Rockingham's native vegetation is protected under these mechanisms. Of the remaining 2910 ha of native vegetation, an estimated 490 ha of locally significant vegetation is managed directly by the City. This native vegetation occurs in a network of reserves, which support a combination of conservation, recreation and cultural values.

In this regard, one of the objectives of the City's *Greening Plan* (2003) was to identify priority areas within the City for the retention, protection and management of native vegetation. In order to achieve this objective, the City engaged Ecoscape Pty Ltd in 2007 to undertake a vegetation assessment of selected reserves using the Perth Biodiversity Project *Natural Area Initial Assessment* (NAIA) templates.

In order to update the original *Vegetation Survey and Prioritisation of the City of Rockingham Reserves* (2007) the City engaged GHD Pty Ltd to undertake an assessment of the vegetation and infrastructure at selected reserves, including an evaluation of trends with respect to the original assessment.

1.2 Purpose

The primary objective of this review is to maximise conservation outcomes and inform future management. This will be achieved through the strategic prioritisiation of nature reserves according to their respective environmental values and the establishment of specific objectives and actions for each priority area to ensure conservation resources are managed in an effective and sustainable manner.

1.3 Study area

The City of Rockingham municipality is located approximately 35 km south of the Perth Central Business District. The City is situated on a coastal plain and includes 34 km of coastline, a suite of wetlands and significant areas of remnant bushland.

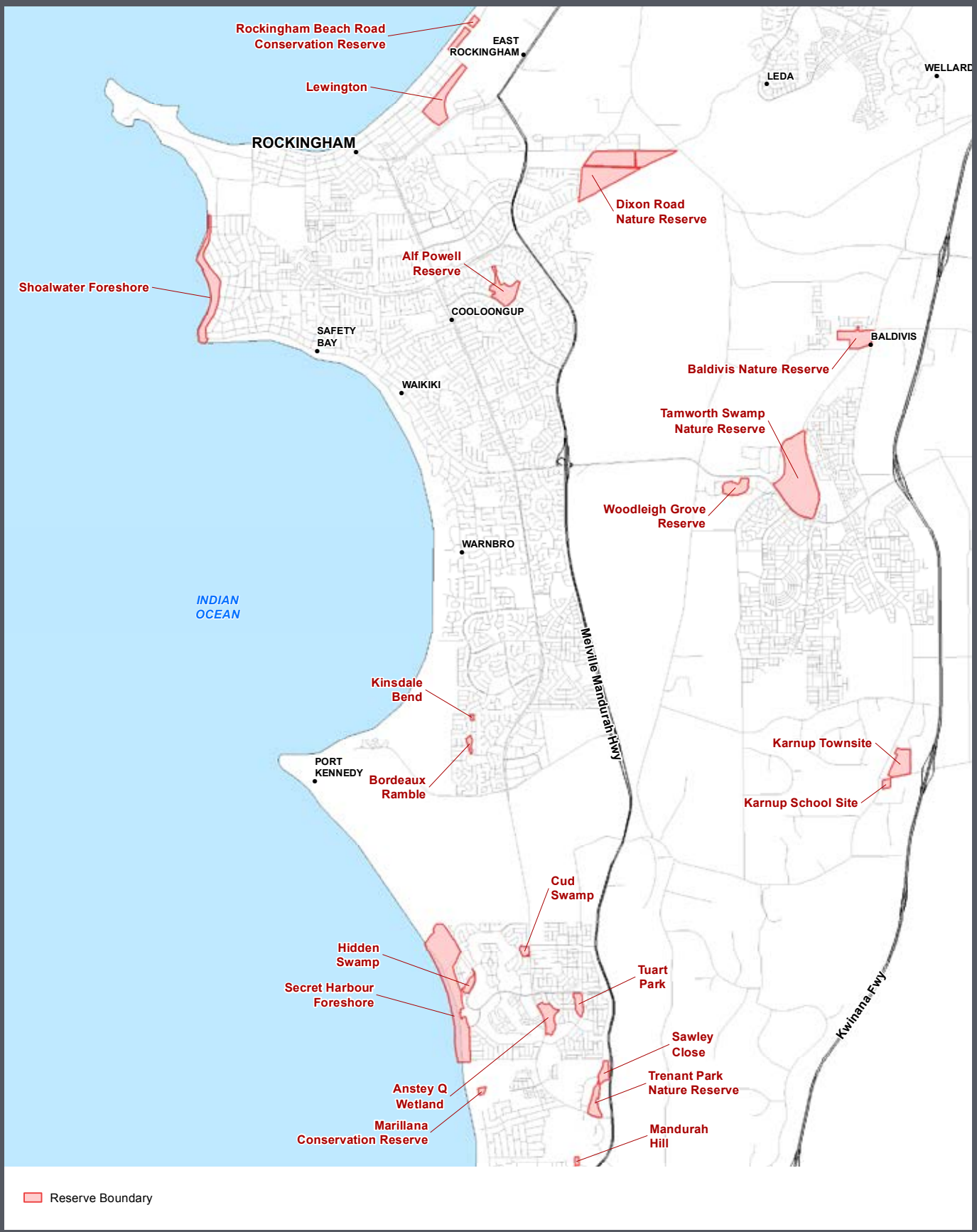
Rockingham reserves

A total of 21 reserves have been selected for inclusion in this study. This includes 14 reserves that were assessed in the 2007 study. The reserves are listed in Table 1 and mapped in Figure 1.

Table 1 **Reserves included in the assessment**

	Reserves	Size (ha)	Included in previous survey
1	**Alf Powell Reserve**	14.24	Yes
2	**Anstey Q Wetland**	10.13	No
3	**Baldivis Nature Reserve**	14.03	Yes
4	**Bordeaux Ramble**	2.02	Yes (previously called Port Kennedy Nature Reserve 1)
5	**CUD Swamp**	2.56	Yes
6	**Dixon Road Conservation Precinct**	61.45	No
7	**Hidden Swamp**	3.24	Yes
8	**Karnup School Site**	2.00	Yes
9	**Karnup Townsite**	12.86	Yes
10	**Kinsdale Bend**	0.56	Yes (previously called Port Kennedy Nature Reserve 2)
11	**Lewington Reserve**	21.00	No
12	**Mandurah Hill**	1.00	Yes
13	**Marillana Conservation Reserve**	1.27	Yes
14	**Rockingham Road Conservation Reserve**	6.67	Yes – part, a larger area has been surveyed for this assessment
15	**Sawley Close Nature Reserve**	4.83	Yes
16	**Secret Harbour Foreshore**	66.98	No
17	**Shoalwater Foreshore**	47.38	No
18	**Tamworth Hill Swamp**	66.00	No
19	**Trenant Park**	7.47	No
20	**Tuart Park**	4.63	Yes
21	**Woodleigh Grove Reserve**	9.20	Yes – part, a larger area has been surveyed for this assessment

Figure 1 **Locality map**



1. Introduction *cont.*

1.4 Scope of works

The scope of works for the vegetation assessment and reserve prioritisation included three phases of work:

- **Phase 1:** Desktop study of the reserves using the Natural Area Initial Desktop Assessment (NAIDA) template.
- **Phase 2:** Field survey of the reserves using the NAIA template to identify vegetation type, vegetation condition, existing infrastructure and potential Black Cockatoo habitat.
- **Phase 3:** Analysis and reporting, including:
  - » Calculation of overall viability and vegetation condition scores
  - » A comparison of results to the previous assessment
  - » Mapping of reserves
  - » Management recommendations and proposed implementation strategy.

2. Methods

2.1 Phase 1: Desktop assessment

The desktop assessment of the reserves included a review of the previous report as well as a number of other relevant documents including:

- Conservation Commission of Western Australia, *Rockingham Lakes Regional Park Management Plan 2010*
- City of Rockingham 2012, *Foreshore Strategy*
- City of Rockingham 2013, *Environmental Management and Implementation Plan, Tamworth Hill Swamp*
- City of Rockingham 2013, *Dixon Road Conservation Precinct Management Plan*.

A number of information sources were used to identify the existing environment of the general Rockingham area and of the 21 selected reserves (Table 2). This information assisted in the completion of the NAIDA templates.

Variations to the Perth Biodiversity NAIDA Template

To ensure that the desktop assessments for each reserve were comparable to the previous vegetation survey, the same amendements to the NAIDA template were adopted. This included:

- Maps 1 and 2 specified by the NAIDA template were combined onto several larger scale maps that cover the entire Rockingham area (Figure 1, Figure 2 and Figure 3). Additionally aerial photography (Map 3 in the NAIDA template) was displayed on the figures produced for Phase 2 (Section 5.3).
- The following factors were only included if information was readily available or could be provided through discussions with the City's staff:
  - » Long term plans
  - » Time since isolation from other natural areas (some historical aerial photography was investigated)
  - » Fire history
  - » Value to local community
  - » Known active friends/environmental group.

Table 2 **Information sources for the desktop investigation**

Aspect	Information Source
Soils	Mapped soil types available from the Australian Soil Resource Information System (ASRIS): *http://www.asris.csiro.au/*
Land zoning	Western Australian Planning Commission's mapping of: • Metropolitan Region Scheme reservation • Local Town Planning Scheme reservation and zoning.
Bush Forever	Bush Forever sites spatial dataset. Information on Bush Forever sites provided by Government of Western Australia (2000) including potential Floristic Community Types (FCTs).
Vegetation	Vegetation in the Project Area as shown in: • Beard (1979) vegetation mapping • Heddle *et al.* (1980) vegetation mapping. Vegetation extent remaining as defined in: • Local Biodiversity Program resources. (*http://pbp.walga.asn.au/Publications.aspx*)
Threatened and Priority Ecological Communities	Ecological communities listed in the following databases as being within the Project Area: • DPaW Threatened Ecological Community (TEC) and Priority Ecological Community (PEC) spatial datasets; • DPaW Priority Ecological Communities List; and • Threatened Ecological Communities Endorsed by the Minister for Environment.
Habitat linkages	Perth Metropolitan Regional Linkages as listed in Government of Western Australia (2000) and in the Local Government Biodiversity Planning Guidelines (Del Marco *et al.* 2004).
Conservation Significant Flora and Fauna	Conservation significant flora and fauna listed in the following databases as being within the Study area: • DPaW: NatureMap; • DPaW Declared Rare and Priority Flora spatial datasets and the Western • Australian Herbarium spatial dataset.
Black Cockatoo roosting, foraging and breeding sites	Department of Planning, 2011, 'Metropolitan Region Scheme (MRS) – potential habitat for the Carnaby's Black Cockatoo which may require further assessment', Department of Planning: Mapping and GeoSpatial Branch.
Waterways and wetlands	Assessment of the surface and groundwater features based on: Department of Water (DoW) Geographic Data Atlas, including: • Ramsar wetlands • Swan Coastal Plain geomorphic wetlands • Environmental Protection Policy Lakes.
Heritage	Identification of Nyungar and European heritage sites using: • Department of Aboriginal Affairs (DAA): Aboriginal Heritage Inquiry System; • DotE: Australian Heritage Database; • Government of Western Australia Inherit Database; and • City of Rockingham Municipal Heritage Inventory (adopted September 2012).

2.2 Phase 2: Field survey

A field survey of the 21 reserves was undertaken using the NAIA template to identify vegetation type, vegetation condition, existing infrastructure and potential Black Cockatoo habitat. GHD aligned the survey methodology with that of the previous vegetation survey to ensure the results were comparable.

The field survey was conducted during October, November and December 2014. The majority of sites were surveyed during early October, which is within the optimal time for undertaking flora surveys on the Swan Coastal Plain. The wetland sites were surveyed later and two sites that were added into the survey late were visited in December. The time spent at each reserve was roughly proportional to the size of the reserve to ensure that equal effort was spent at each reserve. This ranged from three to four days for the largest sites, to nine hours for the smallest.

The methodology for the field assessment and for completing the NAIA templates followed that detailed in the Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region (Del Marco *et al*. 2004), as detailed below, with variations as detailed in Section 2.2.1.

Flora and vegetation

The survey was conducted to provide descriptions of the dominant vegetation units present, vegetation condition and flora species present at the time of the survey. The field survey was not a comprehensive survey; however all the flora species opportunistically encountered during the field survey were recorded.

Field assessment methodology involved traversing the reserves by foot assessing representative sample points and taking opportunistic records. The representative sample points within each reserve are identified on the individual reserve maps.

Vegetation units

Vegetation units were described based on structure, dominant taxa and cover characteristics as defined by field observations and representative sample points. Vegetation units were identified and boundaries delineated using a combination of aerial photography interpretation, topographical features, previous mapping and field observations. Growth form layer and structure classification followed that specified in the Local Government Biodiversity Planning Guidelines (Del Marco *et al*. 2004).

Where possible, the representative sample points that had been sampled during the previous survey were revisited. However, a number of locations had incorrect coordinates. Where this occurred new sample points were chosen that were most similar to the descriptions of the previous sites.

Species identification and nomenclature

Species that were well known to the survey botanist were identified in the field, while species that were unknown were collected and assigned a unique collection number to facilitate tracking. Plant species were identified by the use of local and regional flora keys and by comparison with the named species held at the Western Australian Herbarium.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* and nomenclature used in the report follows that used by the Western Australian Herbarium as reported on *FloraBase* (WA Herbarium).

Vegetation condition

The vegetation condition of the Project Area was assessed using the vegetation condition rating scale developed by Kaesehagen (1995), as this was the scale used during the previous survey and allowed direct comparison between years.

Table 3
Vegetation condition rating scale (Kaesehagen 1995)

Vegetation condition	Description
Very Good – Excellent	• 80-100% native flora composition • Vegetation structure intact or nearly so • Cover/abundance of weeds less than 5% • Minor signs of disturbance.
Fair – Good	• 50-80% native flora composition • Vegetation structure modified or nearly so • Cover/abundance of weeds 5-20% • Disturbance influence moderate.
Poor	• 20-50% native flora composition • Vegetation structure modified completely • Cover/abundance of weeds 20-60% • Disturbance influence high.
Very Poor	• 0-20% native flora composition • Vegetation structure disappeared • Cover/abundance of weeds 60-100% • Disturbance influence very high.

Introduced species

All weed species encountered were recorded and notes made on their location and occurrence on site. Locations of weed species considered significant were recorded using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m. Species were recorded if they were a Weed of National Significance (WoNS), Declared Pest, or if they were a weed species that occurred in only one or a few locations, were not well-established in the area or there was the potential to eradicate them due to their isolated occurrences.

Fauna

During the vegetation assessments records of opportunistic fauna sightings were taken. Notes were also taken on the presence of habitat types and the potential for conservation significant fauna species to occur at the reserves. For each reserve the presence of Black Cockatoo habitat (foraging and breeding) was recorded.

Infrastructure

During the field assessments the various types of infrastructure present in the reserves was recorded on a Trimble Juno. The method of recording infrastructure followed that used in the previous survey to ensure that results were comparable.

Fence types were recorded as:

- Fence (wire, or mesh etc.) or post (ie. bollards)
- High (above chest height) or low (chest height or below)
- Good or poor condition.

Path types were recorded as:

- Limestone, soil/sand, mulch, concrete, limestone or boardwalk (ie. wooden boards)
- Good (no visible issues); poor (sections broken, covered by sand etc), or overgrown.

Signs were recorded as:

- Naming, Information, Regulation or combination of these
- Post, plaque or board.

In addition, other infrastructure, such as recreation facilities, picnic benches and public utility infrastructure was recorded.

Variations to the Perth Biodiversity NAIA Template

To ensure that the assessments for each reserve were comparable to the previous vegetation survey, the same amendments were made to the NAIA template. This included:

- A detailed assessment of Threatened Ecological Communities as outlined in the *Natural Field Assessment B template* was not undertaken as quadrats were not established in each reserve. Rather, potential Threatened Ecological Communities were described by the compilation of a species list based on site transects.
- Only observational notes were made on soil colour and texture. Sub-surface soil, underlying rock type and water depth was omitted.

Field survey limitations

The assessment of each site was not a comprehensive assessment and not all of the species present at each site would have been recorded. The assessment was done at a level appropriate for the need to assess the natural values of the reserves, allow reserve prioritisation and to determine management measures.

3. Existing Environment

The existing environment of the reserves is summarised below, with details for each reserve included in a reserve summary sheets provided in Section 5.3. The legislation and conservation codes relevant to this section are detailed in Appendix A.

3.1 Bioregion

The Project Area is situated in the Southwest Botanical Province of Western Australia (Beard 1990) within the Swan Coastal Plain (SWA) Bioregion and the Perth (SWA02) Sub-region as described by the Interim Biogeographic Region of Western Australia (IBRA) (DotE 2014a).

The Perth Sub-region is characterised by colluvial and Aeolian sands, alluvial river flats, coastal limestone, *Banksia* and Jarrah-*Banksia* woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials (Mitchell *et al.* 2002).

3.2 Land use

Rockingham was originally a farming settlement and timber port. It was a relatively small coastal settlement until the second half of the twentieth century when commercial, light industry and residential development increased. During the last few years Rockingham has experienced rapid urban development.

Some of the reserves considered during this assessment have been subject to a variety of historical land-uses, including farming and settlements. However, the reserves are now primarily used for conservation and/or recreation. In the Rockingham Town Planning Scheme 2 (City of Rockingham 2014) the zoning of the majority of reserves ranges from Public Open Space to Parks and Recreation. However, Kindsdale Bend, Bordeaux Ramble, Tuart Park and Anstey Q Wetland are currently zoned as development areas.

The reserves within the City offer a range of active and passive recreation possibilities. The reserves are used by both the Rockingham community and the broader community. The reserves in the east of the City are generally used by the local community only, while the coastal reserves, particularly Shoalwater Foreshore and Secret Harbour Foreshore, are used by the wider community and by tourists. The dominant recreational activities undertaken within the reserves are detailed in Table 4.

Table 4 **Recreational activities and facilities within the reserves**

Vegetation condition	Description
Walking/dog walking	All reserves except Marillana Conservation Reserve are used to some extent for walking.
Nature appreciation	Nature trails with informative signs occur directly adjacent to Karnup Townsite, Baldivis Nature Reserve and along an area of Shoalwater Foreshore.
Historical sites	Around the outside of Woodleigh Reserve are a number of signs indicating sites of historical interest. Karnup School Site also has information on its historical use.
Cycling	A specific cycling trail passes along the Shoalwater Foreshore and trails throughout a number of other reserves, including Dixon Road Conservation Precinct, are also used for cycling. Unauthorised BMX tracks have been created within Dixon Road Conservation Precinct, Alf Powell Reserve and Sawley Close.
Picnicing	Recreation facilities for picnicing are available at Rockingham Road Conservation Reserve, Shoalwater Foreshore, Secret Harbour Foreshore, Karnup School Site, Baldivis Nature Reserve, Tuart Park.
Water sports	A wide range of water sports are undertaken at Rockingham Road Conservation Reserve, Shoalwater Foreshore and Secret Harbour Foreshore.
Sports	Sporting ovals occur within Tuart Park and Alf-Powell Reserve (which also has a skate park).
Children's playgrounds	Children's playgrounds occur within Shoalwater Foreshore, Rockingham Road Conservation Reserve, Lewington Reserve, Alf Powell Reserve and Baldivis Nature Reserve.

3.3 Nyungar heritage sites

The Rockingham area has long been occupied by the Aboriginal Nyungar people. The area holds significance to the traditional owners and many sacred sites occur within the region (Conservation Commission of WA 2010).

In Western Australia, the *Aboriginal Heritage Act 1972* protects places and objects customarily used by, or traditional to, the original inhabitants of Australia. A register of such places and objects is maintained under the Act, however, all sites are protected under the Act whether they have been entered on the register or not.

In Western Australia the Department of Aboriginal Affairs (DAA) manages the online Aboriginal Heritage Inquiry System, which identifies any registered Nyungar heritage sites within the vicinity of the search area. A search of this database determined that three registered sites and one 'other heritage place' are located either within or directly adjacent to the reserves. These sites are detailed in Table 5.

3.4 European heritage sites

The State Heritage Office keeps a heritage register InHerit that contains comprehensive information about cultural heritage places listed in the State Register of Heritage Places, local government inventories and other lists, the Australian Government's heritage list, and other non-government lists and surveys. A search of the InHerit database identified a number of heritage places that occur within the reserves. These heritage places are detailed in Table 6.

Table 5 Nyungar heritage sites identified within or directly adjacent to the reserves

Site ID	Place Name	Type/Comments	Location
Registered Sites			
3,519	Golden Bay Camp and Swamp		Occurs approximately 60 metres east of Marillana Conservation Reserve
3,582	Serpentine River	Ceremonial, mythological	Occurs across Karnup Townsite and Karnup School Site
4,323	Gas Pipeline 82	Artefacts/scatter	Occurs directly adjacent to the north end of Tamworth Hill Swamp
Other Heritage Places			
22,891	Mersey Point Burial	Skeletal material/burial	Occurs within Shoalwater Foreshore

Table 6 Heritage places occurring within the reserves

Place	Type of listing	Description/Comments
Abattoir (former), East Rockingham	Municipal Inventory	Within Dixon Road Conservation Precinct
Baldivis Primary School (Day Centre and Art Centre) and Natural Bush Reserve	Municipal Inventory	Within Baldivis Nature Reserve
Penguin Island and Mersey Point	Municipal Inventory Register of the National Estate	Covers Shoalwater Foreshore
Rockingham Cairn	Municipal Inventory	Within Rockingham Road Conservation Reserve

3.5 Landforms and topography

The landforms that occur within the City of Rockingham are all relatively young and the majority of the reserves are located upon Aeolian (wind-blown soils) that have been laid down relatively recently. The majority of the western side of the City of Rockingham is dominated by the Quindalup dune system which is a relatively recent landform that comprises marine sands. For the majority of the Swan Coastal Plain this landsystem occurs as a thin stretch adjacent to the ocean; however in the City of Rockingham the Quindalup dunes form a wide plain, the Rockingham – Becher Plain, which is one of the youngest formations on the Swan Coastal Plain and consists of a series of multiple, parallel, linear sand-ridges that are stranded former beach ridges (Semeniuk 1995). This plain provides an important example of Holocene sedimentation and stratigraphic evolution and is arguably the best example of a consistently-developed beach ridge complex in the world (Conservation Commission of WA 2010).

To the east of the Quindalup dunes stretches the Spearwood dunes, which is an older dune system that appears as a series of parallel ridges and depressions underlain by Tamala limestone.

The eastern edge of Rockingham sits on the Pinjarra Plain which is an alluvial plain of Pleistocene to Holocene age, originating from the river systems flowing down from the plateaus (Government of Western Australia 2000).

3.6 Geology and soils

The Quindalup dunes are underlain by the Safety Bay Sand formation. These soils are calcareous. Soils of the Spearwood dune system are derived from Tamala limestone, which is visible at a number of sites within Rockingham.

The soil subsystems that have been mapped at each reserve are summarised in Table 7.

Table 7 **Soil subsystems mapped at each reserve**

Reserve	Soil subsystems	Location within reserve
Alf Powell Reserve	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Whole site apart from a small portion in the centre
	211QuW_SWAMP Swamp.	A slice in the centre of site
Anstey Q Wetland	211Qu_Qd Small gently undulating plains (deflation basins) enclosed by discrete parabolic dunes with moderately deep to very deep calcareous sands over limestone.	Eastern portion of the wetland
	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Southern portion
	211Qu_Qp1 Complex of nested low relief parabolic dunes with moderate to steep slopes and uniform calcareous sands showing variable depths of surface darkening.	Centre of the wetland
Baldivis Nature Reserve	211Sp_S2a Lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrop.	Southern portion and the north east corner
	211Sp_S1b Dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil and slopes up to 15%.	Northern portion
Bordeaux Ramble	211QuW_SWAMP Swamp.	Western portion
	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Centre portion
	211Qu_Qf2a More prominent relict foredune ridges which occur within unit Qf2, with deep uniform calcareous sands.	Eastern portion
Cud Swamp	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Whole site
Dixon Road Conservation Precinct	211Qu_Qf3 Relict foredunes forming a plain which is topographically lower than Qf2 with prominent ridges and swales. Swamps frequently occupy the swales. Deep calcareous sands with variable organic matter.	Whole site
Hidden Swamp	211Qu_Qd Small gently undulating plains (deflation basins) enclosed by discrete parabolic dunes with moderately deep to very deep calcareous sands over limestone.	South-western portion
	211Qu_Qp1 Complex of nested low relief parabolic dunes with moderate to steep slopes and uniform calcareous sands showing variable depths of surface darkening.	North-eastern portion
	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Northern most point

Table 7 **Soil subsystems mapped at each reserve** *cont.*

Reserve	Soil subsystems	Location within reserve
Karnup School Site	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils.	Whole site
Karnup Townsite	212Bs_B2 Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2 m.	Eastern portion
	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils.	Western portion
Kinsdale Bend	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Whole site
Mandurah Hill	211Qu_Qp1 Complex of nested low relief parabolic dunes with moderate to steep slopes and uniform calcareous sands showing variable depths of surface darkening.	Whole site
Marillana Conservation Reserve	211Qu_Qp1 Complex of nested low relief parabolic dunes with moderate to steep slopes and uniform calcareous sands showing variable depths of surface darkening.	Eastern side
	211Qu_Qd Small gently undulating plains (deflation basins) enclosed by discrete parabolic dunes with moderately deep to very deep calcareous sands over limestone.	Centre of site
	W11Qu_Qf1	North west corner
Rockingham Road Conservation Reserve	211Qu_Qf3 Relict foredunes forming a plain which is topographically lower than Qf2 with prominent ridges and swales. Swamps frequently occupy the swales. Deep calcareous sands with variable organic matter.	Throughout the site apart from the western most boundary
	211Qu_Qf1 Foredune/blowout complexes (semi-erosional) with very low relief ridge and swale topography with deep uniform calcareous sands.	A small section along the western most border
Secret Harbour Foreshore	211Qu_Qf1 Foredune/blowout complexes (semi-erosional) with very low relief ridge and swale topography with deep uniform calcareous sands.	Western side of site
	211Qu_Qf2a More prominent relict foredune ridges which occur within unit Qf2, with deep uniform calcareous sands.	Eastern side of site
	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	North east corner
Shoalwater Foreshore	211Qu_Qf1 Foredune/blowout complexes (semi-erosional) with very low relief ridge and swale topography with deep uniform calcareous sands.	Thin strip through the centre of the Reserve as well as along the southern border
	211Qu_Qf4 Relict foredunes forming a plain which is topographically lower than Qf2 and Qf3 with prominent ridges and swales. Swamps frequently occupy the swales. Deep calcareous sands with variable organic matter.	A long the western border of the reserve

Table 7 **Soil subsystems mapped at each reserve** *cont.*

Reserve	Soil subsystems	Location within reserve
Shoalwater Foreshore cont.	211Qu_Qf2 Relict foredunes and gently undulating beach ridge plain with deep uniform calcareous sands.	Along the eastern border of the Reserve
	211Qu_Qp1 Complex of nested low relief parabolic dunes with moderate to steep slopes and uniform calcareous sands showing variable depths of surface darkening.	A small section of the northern portion of the Reserve
	211QuU_BEACH Beach.	South-west corner of the Reserve
Tamworth Hill Swamp	211Sp_S2a Lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrop.	Southern most point
	211SpW_SWAMP Swamp.	Across the centre of the site
	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils.	Southern portion
	211Sp_S4c Flat to gently undulating sandplain with deep, yellow-brown or dark brown siliceous sands that are seasonally inundated.	Eastern boundary
Trenant Park	211Sp_S4c 'Flat to gently undulating sandplain with deep, yellow-brown or dark brown siliceous sands that are seasonally inundated.	Northern and southern areas
	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils.	Along the western boundary and the south east corner
	211SpW_SWAMP Swamp.	Centre of site
Tuart Park	211Sp_S2a Lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrop.	Eastern portion
	211Sp_S1b Dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil and slopes up to 15%.	South-east corner
	211Qu_Qp2 Long walled discrete parabolic dunes with moderate to steep slopes and uniform calcareous sands showing variable depths of surface darkening.	Southern tip
	211Sp_S2b Lower slopes (1-5%) of dune ridge with shallow to deep siliceous yellow-brown sands and common limestone outcrop.	Western portion
Woodleigh Grove Reserve	211Sp_S4a Flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils.	Western and southern portion
	211SpW_SWAMP Swamp.	Centre and eastern portions

3.7 Wetlands

Ramsar wetlands

The Becher Point Wetlands at Port Kennedy are listed as wetlands of international importance under the Ramsar Convention. These wetlands are included within the Rockingham Lakes Regional Park and occur directly north of Secret Harbour Foreshore.

Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 Lakes

Wetlands listed under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) occur within the following reserves:

- Anstey Q Wetland
- Trenant Park
- Sawley Close
- Woodleigh Grove Reserve
- Tamworth Hill Swamp.

Geomorphic wetlands

Geomorphic wetlands occur within a number of the reserves as detailed in Table 8 and mapped at Figure 2.

3.8 Reserves and conservation areas

Of the 6832 ha within the City of Rockingham identified as natural bushland reserve 3890 ha (53%) is deemed regionally significant and is protected as part of the Rockingham Lakes Regional Park or as a Bush Forever site.

The Rockingham Lakes Regional Park is a network of environmentally significant lands containing coastal, wetland and upland ecosystems. The park occupies a significant proportion of the City (Conservation Commission of WA 2010) and occurs directly adjacent to a number of the reserves, including Shoalwater Foreshore, Dixon Road Conservation Precinct, Tamworth Hill Swamp, Secret Harbour Foreshore and Sawley Close. This park is managed by the Department of Parks and Wildlife (DPaW).

A network of Bush Forever sites occur within the City of Rockingham and a number of the bushland areas of the reserves have been identified as Bush Forever sites, as summarised in Table 9.

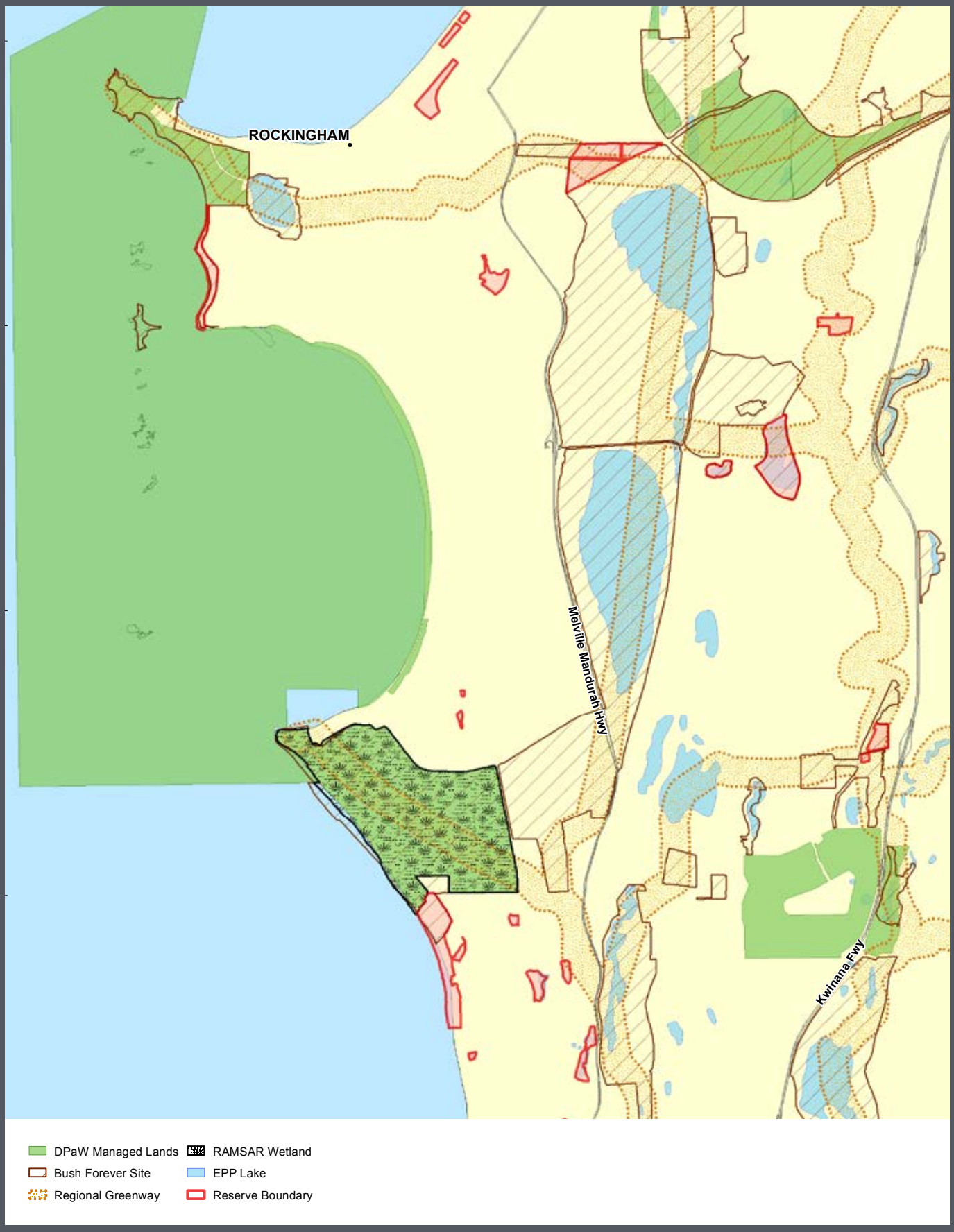
Table 8 Geomorphic wetlands within the reserves

Reserve	Wetland type	Location
Anstey Q Wetland	Conservation Category sumpland	Covers the majority of the eastern side of site
Bordeaux Ramble	Conservation Category damplands	One occurs along entire length of site, the second in the north-east corner
CUD Swamp	Conservation Category dampland	Western side of site
Hidden Swamp	Conservation Category dampland	Centre of site
	Multiple Use damplands	South-east of site
Karnup Townsite	Multiple Use palus-plain	Intersects eastern side of site
Kinsdale Bend	Conservation Category dampland	Centre of site
Marillana Conservation Reserve	Conservation Category	Covers majority of eastern side of site
Sawley Close	Conservation Category Sumpland – Anstey Swamp	Covers southern part of site
Tamworth Hill Swamp	Conservation Category sumpland	Majority of site
	Multiple Use	North and east of site
Trenant Park	Conservation Category Sumpland – Anstey Swamp	Covers majority of site
Woodleigh Grove Reserve	Resource Enhancement sumpland – Baldivis Swamp	Majority of centre of site

Table 9 **Bush Forever sites within the reserves**

Reserve	Wetland type	Location
Dixon Road Conservation Precinct	Site 356: Lake Cooloongup, Lake Walyungup and adjacent bushland, Hillman to Port Kennedy	Whole of site
Karnup Townsite and Karnup School Site	Site 376: Baldivis Road Bushland, Baldivis	Whole of sites
Secret Harbour Foreshore	Site 377: Port Kennedy	Northern section of reserve
Shoalwater Foreshore	Site 355: Point Peron and adjacent bushland, Peron/ Shoalwater Foreshore	Majority of site
Tamworth Hill Swamp	Site 356: Lake Cooloongup, Lake Walyungup and adjacent bushland, Hillman to Port Kennedy	Whole of site
Woodleigh Grove Reserve	Site 495: Baldivis Swamp and adjacent bushland	Whole of site

Figure 2 **Environmental context**



3.9 Vegetation

3.9.1 Vegetation associations

Broad scale vegetation mapping of the Perth area was completed by Beard (1979) at an association level. Beard (1979) mapping indicates that six vegetation associations are present within the City of Rockingham. The majority of the western part of the City was mapped as vegetation association 3048 'Shrublands: scrub-heath on the Swan Coastal Plain', with one small patch of 129 'Bare area: dune sand' at Secret Harbour Foreshore. At Lake Cooloongup and Lake Walyungup, Beard (1979) mapped association 125 'Bare area: salt lakes'. East of the lakes and Mandurah Road, vegetation association 998 'Medium woodland: tuart' occurs in a strip bound by a thin strip of vegetation association 1001 'Medium very sparse woodland: Jarrah with low woodland: *Banksia* and Casuarina' at approximately Baldivis Road and in the south around Fletcher Road. This vegetation association also occurs in the area of St Albans and Dog Hill Road in Baldivis. Within Baldivis, east of Baldivis Road, the dominant vegetation association is 968 'Medium woodland: Jarrah, Marri and Wandoo'. In the suburb of Keralup in the south-east of the City vegetation association 1000 'Mosaic: Medium forest: Jarrah-Marri/Low woodland: *Banksia*/Low forest: teatree (*Melaleuca* spp.)' has been mapped.

3.9.2 Vegetation complexes

Regional vegetation has been mapped by Heddle *et al.* (1980) based on major geomorphic units on the Swan Coastal Plain. Heddle *et al.* (1980) mapping indicates that the majority of Rockingham occurs within the Quindalup complex. East of the Quindalup complex two vegetation complexes associated with the Spearwood dunes are present within the City 'Cottesloe Complex – central and south (Spearwood Dunes)' and 'Karrakatta complex –central and south'. A small section of the vegetation complex 'Serpentine River Complex' occurs on the eastern edge of the City. In the south of the City small sections has been mapped as Yoongarillup complex and Bassendean Dunes. The eastern boundary of Rockingham overlaps some patches of Dardanup complex and Guildford complex. Occasional patches of Herdsman complex occur throughout the area. The vegetation complexes present within the reserves are detailed in Table 10.

Representation of vegetation complexes

The Perth Biodiversity Project provides information on remnant vegetation retention and protection status at regional and local scales, based on the vegetation complexes of Heddle *et al.* (1980). Calculations are provided on the vegetation complexes currently present against presumed pre-European extents (Table 11).

Table 10 **Vegetation complexes (Heddle *et al*. 1980) mapped within the City of Rockingham**

Vegetation complex	Description	Reserves in which complex occurs
Quindalup complex	Coastal dune complex consisting mainly of two alliances – the strand and foredune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata – Callitris preissii* and the closed scrub of *Acacia rostellifera.*	Rockingham Road Conservation Reserve, Lewington Reserve, Dixon Road Conservation Precinct, Alf Powell Reserve, Shoalwater Foreshore, Kinsdale Bends, Bordeaux Ramble, Secret Harbour Foreshore, Hidden Swamp, Marillana Conservation Park, Tuart Park, Anstey Q Wetland, CUD Swamp.
Cottesloe complex – central and south	Mosaic of woodland of *Eucalyptus gomphocephala* and open forest of *E. gomphocephala-E. marginata – Corymbia calophylla*; closed heath on the limestone outcrops.	Woodleigh Reserve, Mandurah Hill Reserve, The north-west of Tamworth Hill Swamp, The majority of Trenant Park.
Karrakatta complex – central and south	Predominantly open forest of *Eucalyptus gomphocephala-E.marginata-Corymbia calophylla* and woodland of *E. marginata-Banksia species.*	Baldivis Nature Reserve, The south-east of Tamworth Hill Swamp, Sawley Close Nature Reserve, Karnup School Site, West side of Karnup Nature Reserve.
Serpentine River complex	Closed scrub of *Melaleuca* species and fringing woodland of *E. rudis-M. rhaphiophylla* along streams.	East side of Karnup Nature Reserve, South-east corner of Karnup School Site.
Herdsman complex	Sedgelands and fringing woodlands of *Eucalyptus rudis-Melaleuca species.*	Sawley Close.

Table 11 **Extent and status of vegetation complexes within the reserves for the Swan Coastal Plain and the City of Rockingham**

Vegetation Complex	Scale*	Total Pre-1750 extent (ha)	2010 Remnant Vegetation extent (ha)	% of Pre-European extent
Quindalup Complex	Swan Coastal Plain	38,503.00	21,322.64	55.38
	LGA (City of Rockingham)	9,774.00	3,457.51	35.38
Cottesloe Complex – central and south	Swan Coastal Plain	44,899.92	15,815.73	35.22
	LGA (City of Rockingham)	2,017.00	849.31	42.10
Karrakatta complex – central and south	Swan Coastal Plain	49,786.04	11,905.85	23.91
	LGA (City of Rockingham)	4,276.00	1,295.88	30.31
Serpentine River complex	Swan Coastal Plain	19,855.39	2,147.84	10.82
	LGA (City of Rockingham)	3,658.00	433.69	11.86
Herdsman complex	Swan Coastal Plain	8,309.48	2,877.47	34.63
	LGA (City of Rockingham)	532.00	297.53	55.95

** Source: Swan Coastal Plain – Local Biodiversity Program 2013 LGA – Local Biodiversity Program 2010*

3.9.3 Floristic community types

A detailed analysis of the patterning of plant communities on the Swan Coastal Plain was undertaken by Gibson *et al.* (1994) and updated for the System 6 and Part System 1 Update Program (DEP 1996). These assessments determined a total of 66 Floristic Community Types (FCTs) on the Swan Coastal Plain (Government of Western Australia 2000). The FCTs that have been previously recorded within the Bush Forever sites that cover the reserves are detailed in Table 12.

3.9.4 Vegetation units

The vegetation units present within each reserve were described during the current field assessment using the NAIA templates. These vegetation units are detailed in Table B.1, Appendix B and have been mapped in the individual reserve sheets.

The vegetation of the Rockingham area ranges from low grasslands and shrublands on the coastal foredunes to woodlands and forests on deeper soils in the east.

The mobile dunes directly adjacent to the beaches support a low *Spinifex* grassland. Behind these foredunes low heaths are present on shallow soils over limestone with an overstorey dominated by *Spryidium globulosum*, *Olearia axillaris* and *Rhagodia baccata*. The rows of dunes to the east are taller with deeper sands and they support shrublands dominated by *Acacia rostellifera*.

Across the coastal plain a number of linear swales occur at the base of dunes which support sedgelands dominated by *Ficinia nodosa*, *Lepidosperma gladiatum* and *Juncus* species. A number of these swales contain a woodland overstorey dominated by Tuart (*Eucalyptus gomphocephala*).

Tuart woodlands and shrublands dominated by *Xanthorrhoea preissii* and *Acacia* species occur on sandplains and low undulating dunes in the centre of the Rockingham area. In the east of the City the reserves contain woodlands of Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and *Banksia* species over a diverse shrubland understorey.

Wetlands that support *Baumea* sedglands and *Melaleuca rhaphiophylla* woodlands occur in a number of locations across the area.

3.9.5 Threatened Ecological Communities

The desktop searches determined that four Threatened Ecological Communities (TECs) and four Priority Ecological Communities (PECs) have previously been recorded within the City of Rockingham (Table 13 and Figure 3).

Table 12 Floristic community types previously within Bush Forever that occur within the reserves (Government of Western Australia 2000)

Floristic Community Number and name	Occurrence in Rockingham Bush Forever sites
Supergroup 2: Seasonal wetlands	
16 Highly saline seasonal wetlands	Site 355: Point Peron
17 Melaleuca rhaphiophylla – Gahnia trifida seasonal wetlands	Site 356: Lake Cooloongup etc., Site 495: Baldivis Swamp
19a Sedgelands in Holocene dune swales	Site 377: Port Kennedy; Site 356: Lake Cooloongup etc.
19b Woodlands over sedgelands in Holocene dune swales	Site 356: Lake Cooloongup etc.
Supergroup 3: Uplands centred on Bassendean Dunes and Dandaragan Plateau	
21a Central Banksia attenuata – Eucalyptus marginata woodlands	Site 356: Lake Cooloongup etc.; Site 376: Baldivis Road Bushland
Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes	
24 Northern Spearwood shrublands and woodlands	Site 356: Lake Cooloongup etc., Site 495: Baldivis Swamp
28 Spearwood Banksia attenuata or B. attenuata-Eucalyptus woodlands	Site 376: Baldivis Road Bushland
29a Coastal shrublands on shallow soils	Site 355: Point Peron
29b Acacia shrublands on taller dunes	Site 377: Port Kennedy; Site 356: Lake Cooloongup etc., Site 355: Point Peron
S13 Northern Olearia axillaris – Scaevola crassifolia shrublands	Site 377: Port Kennedy, Site 355: Point Peron
S14 Spinifex longifolius grassland and low shrubland	Site 377: Port Kennedy, Site 355: Point Peron

Table 13 Threatened and Priority Ecological Communities previously recorded within the Rockingham area

Threatened or Priority Ecological Communities	Status – Federal	Status – State	Location (based on mapping from DPaW databases)
Threatened Ecological Communities			
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (FCT SCP19a)	Endangered	Critically Endangered	Numerous locations throughout the Quindalup dune system, in the west of the area
Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (FCT SCP19b)	Endangered	Critically Endangered	Numerous locations throughout the Quindalup dune system, in the west of the area
Stromatolite like microbialite community of coastal freshwater lakes	Endangered	Critically Endangered	Lake Richmond
Callitris preissii (or Melaleuca lanceolata) forests and woodlands, Swan Coastal Plain (FCT SCP 30a)	N/A	Vulnerable	Garden Island, Point Peron
Priority Ecological Communities			
Microbial community of a coastal saline lake		Priority 1	Lake Walyungup
Southern Eucalyptus gomphocephala – Agonis flexuosa woodlands (FCT SCP 25)		Priority 3	One occurrence on the southern boundary of Rockingham
Northern Spearwood shrublands and woodlands (FCT SCP24)		Priority 3	Within Lake Cooloongup adjacent to Dixon Road Conservation Precinct and occurrences south of Mandurah Hill
Coastal shrublands on shallow soils (FCT SCP29a)		Priority 3	Occurrences south of Mandurah Hill

The field survey of the reserves was not detailed and did not include a full survey for TECS or PECs; however, the presence, or potential presence, of these communities was inferred based on opportunistic sampling. A number of TECs/PECs were determined as likely present within the reserves as detailed in Table 14.

Within Lewington Reserve there were a number of *Callitris preissii* and *Melaleuca lanceolata* trees and it is likely that the TEC '*Callitris preissii* (or *Melaleuca lanceolata*) forests and woodlands, Swan Coastal Plain' may have previously occurred in this area; however this vegetation is now largely degraded.

Table 14 **Threatened or Priority Ecological Communities inferred to occur within the reserves**

Threatened or Priority Ecological Communities	Status – Federal	Status – State	Reserves containing the TEC/PEC	Comment
Threatened Ecological Communities				
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (FCT SCP19a)	Endangered	Critically Endangered	Anstey Q Wetland Bordeaux Ramble Hidden Swamp Kinsdale Bend Marillana Conservation Reserve	This TEC has a restricted distribution and is almost entirely located within linear wetlands depressions or swales that occur between parallel sand ridges. The typical wetland is a dampland that is waterlogged in winter and has high moisture in summer.
Woodlands over sedgelands in Holocene dune swales of the southern Swan Coastal Plain (FCT SCP19b)	Endangered	Critically Endangered	Anstey Q Wetland Dixon Road Conservation Precinct. Also likely present in Lewington Reserve in a degraded form (DEC 2011).	This TEC is a sub-group of the sedgelands (described above) that contain an overstorey of woodlands that includes Tuart (*Eucalyptus gomphocephala*), Swamp Paperbark (*Melaleuca rhaphiophylla*) and Swamp Banksia (*Banksia littoralis*) (DEC 2011).
Priority Ecological Communities				
Northern Spearwood shrublands and woodlands (FCT SCP24)		Priority 3	Sawley Close Nature Reserve Trenant Park Tuart Park (but very degraded)	
Coastal shrublands on shallow soils (FCT SCP29a)		Priority 3	Rockingham Road Conservation Reserve Secret Harbour Foreshore Mandurah Hill	

3.9.6 Vegetation condition

The vegetation condition of the reserves was rated using the Kaesehagen (1995) scale, with the extent of each condition rating detailed in Table 15 (for the bushland areas only) and graphed in the individual reserve sheets.

Cleared areas, including carparks and buildings were not rated; however, parkland cleared areas were mapped as "very poor" as they contained some native species and have some ecological value as fauna habitat. However, these were excluded from the "bushland areas" detailed in Table 15.

The reserves with the bushland in the best condition (with more than 70% in Very Good – Excellent condition) were Bordeaux Ramble, Hidden Swamp, Karnup Townsite and Marillana Conservation Reserve.

In some reserves, and in particular in Dixon Road Conservation Precinct, there has been substantial decline in the health of the Tuarts (*Eucalyptus gomphocephala*). However, within Dixon Road Conservation Precinct there has been recruitment of seedlings with good numbers of young trees, which indicates the reserve may be recovering post-fire.

Figure 3 **Vegetation mapping**

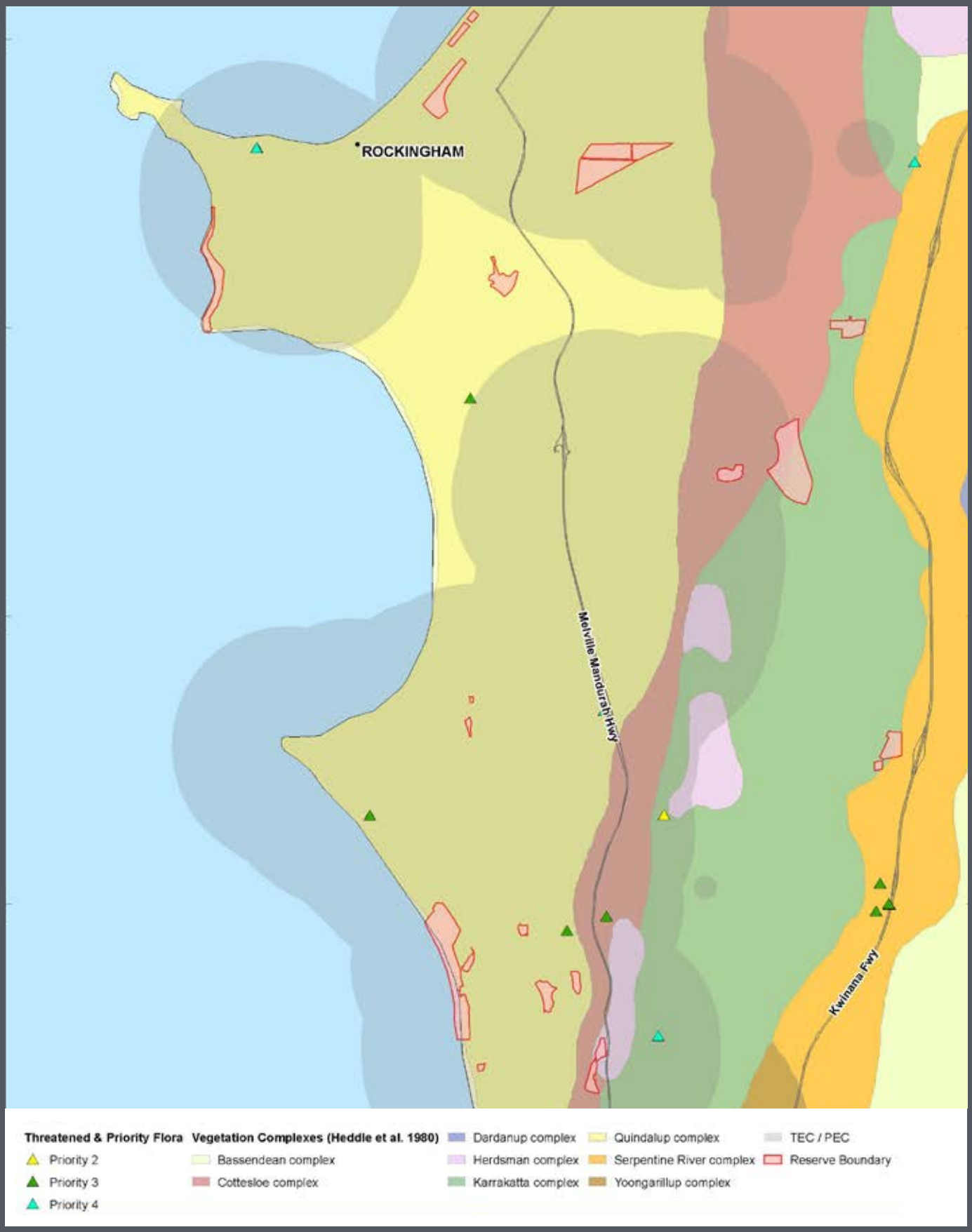


Table 15 **Extent of vegetation condition ratings within the bushland areas of each reserve**

Reserve		Very Good – Excellent	Fair – Good	Poor	Very Poor	Total Bushland area
Alf Powell Reserve	Extent (ha)			3.71	1.05	4.76
	% of total bushland area			**77.97**	**22.03**	
Anstey Q Wetland	Extent (ha)	4.99	2.26	0.61	0.78	8.65
	% of total bushland area	**57.75**	**26.14**	**7.08**	**9.03**	
Baldivis Nature Reserve	Extent (ha)	3.32	1.73	2.82	0.31	8.18
	% of total bushland area	**40.59**	**21.10**	**34.47**	**3.84**	
Bordeaux Ramble	Extent (ha)	1.66				
	% of total bushland area	**100.00**				
Cud Swamp	Extent (ha)		0.13	1.43	0.24	1.80
	% of total bushland area		**7.01**	**79.85**	**13.13**	
Dixon Road Conservation Precinct	Extent (ha)	0.16	46.50	7.65	0.11	54.43
	% of total bushland area	**0.30**	**85.44**	**14.06**	**0.20**	
Hidden Swamp	Extent (ha)	1.99	0.75	0.07		2.81
	% of total bushland area	**70.83**	**26.67**	**2.49**		
Karnup School Site	Extent (ha)	1.03	0.49	0.12		1.63
	% of total bushland area	**62.88**	**29.72**	**7.40**		
Karnup Townsite	Extent (ha)	12.69	0.27			12.96
	% of total bushland area	**97.90**	**2.10**			
Kinsdale Bend	Extent (ha)	0.11	0.13	0.12	0.21	0.56
	% of total bushland area	**20.13**	**22.28**	**20.56**	**37.03**	
Lewington Reserve	Extent (ha)		7.25	10.50		17.75
	% of total bushland area		**40.86**	**59.14**		
Mandurah Hill	Extent (ha)		0.31	0.45	0.01	0.77
	% of total bushland area		**39.69**	**58.48**	**1.83**	
Marillana Conservation Reserve	Extent (ha)	1.27				1.27
	% of total bushland area	**100.00**				
Rockingham Road Conservation Reserve	Extent (ha)	2.13	1.40	0.41	1.14	5.08
	% of total bushland area	**42.03**	**27.55**	**8.02**	**22.41**	
Sawley Close	Extent (ha)	0.81	2.93	0.54		4.29
	% of total bushland area	**18.97**	**68.35**	**12.68**		
Secret Harbour Foreshore	Extent (ha)	18.28	8.08	21.54	0.93	48.83
	% of total bushland area	**37.43**	**16.56**	**44.11**	**1.90**	
Shoalwater Foreshore	Extent (ha)		4.12	10.51		14.63
	% of total bushland area		**28.17**	**71.83**		
Tamworth Hill Swamp	Extent (ha)	0.29	24.93	21.51	19.53	66.27
	% of total bushland area	**0.43**	**37.63**	**32.46**	**29.48**	
Trenant Park	Extent (ha)	3.29	1.48	2.42	0.29	7.47
	% of total bushland area	**43.99**	**19.79**	**32.38**	**3.84**	
Tuart Park	Extent (ha)		1.29	0.48	0.12	1.89
	% of total bushland area		**68.28**	**25.38**	**6.34**	
Woodleigh Grove Reserve	Extent (ha)	3.65	4.92			8.57
	% of total bushland area	**42.60**	**57.40**			

3.10 Flora

3.10.1 Flora diversity

A total of 358 flora taxa (including subspecies and varieties) were recorded during the reserve surveys. This total comprised 233 (65%) native taxa and 125 (35%) introduced taxa. The flora surveys involved a brief field visit and not all the species recorded in the reserves would have been recorded in the single survey; however the numbers are compared to provide an idea of the species diversity of the reserves.

The flora diversity of the reserves was proportional to the number of different vegetation types, with areas containing both upland and wetland areas containing the highest diversity. The diversity also generally increased in a gradient across the plain, with higher diversity in the eastern reserves.

3.10.2 Conservation significant flora

Desktop assessments indicate that a number of Threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Wildlife Conservation Act 1950* (WC Act) and Priority species listed by DPaW occur within the Rockingham region, as detailed in Table B.2, Appendix B.

No Threatened species were recorded during the field surveys. Two priority flora species were recorded within the reserves during the field survey and these are detailed in Table 16. The recorded locations of these species have been mapped in the individual reserve sheets and are detailed in Table B.4, Appendix B.

In addition a Priority flora species was opportunistically noted during the field survey directly adjacent to Dixon Road Conservation Precinct: *Dodonaea hackettiana* (Priority 4). This species was recorded on the edge of the rail reserve that runs adjacent to this nature reserve.

The flora species recorded during the field survey were assessed to determine if they were considered as 'other significant flora' as defined by the EPA (2004) (as described in Appendix A). Bush Forever provides information on species that are considered 'other significant flora' on the Swan Coastal Plain (Government of Western Australia (2000)). Based on this, five species identified and recorded within the reserves during the field survey were considered either representative of populations at the northern or southern limit of their known geographic range, significant populations which are known to occur in the Perth area or populations which are considered to be poorly reserved:

- *Diplolaena dampieri* (Anstey Q Wetland, CUD Swamp, Secret Harbour Foreshore)
- *Conospermum triplinervium* (Trenant Park)
- *Hibbertia cuneiformis* (CUD Swamp, Hidden Swamp, Mandurah Hill, Marillana Conservation Reserve, Secret Harbour Foreshore, Trenant Park)
- *Kennedia coccinea* (Dixon Nature Reserve and Woodleigh Grove Reserve)
- *Melaleuca lanceolata* (Lewington Reserve).

Table 16 **Priority flora species recorded within the reserves during the 2014 field assessment**

Reserve	Species (status)	Description (WA Herbarium)	Photo
Marillana Conservation Reserve	*Sphaerolobium calcicola* (Priority 3)	This pea species is a slender, multi-stemmed scandent or erect shrub to 1.5 m high. It grows in tall dunes, winter-wet flats, interdunal swamps and in low-lying areas. This species was recorded in a dune-swale within Marillana Conservation Reserve, on the external edge of the sedgeland.	
Dixon Road Conservation Precinct	*Pimelea calcicola* (Priority 3)	*Pimelea calcicola* is an erect to spreading shrub that grows to 1 m high. This species grows in sand an on coastal limestone ridges. This species was recorded in one location within Dixon Road Conservation Precinct, on the edge of shrubland; however is likely more widespread through this reserve.	

3.11 Fauna

3.11.1 Fauna diversity

A NatureMap search (DPaW 2007) identified 506 fauna taxa that have previously been recorded within a 10 km radius of Rockingham, including 227 bird, 125 fish, 71 reptile, 46 invertebrate, 31 mammal and six amphibian species. Of these, 490 are native and 16 are introduced fauna species.

During the site visits of the reserves a total of 41 bird, five mammal and three reptile species were recorded, of which four are introduced. The list of species recorded at each reserve is included in Table C.1, Appendix C.

3.11.2 Conservation significant fauna

Numerous fauna surveys have been conducted on the Swan Coastal Plain. The WA Museum and DPaW Naturemap database provides the most comprehensive source of information on the distribution of Western Australia's fauna, based on the results of many of these surveys. Searches of the EPBC Act Protected Matters database (DotE 2014b) and DPaW NatureMap records (DPaW 2007) identified the presence/potential presence of 79 conservation significant fauna taxa (including migratory birds) within a 10 km radius of the City of Rockingham reserves study area, including 56 bird, 11 mammal, seven reptile, two invertebrate and three fish/shark species. Given the close proximity of the project area to the coastline, this species list consists of a large proportion of marine bird, mammal, fish and reptile species.

The presence or potential presence of conservation significant fauna species within the reserves, based on the presence and size of suitable habitat, has been identified and is discussed in further detail in section 3.9.

3.11.3 Habitat

The reserves contain a number of habitat types ranging from low coastal heath to woodlands to wetlands. The habitat diversity varies with some reserves containing a number of different habitat types, including wetlands and uplands; however other reserves have more uniform habitat that has been highly modified through clearing (such as CUD swamp). The fauna habitat types that occur within the reserves have been summarised in Table C.2, Appendix C and described for the individual reserves in Section 5.3.

Black Cockatoo habitat

The City of Rockingham reserves are located within the known distribution of the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and within the modelled breeding range of the Carnaby's Black Cockatoo. Although the breeding range for the Forest Red-tailed Black Cockatoo has not been modelled, it is recognised that it may breed anywhere in its range (DSEWPaC 2012). Additionally, whilst the reserves are located just outside the currently modelled distribution of the Baudin's Black Cockatoo (*Calyptorhynchus baudinii*) it is recognised that this species has previously been recorded in the area (DPaW 2007).

The reserves containing woodland habitat, including Tuart woodlands and Marri-Jarrah-*Banksia* woodlands provide suitable foraging habitat, roosting habitat and potential breeding habitat (where trees contain suitable hollows or have a diameter at breast height (DBH) >500 mm) for all three Black Cockatoo species. Suitable reserves are:

- Anstey Q Wetland
- Baldivis Nature Reserve
- Dixon Nature Reserve
- Karnup School Site
- Karnup Townsite
- Sawley Close
- Trenant Park
- Tuart Park
- Woodleigh Grove Reserve.

The coastal plain generally has limited habitat for roosting and breeding; however Black Cockatoos may still use these reserves for foraging. The potential foraging, roosting and breeding habitats for the Black Cockatoos have been mapped in the individual reserve sheets. These areas identify the habitat primarily used by Black Cockatoos, though it should be noted that the Black Cockatoos are known to forage opportunistically in other areas, such as coastal dunes, planted vegetation and weed dominated areas, which have not been mapped. Flora species that Carnaby's Black Cockatoo are likely to forage on, which occur within the Rockingham reserves, are included in Table 17 (Groom 2011) and are differentiated into the habitat types in which the flora species occur.

Loss of habitat on the Swan Coastal Plain is a major threat to Black Cockatoos and increasing good quality, protected habitat is a priority conservation objective. Revegetation of reserves should include species suitable for Black Cockatoos, including local Proteaceae plants for feeding and *Eucalyptus* species.

Table 17 **Plants used by Carnaby's Black Cockatoo that occur within the Rockingham Reserves**

Habitat types	Plants used by Carnaby's Black Cockatoo		
	Foraging	Nesting	Roosting
Tall shrublands on dunes and sandplains	*Acacia saligna, Agonis flexuosa, B. sessilis, Eucalyptus citriodora (planted), E. gomphocephala, Ficus sp., H. lissocarpha, H. prostrata, H. varia, Jacksonia furcellata, Mesomeleana sp., Xanthorrhoea preissii*	*E. gomphocephala*	*E. gomphocephala*
Woodland	*Agonis flexuosa, Banksia attenuata, B. dallanneyi, B. grandis, B. ilicifolia, B. littoralis, B. menziesii, Corymbia calophylla, Eucalyptus gomphocephala, E. marginata, Ficus sp., Hakea lissocarpha, Jacksonia furcellata, Mesomeleana sp., Xanthorrhoea preissii*	*C. calophylla, E. gomphocephala*	*C. calophylla, E. gomphocephala, E. marginata, E. rudis*
Parkland cleared/ enrichment planting	*Agonis flexuosa, Eucalyptus citriodora, E. gomphocephala, *Lupinus sp., *Raphanus raphanistrum, Xanthorrhoea preissii*	*E. gomphocephala*	*E. gomphocephala*

3.11.4 Habitat linkages

Habitat linkages are important to allow animals to move through the landscape between areas of resource availability. Habitat linkage is important for ground dwelling and aerial fauna; providing cover, resources and linking areas for foraging, rest and reproduction. The reserves in the City of Rockingham have value as areas of fauna habitat in a largely cleared landscape. The network of small reserves provides a patchwork of fauna habitat throughout the urban area and link to larger bushland areas, including the Rockingham Lakes Regional Park.

Fragmentation of habitat isolates resources for fauna. Where the distance between habitat fragments is short, species may still be able to move between the patches of habitat but may be more exposed to predation pressures in the cleared areas. The isolated patches of habitat within the residential areas of the City (such as Alf Powell Reserve) are highly separated from other areas of natural habitat.

Birds are highly mobile and less affected by the isolation of habitat caused by fragmentation than ground dwelling animals. However, habitat degradation (caused by the edge effects of fragmentation) is still a major threat to birds.

Draft regional ecological linkages for the Perth area are described in the Local Government Biodiversity Planning Guidelines (Del Marco *et al.* 2004) and the linkages in the Rockingham area have been mapped in Figure 2. There are two major north-south linkages that run through the Rockingham area. Sawley Close, Trenant Park and Tuart Park are all located in close proximity to this linkage and would provide habitat connectivity within this area. This linkage connects to the Rockingham Lakes Regional Park (Lake Cooloongup and Lake Walyungup). To the east Baldivis Nature Reserve, Tamworth Hill Swamp, Karnup Townsite and Karnup School Site form part of the eastern regional ecological linkage. Dixon Road Conservation Precinct forms part of an east-west linkage that connects reserves in the east through to Lake Richmond and Cape Peron.

While not part of the defined regional ecological linkages, a number of the other reserves would assist in providing a local linkage through smaller reserves. In particular, the foreshore reserves provide a relatively unbroken linkage along the coast.

3.12 Infrastructure

3.12.1 Fencing

Fencing of sensitive areas is important to prevent impacts from unauthorised access. Fencing has been installed in the majority of the reserves and is generally of high quality; however there are exceptions where fencing is inadequate or in need of repair. The reserves that should be prioritised for additional fencing or repair of fencing include:

- **Sawley Close Reserve** – the fencing at this reserve is either very poorly maintained or missing entirely. Vehicle access is possible from both Mandurah Road and Sawley Close and the result of this is a large amount of dumped rubbish throughout this reserve.
- **Marillana Conservation Reserve** – this reserve is part of a larger bushland area through which a number of 4WD tracks pass. These have been blocked off by large rocks but ongoing surveillance is required to ensure that access remains blocked. It is not advisable to fence Marillana Conservation Reserve itself. Rather, it needs to be managed as part of the larger bushland area.
- **Karnup Townsite** – areas of fence, particularly along the eastern and northern boundary are in poor condition with some sections burnt and some sections with missing wires. Requires repair.
- **Kinsdale Bend** – good quality mesh fencing is present around the TEC in this reserve; however the wire has been bent in a number of places which allows access to dogs. Low level maintenance and re-shaping of the wire will solve this issue.
- **Secret Harbour Foreshore** – fencing is missing in some areas along the interface between the beach and the dunes, and in other areas fencing has been impacted by sand accretion. Additional fencing within this area must consider the effects of mobile sand on the fences.
- **Alf Powell Reserve** – small sections of the fence have loose wires and are in poor condition.

The extent, type and condition of fencing for each reserve has been mapped in the individual reserve sheets and summarised in Table 18.

Table 18 **Fence type and condition**

Reserve	Type	Condition		Comment
		Good (m)	Poor (m)	
Alf Powell Reserve	Fence	464	531	Some wires loose and missing.
	Post	1,201	81	Includes bollards and bollards combined with cross-post.
Anstey Q Wetland	Fence	1,351		Good condition.
	Post	699		
Baldivis Nature Reserve	Fence	1,425	94	Branch fallen on high fence around oval.
	Post	206		
Bordeaux Ramble	Fence	789		Mesh bent in some sections.
	Low limestone wall	141		
CUD Swamp	Post	511		
	Private fence	38		Fence in private properties.
Dixon Road Conservation Precinct	Fence	9,258		Mainly good condition but wires loose in some areas. Includes fencing along railway.
Hidden Swamp	Low limestone wall	77		Reserve also backs onto private properties which have fences.
Karnup School Site	Fence	395		
	Post	25	52	
Karnup Townsite	Fence	377	566	Areas of fence burnt. Some sections with missing wires. Requires repair.
Kinsdale Bend	Fence	130		
	Low limestone wall	80		
	Private Fences	87		
Lewington Reserve	Post	1,260		
Mandurah Hill	Fence	283	482	
Marillana Conservation Reserve	N/A			
Rockingham Road Conservation Reserve	Fence	1,286	250	Fence through centre of bushland is overgrown, but still in good condition.
	Post	608		
Sawley Close Nature Reserve	Fence			Broken and loose in a number of locations.
Secret Harbour Foreshore	Fence	4,247	3,427	Main issues are missing wires, sand accretion and some fallen poles.
	Post	61	95	
	Low limestone wall	835		
Shoalwater Foreshore	Fence	1,999	481	Some fences impacted by sand accretion.
	Post	349	40	
	Low limestone wall	27		

Table 18 **Fence type and condition** *cont.*

Reserve	Type	Condition		Comment
		Good (m)	Poor (m)	
Tamworth Hill Swamp	Fence	2,645	1358	Some of the poor condition fence is old farm fence through wetland, not required and could be removed.
Trenant Park	Fence		936	Wires broken and loose in a number of areas.
	Private fences	574		
Tuart Park	Fence	60		
	Post	791		
	Low limestone wall	58		
Woodleigh Grove Reserve	Fence	1,340	195	Poor condition fence is old farm fence through wetland, not required and could be removed.

3.12.2 Paths and access

Paths are an important feature in providing access to the reserves for recreation. However, this access needs to be managed to ensure uncontrolled vehicle and pedestrian access does not lead to the degradation of nature reserves. Paths through the reserves range from well maintained concrete paths, to limestone walking tracks, to sandy 4WD tracks.

The reserves considered as part of this assessment included both reserves that have a recreation focus, such as Tuart Park, and those that are in a more natural state with few recreation facilities. The reserves with high visitor usage, including Rockingham Road Conservation Reserve, Shoalwater Foreshore, Secret Harbour Foreshore and Tuart Park contain concrete paths in good condition which allow access for bicycles and pedestrians, including people with disabilities.

Well compacted limestone or woodchip paths are located within Alf Powell, Dixon Road Conservation Precinct, Lewington Reserve, Baldivis Nature Reserve and Karnup Nature Reserve. These paths provide good access for pedestrians and bicycles.

The bushland reserves Trenant Park, Sawley Close and Tamworth Hill Swamp have sandy access tracks/firebreaks that have not been specifically built for pedestrian access but which are used by local residents for walking and dog walking.

There was only one reserve that did not have any paths within it, that is Marillana Conservation Reserve. This reserve had an old 4WD track through the centre, however this is overgrown. As the main value of this reserve is its relatively untouched bushland the lack of paths into the site is positive.

Unauthorised BMX tracks have been created by users of a number of paths including Sawley Close, Dixon Road Conservation Precinct and Alf Powell Reserve. Jumps have been built out of mounds of soils and household material such as carpets, crates etc. The creation of these unauthorised tracks can lead to weed invasion, erosion and degradation of the surrounding areas. Creation of more tracks should be discouraged and community awareness programs should include information on the potential impacts of unauthorised tracks.

The majority of the reserves have excluded vehicle access, however vehicles still appear to be accessing Sawley Close (see section 3.12.1 for further discussion).

A few of the paths are in poor condition and require some improvement including:

- **Alf Powell** – concrete paths are cracking and there is wind-blown sand over the path in some sections
- **CUD Swamp** – the path up to the high vantage point overlooking the reserve is in disrepair and may be a safety issue
- A number of the coastal reserves, such as Secret Harbour Foreshore and Shoalwater Foreshore, have sand accretion issues, with wind-blown sand covering sections of the tracks.

Dog walking is probably the most common use of the reserves and is undertaken at the majority of them. Dog walking is generally compatible with the management priorities for the reserves, however, some signage educating dog owners on responsible use of the reserves may assist in minimising potential issues. Where it is important to keep dogs on leads, such as Hidden Swamp, it would be helpful to provide signs that inform the public why this is necessary, to ensure a better acceptance of this regulation.

The paths recorded in each reserve have been mapped in the individual reserve sheets and the extent, type and condition of paths summarised in Table 19.

Table 19 **Path condition**

Reserve	Type	Condition			Comment
		Good (m)	Poor (m)	Overgrown (m)	
Alf Powell Reserve	Concrete	388	137		Some sections with cracked concrete and sand accretion from batter.
	Limestone	222			
	Soil/sand (unauthorised track)		207		Use of these tracks should be discouraged.
Anstey Q Wetland	Concrete	1,117			
	Soil/sand		94		Unauthorised tracks.
Baldivis Nature Reserve	Concrete	118			
	Firebreak	322			Approximately 20m wide, trees remaining but understorey cleared.
	Mulch		182		Overgrown and uneven, maybe modified for BMX.
	Soil/sand	1,690			
Bordeaux Ramble	Boardwalk	80			
	Concrete	668			
CUD Swamp	Mulch		191		
	Concrete	288			
	Limestone	153	218		Path to lookout area eroding.
Dixon Road Conservation Precinct	Limestone	14,115			
	Soil/Sand	843	904	321	Some unauthorised tracks.
Hidden Swamp	Boardwalk	42			Stairs to lookout.
	Mulch	94			
	Soil/sand	410	324		Lots of rubbish on tracks next to houses.
Karnup School Site	Soil/sand			166	Very narrow overgrown track with fallen logs etc.
Karnup Townsite	Mulch	977			Includes paths in adjacent reserve.
	Soil/sand	108			Includes paths in adjacent reserve.
Kinsdale Bend	Concrete	193			
	Firebreak	86			
Lewington Reserve	Limestone	932			
	Soil/sand			983	Includes unauthorised tracks that could be closed.
Mandurah Hill	Firebreak	164			
	Bitumen	102			
	Road	121			Used by walkers, closed to general public.
Marillana Conservation Reserve	N/A				
Rockingham Road Conservation Reserve	Concrete	74	20.9		Some sections with holes.
	Soil/sand	35	40	31	Some sections completely overgrown, but not required for access.

Table 19 **Path condition** *cont.*

Reserve	Type	Condition			Comment
		Good (m)	Poor (m)	Overgrown (m)	
Sawley Close	Firebreak	1,226			Used by 4WDs.
	Soil/sand	146			
Secret Harbour Foreshore	Concrete	2,404			
	Firebreak	413			
	Limestone	21			
	Mulch	44			
	Soil/Sand	1,149	319		Affected by sand accretion from adjacent dunes.
	Paving	110			
Shoalwater Foreshore	Boardwalk	43			Wood and synthetic materials. Includeds some stairs.
	Concrete	1,390			
	Limestone	32	179		
	Soil/sand	272	227	104	Affected by sand accretion from adjacent dunes.
Tamworth Hill Swamp	Soil/sand	2,248			
	Firebreak		659		Some sections flooded and under water during survey.
Trenant Park	Firebreak	1,466			
Tuart Park	Concrete	1,072			
Woodleigh Grove Reserve	Firebreak	304			
	Soil/sand	329			Some unauthorised tracks.

3.12.3 Signs

The use of signs needs to balance the need to educate and inform with the potential for visual clutter. The majority of reserves are well signed and little additional signage is needed. However, a number of the signs are old and have been weathered, resulting in faded and unreadable information. The addition of any new signage should consider this issue and ensure the most appropriate signage materials are used to prevent deterioration. The following reserves could benefit from some additional signage or upgrading of existing signage:

- **Bordeaux Ramble** – one TEC sign has fallen over and needs replacing.
- **Baldivis Nature Reserve** – the plaques associated with the nature walk are very faded and require upgrading.
- **Kinsdale Bend** – TEC signs need replacing.
- **Hidden Swamp** – erect signs informing public of sensitive conservation area and TEC.
- **Trenant Park** – erect signs to educate neighbours and the public about the sensitive environment. Include information about the potential issues associated with dumped garden waste.
- **Shoalwater Foreshore** – discourage trampling through dunes by erecting signs informing the public of the sensitive nature of the environment and by fencing sensitive areas.

The locations of the signs within each reserve have been mapped in the individual reserve sheets and the information summarised in Table 20.

Table 20 **Signs**

Reserve	Condition			
	Naming	Regulation	Naming / Regulation	Information
Alf Powell Reserve	1	1		
Anstey Q Wetland		1		1
Baldivis Nature Reserve	3			5
Bordeaux Ramble				3
CUD Swamp			1	
Dixon Road Conservation Precinct	3	7		4
Hidden Swamp		1	1	
Karnup School Site		3		1
Karnup Townsite	3			11
Kinsdale Bend				3
Lewington Reserve		3	1	1
Mandurah Hill		1		
Marillana Conservation Reserve				
Rockingham Road Conservation Reserve		10		2
Sawley Close				
Secret Harbour Foreshore	1	18	14	1
Shoalwater Foreshore	4	12	14	19
Tamworth Hill Swamp	1			
Trenant Park				
Tuart Park				
Woodleigh Grove Reserve	1			4

3.12.4 Other infrastructure

Recreation facilities, including barbeques, picnic tables and children's playgrounds are provided in a number of the reserves, such as Tuart Park, Alf Powell Reserve, Secret Harbour Foreshore, Shoalwater Foreshore and Karnup School Site. The majority of the facilities are in good condition, are provided in appropriate nodes and are harmonious with the natural areas, minimising the impact on areas of conservation value.

Both Mandurah Hill and Hidden Swamp have lookouts at high vantage points that provide a passive recreation focus. The stairs and lookout at Hidden Swamp are in good condition and provide views out over the swamp and undulating high dunes.

Reserves that have recreation facilities requiring management include:

- **Karnup Townsite** – this reserve has barbeque and picnic facilities that show some disrepair and are very weedy. Additionally, there are no bathroom facilities provided. A substantial amount of toilet paper was noted throughout the bushland areas and it appears that the lack of bathroom facilities is resulting in the use of the bushland for this purpose. The addition of bathroom facilities is unlikely to be possible in the current budget for this reserve but this issue, and the purpose of this reserve as a picnic area, needs consideration. An upgrade of this picnic area may be considered for future planning, as noted in the Baldivis Tramway Master Plan.
- **Mandurah Hill** – the lookout is in poor condition and there is a substantial amount of rubbish scattered around the lookout.

The locations of the recorded infrastructure within each reserve have been mapped in the individual reserve sheets and the information summarised in Table 21.

Table 21 **Infrastructure**

Reserve	Type (count)
Alf Powell Reserve	Access Point (5), Carpark (1), Gate (2), Park Bench (1), Recreation (3), Rubbish Bin (2), Utility (12)
Anstey Q Wetland	Drain Outlet (1), Park Bench (1), Rubbish Bin (1), Utility (4)
Baldivis Nature Reserve	Bubble-up (1), Gate (6), Park Bench (1), Picnic Table (2) Recreation (2), Toilet (2)
Bordeaux Ramble	Gazebo (1), Park Bench (4), Utility (13)
CUD Swamp	Gate (1), Lookout (2), Park Bench (6), Recreation (1), Rubbish Bin (2), Utility (2)
Dixon Road Conservation Precinct	Access Point (6), Gate (5), Other (1), Rubbish Bin (2), Utility (1)
Hidden Swamp	Gate (2), Lookout (1)
Karnup School Site	Carpark (1), Gate (1), Gazebo (2), Picnic Table (2), Recreation (1), Utility (1)
Karnup Townsite	Access Point (2), Gate (3), Other (2), Park Bench (3), Utility (2)
Kinsdale Bend	Gate (1), Lookout (1), Utility (6)
Lewington Reserve	Gate (3), Other (3), Park Bench (2), Recreation (1), Rubbish Bin (1), Utility (5)
Mandurah Hill	Access Point (1), Carpark (2), Gate (1), Lookout (1), Other (1), Park Bench (4), Utility (2)
Marillana Conservation Reserve	none
Rockingham Road Conservation Reserve	Carpark (1), Gate (2), Gazebo (3), Other (3), Park Bench (3), Recreation (3), Rubbish Bin (3), Toilet (1), Utility (3), Water Fountain (1)
Sawley Close	none
Secret Harbour Foreshore	Access Point (2), Carpark (2), Drain Outlet (1),Gate (3), Gazebo (1), Lookout (5), Other (10), Park Bench (18), Picnic Table (12), Recreation (5), Rubbish Bin (11), Toilet (1), Utility (4), Water Fountain (7)
Shoalwater Foreshore	Bubble-up (3), Carpark (4), Drain Outlet (4), Gate (2), Gazebo (4), Other (3), Park Bench (30), Recreation (3), Rubbish Bin (13), Toilet (1), Utility (10), Water Fountain (2)
Tamworth Hill Swamp	Access Point (3), Gate (3)
Trenant Park	Access Point (1), Drain Outlet (1), Gate (3)
Tuart Park	Access Point (2), Bubble-up (3), Gazebo (2), Other (2), Park Bench (4), Picnic Table (5), Recreation (5), Rubbish Bin (7), Toilet (1), Utility (7), Water Fountain (1)
Woodleigh Grove Reserve	Access Point (2), Gate (4), Utility (7)

4. Threatening Processes

4.1 Weeds

Invasive species (including weeds) represent the biggest threat to biodiversity after habitat loss (DotE 2014c). Weeds are plants that grow in areas where they are not wanted and where they may have an environmental or economic impact. Weeds can impact on natural values by:

- Out-competing native species for nutrients, water, space and sunlight
- Reducing the natural diversity by smothering native plants or preventing them from growing back
- Reducing habitat for native animals
- Altering fire regimes (DPaW 2014).

The major vectors for the introduction and spread of weeds in the reserves include:

- Dumping of rubbish
- Escape of garden plants, particularly in areas where gardens border the reserves
- Human and animal transport.

Introduced plants occur throughout all of the reserves but are most dominant in the modified or previously disturbed/ cleared areas. However, in some areas, such as in the coastal foredunes, the weedy species can play a role in dune stabilisation. Some introduced species also provide recreational amenity such as shade trees or lawns within the parkland cleared areas. However, the weed species become a threat when they spread into areas of native vegetation adjacent to the maintained parkland areas. This can become an issue where there is a lack of delineation between grassed areas and native vegetation, which allows the grasses to enter and smother the vegetation.

The reserves with bushland in excellent condition, such as Karnup Townsite, have limited weed infestations with few aggressive weeds. However, herbs such as **Hypochaeris* sp. (Flat weeds), **Ursinia anthemioides, *Romulea rosea* (Guildford Grass) are scattered throughout the bushland areas.

Within the coastal reserves, including Shoalwater Foreshore, Rockingham Road Conservation Reserve and Secret Harbour Foreshore, introduced plants make up a significant proportion of the species within the bushland areas, with the foredunes often dominated by species such as **Euphorbia peplus, *Trachyandra divaricata* and **Tetragonia decumbens*.

Very large infestations of **Schinus terebinthifolius* (Pepper tree) occur within Lewington Reserve. This species spreads by suckering and large thickets dominate the mid-storey within some sections of this reserve. These dense thickets would prevent regeneration of native species and have a large impact on the condition of some sections of this reserve.

The wetlands that occur within the reserves have been invaded by a different suite of weeds that include **Cirsium vulgare, *Cortaderia selloana* (Pampas Grass), **Gomphocarpus fruticosus* (Cotton bush) and **Zantedesdchia aethiopica* (Arum Lily). Very large infestations of **Cortaderia selloana* were recorded at Tamworth Hill Swamp. **Ficus carica* (Common Fig) is also an aggressive weed in a number of the wetland areas, in particular Tamworth Hill Swamp.

Typha orientalis was recorded in a number of the wetlands, including Anstey Q Wetland, Hidden Swamp, Tamworth Hill Swamp and Woodleigh Grove Reserve. This species is believed to be an introduced species but can offer similar ecological function to the native species *Typha* domingiensis. However, this species can be very aggressive, spreading widely in wetlands and can also be a fire hazard when dry.

**Euphorbia terracina* is a very widespread weed, recorded in all of the reserves. This species is more frequent in disturbed areas but was recorded invading good condition bushland in some reserves. Grassy weeds, such as **Avena barbata, *Ehrharta spp, *Eragrostis curvula* and **Bromus diandrus* were also widespread throughout all the reserves.

Significant weeds

Two Weeds of National Significance were recorded within the reserves: **Asparagus asparagoides* (Bridal Creeper) and **Lantana* sp.. These species are also declared pests under the Biosecurity and Agriculture Management Act 2007. Other declared pests recorded within the reserves include **Emex australis* (Double Gee), *Solanum linnaenum, Gomphocarpus fruticosus, *Zantedeschia aethiopica* (Arum Lily).

DPaW has prioritised environmental weeds in each of the DPaW regions based on attributes such as invasiveness, current distribution and feasibility of control (DPaW 2013). The weeds prioritised as high or medium within the Swan region that were recorded within the reserves have been detailed in Table B.3, Appendix B. The high priority weeds include:

- **Centranthus macrosiphon*
- **Juncus acutus* (Spiny Rush)
- **Leptospermum laevigatum* (Victorian Tea-tree)
- **Lupinus cosentinii* (Lupin)
- **Olea europea* (Olive tree)
- **Watsonia meriana* (Watsonia).

4.2 Trampling of vegetation

Loss of vegetation can be caused by trampling through uncontrolled access, such as the use of undefined tracks through reserves. Trampling can damage vegetation, change plant composition, reduce plant cover and may result in the spread of weeds. Trampling and loss of vegetation can also lead to soil erosion. Trampling impacts can depend on the type and density of vegetation.

4.3 Vandalism and dumping of rubbish

Vandalism can include destruction of property and facilities as well as damage to native vegetation, such as tree poisoning and illegal clearing. Dumping of large amounts of rubbish in most of the reserves is uncommon as access is generally well regulated; however rubbish dumping is an issue in some of the reserves with poor fencing, such as Sawley Close. Dumping of rubbish can spread weed and diseases, can reduce the visual amenity of the reserves and can constitute a fire hazard. Littering is a common problem in the reserves, particularly those of high use, such as the foreshore areas and the reserves within residential areas.

Dumping of rubbish appears to be an issue that is well controlled by the City. Dumped rubbish was noted to be quickly removed from the accessible areas, such as Karnup School Site. However, this issue needs to be addressed in a number of reserves, particularly Sawley Close.

4.4 Introduced fauna

There are a number of introduced fauna species that have the potential to occur within the reserves and these animals can have potential impacts on native species including:

- Predation on native fauna species and grazing of native plants
- Competition with native fauna for food and shelter
- Destroying habitat
- Spreading diseases
- Land degradation including soil erosion and destruction of vegetation.

Introduced fauna species that may be a threat to the vegetation of the reserves include:

- European rabbit (*Oryctolagus cuniculus*): grazes on native vegetation, may impact on revegetation efforts by killing juvenile plants as well as leading to erosion
- European red fox (*Vulpes vulpes*): preys on native fauna species, competes with native fauna
- Feral cat (*Felis catus*): preys on native fauna species, competes with native fauna
- European bee (*Apis mellifera*): competition with native fauna species (such as cockatoos) for tree hollows.

Rabbits, foxes and feral cats are listed under the EPBC Act as key threatening process to the conservation of biodiversity in Australia.

4.5 Diseases and pathogens

Diseases and pathogens of plants have the potential to cause death and decline of plant species within the reserves. There are a number of diseases and pathogens, including rusts, cankers and Mundulla Yellows that may potentially occur within the reserves and affect vegetation health. The key threatening diseases and pathogens are discussed below.

Tuart borer

The beetle (*Phoracantha impavida*) occurs naturally within the Tuart ecosystem; however, the beetle has become an increased threat due to an increased susceptibility of Tuart to borer attack when they are stressed. It is likely that Tuarts are becoming increasingly stressed due to environmental changes, including climate and fire frequency (Conservation Commission of WA 2010).

Honey fungus

Honey fungus (*Armillaria luteobubalina*) is one of the main diseases affecting coastal vegetation in the Quindalup and Spearwood dunes (Conservation Commission of WA 2010). Honey fungus causes root rot and large infestations can affect the structure and composition of dunes. Honey fungus normally spreads slowly; however the movement of infected soils can exacerbate the spread.

Dieback

Dieback (*Phythopthora cinnamomi*) is found throughout the southern extent of Western Australia in areas with susceptible plant species that receive rainfall in excess of 400 mm/year (Dieback Working Group 2010). The City of Rockingham is within the Spearwood and Quindalup dune systems which are landforms where the effect of P. *cinnamomi* on the vegetation is minimal. The disease may be present within the area, but is unlikely to have an observable impact on the vegetation on these land systems. However, the reserves in the east of the City, including Karnup Townsite and Karnup School Site have the potential to be impacted by P. *cinnamomi*.

Phythopthora cinnamomi causes root rot in susceptible plants, thereby limiting or stopping the uptake of water and nutrients (Dieback Working Group 2014). It is spread by the movement of infected soil, plant material or water. The disease spreads naturally in sloping areas where surface water movements may result in contamination of areas downslope of an infected area. Dieback is also commonly spread via human activities, such as earth moving, vehicle movement and movement on foot. The expression of the disease is determined by a combination of the pathogen, vegetation and environmental conditions and is affected by soil type and climate.

In addition there are a number of other *Phytophthora* species that have the potential to occur within the reserves, including *P. humilis* and *P. littoralis.*

4.6 Fire

Fire impacts on native vegetation in a variety of ways, depending on the scale of the fire and the vegetation. The impacts of fire on vegetation can be very complex with both positive and negative effects. Management of fire in the reserves requires detailed consideration of all the ecological, social and resourcing factors associated with this issue.

5. Results *cont.*

5.1 Prioritisation of reserves

Reserves were prioritised using the quantitative assessment detailed in the Perth Biodiversity Project guidelines (Del Marco *et al.* 2004). This process uses ecological criteria and viability factors to prioritise areas according to their importance for biodiversity conservation. The prioritisation of the reserves using the Perth Biodiversity Project template is included in Appendix D and the results are summarised in Table 22.

All of the reserves, except for Alf Powell Reserve, met one or more or the ecological criteria and were determined to be Priority 1A areas, which are defined as 'natural areas of high value in a regional context' for their ecological values.

With regard to the viability ranking of the reserves, Karnup Townsite ranked the highest and Mandurah Hill ranked the lowest. In general, the small isolated reserves such as Kinsdale Bend, Tuart Park, CUD Swamp, Alf Powell Reserve and Mandurah Hill had a low viability score (Table 22).

The management priority was determined with consideration for the ecological features of the site and the existing and potential threatening processes, as detailed in the individual reserve sheets, section 5.3.

Table 22 **Prioritisation of the reserves**

Reserve	Ecological Criteria	Viability Ranking (score)	Management Priority
Karnup Townsite	Priority 1A	22.42	**Medium** Reserve has high ecological value, but is generally in very good condition. Requires general ongoing maintenance to ensure good condition.
Woodleigh Grove Reserve	Priority 1A	20.2	**Medium** Wetland has high ecological value, in good condition. General, ongoing maintenance required.
Marillana Conservation Reserve	Priority 1A	20	**Medium** While this reserve has high conservation values, there is little immediate threat.
Karnup School Site	Priority 1A	19.87	**High** Purpose of the reserve is unclear. If the purpose is for recreation then substantial resources will be required for improve site; if for conservation, management can be restricted to ongoing maintenance including weed control.
Secret Harbour Foreshore	Priority 1A	19.54	**High** Large areas of coastal vegetation; requires intensive management to rehabilitate degraded areas.
Dixon Road Conservation Precinct	Priority 1A	19.22	**High** Site has high ecological value and requires ongoing management to improve its condition.
Tamworth Hill Swamp	Priority 1A	18.19	**High** The management commitments established in the management plan specify substantial areas of rehabilitation.
Trenant Park	Priority 1A	17.96	**Medium** Ongoing weed management required.
Sawley Close Nature Reserve	Priority 1A	17.51	**High** Reserve has high ecological value and is subject to a number of threats; management is required.
Shoalwater Foreshore	Priority 1A	15.06	**High** Large areas of coastal vegetation, require intensive management to rehabilitate degraded areas.

Table 22 **Prioritisation of the reserves** *cont.*

Reserve	Ecological Criteria	Viability Ranking (score)	Management Priority
Anstey Q Wetland	Priority 1A	15.31	**High** High ecological value and requires management to maintain and improve site's natural features.
Bordeaux Ramble	Priority 1A	15	**Medium** Site has high ecological value; however is in good condition with infrastructure in excellent condition. Ongoing weed management required.
Hidden Swamp	Priority 1A	14.28	**Medium** Reserve has high ecological value and is generally in very good condition. Requires general ongoing maintenance to ensure good condition is retained.
Baldivis Nature Reserve	Priority 1A	13.78	**High** Has high ecological value; requires ongoing management.
Rockingham Road Conservation Reserve	Priority 1A	13.62	**Medium** Ecological values generally well maintained.
Lewington Reserve	Priority 1A	13.32	**High** Requires intensive management to improve condition of reserve.
Kinsdale Bend	Priority 1A	8.41	**High** Reserve has high ecological value, degraded areas require management.
Tuart Park	Priority 1A	9.49	**Low** Ecological values of the reserve are low and reserve is used predominantly for recreation.
Alf Powell Reserve	Meets no criteria	9.06	**Medium** Site is in degraded condition and requires significant management to improve condition; however it is not a priority site as has relatively low ecological value. Revegetation and weed control should be a priority.
CUD Swamp	Priority 1A	8.38	**High** Site is very degraded and requires intensive management and significant resources to improve condition.
Mandurah Hill	Priority 1A	8.26	**Medium** Small area that requires low-level ongoing management.

The 2015–2025 Strategic Community Plan outlines A Sustainable Environment as a key Community Aspiration, whereby 'coastal and bushland reserves are well used and sustainably managed, preserving them for future generations to enjoy'. The results of this survey demonstrate that the City of Rockingham is effectively working toward this aspiration.

5.2 Trends and changes

5.2.1 Bushland condition

The bushland condition ratings (as a percentage of the bushland area of the site) determined during this assessment were compared with the previous assessment to assess any overall changes or fluctuations (Plate 1). There were some differences between years that may have been caused by the use of the Kaesahagen (1995) condition rating scale which places emphasis on the coverage of weeds, which can vary seasonally and sometimes skew the results.

In general, the bushland condition appears to be similar across the assessment years. One exception is Alf Powell Reserve which has increased in condition score. This may be a result of differences in seasonal weed cover, but may also indicate an improved condition due to natural regeneration. Woodleigh Grove Reserve has also improved in condition, which may be attributed to weed control targeting some of the more aggressive weeds in this wetland. Hidden Swamp has shown some improvement in condition, with more areas rated as 'Fair-Good' and less as 'Poor'. This is likely a result of restricted access to the dunes which has enabled natural regeneration.

Rockingham Road Conservation Reserve appears to show a decline in condition, but this is because a larger area was assessed during this survey, which included a more degraded section of the foredunes. If the assessment had been restricted to the area considered in the previous survey, this reserve would have shown a slight increase in condition due to rehabilitation works.

Karnup Townsite has shown a substantial increase in condition. This is because the previous assessment was undertaken not long after the reserve had been burnt. Kinsdale Bend has also shown an increase in condition, which is likely a result of revegetation works and natural regeneration within the site.

Sawley Close has shown a decrease in condition, which may be due to an increase in weeds and degradation in areas adjacent to tracks, as this site is accessed by the public and used for rubbish dumping.

Comparison of Bushland Condition from 2007 to 2014

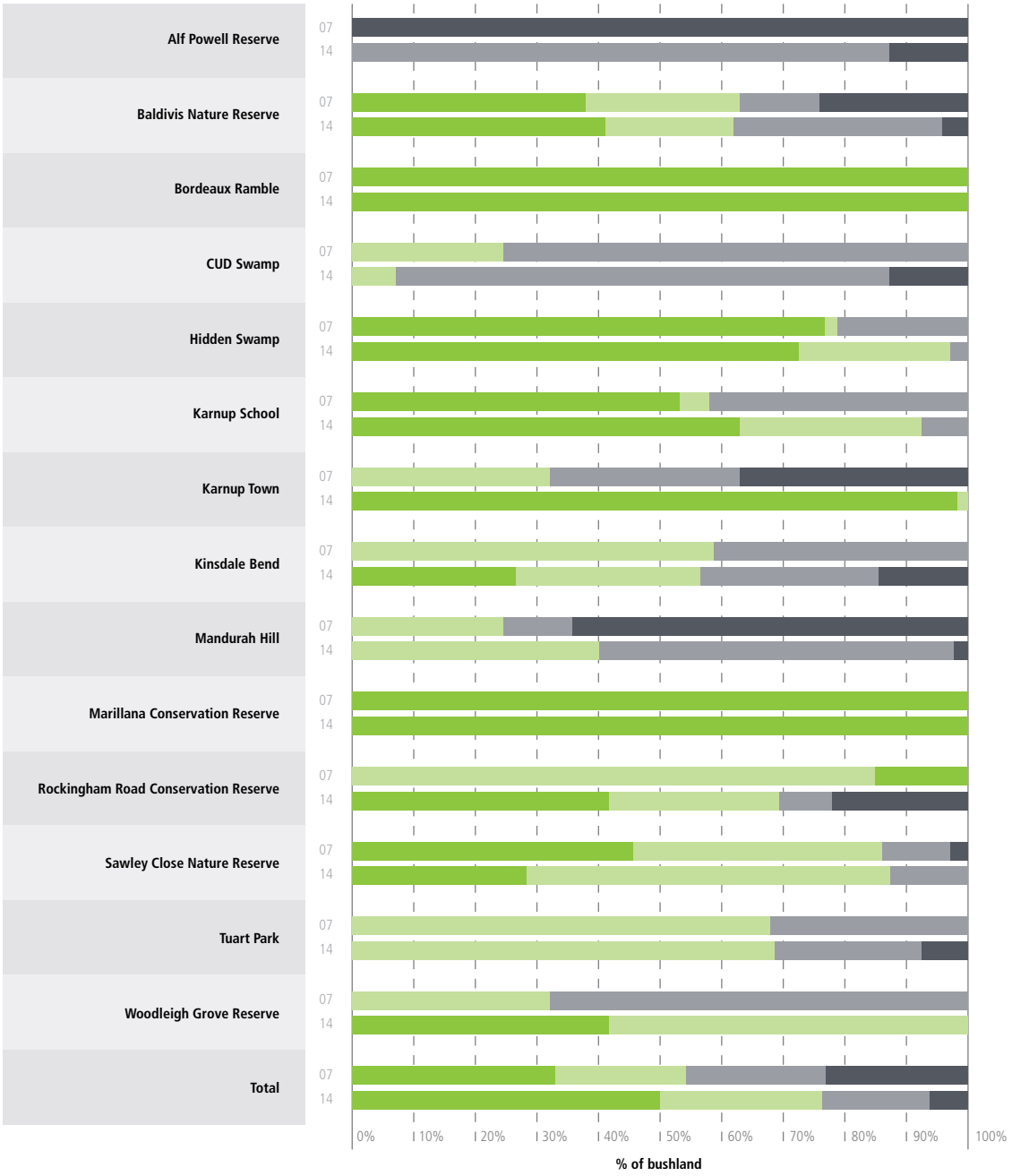


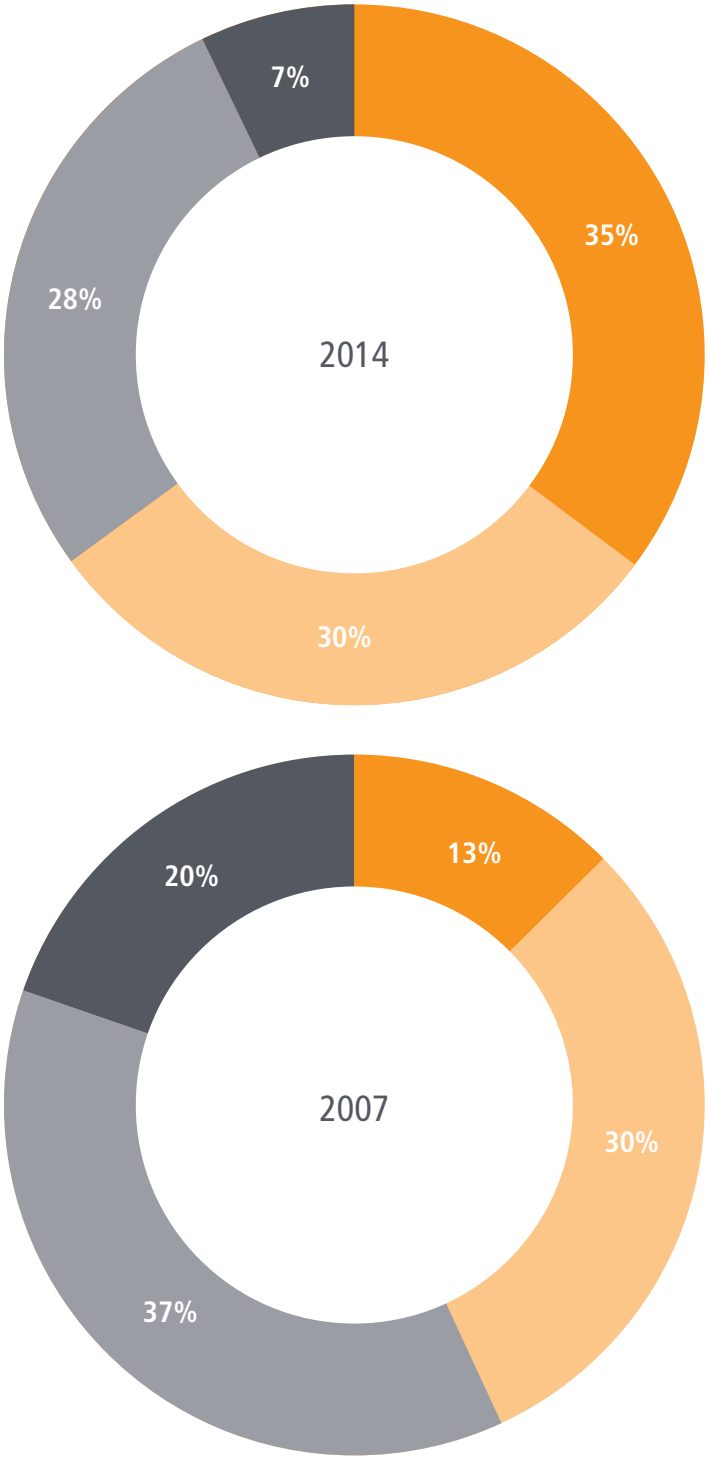
Plate 1 **Comparison of the percentage of each vegetation condition rating (Kaesehagen 1995) between the current survey and the previous survey**

- Very Good-Excellent
- Fair-Good
- Poor
- Very Poor

Combined Overall Bushland Condition Rating for City of Rockingham Reserves

Plate 2 **Percentage of each bushland condition rating for total vegetation surveyed in all reserves in 2007 and 2014**

The percentage of each vegetation condition rating across the entire study area for both the 2007 and 2014 assessment is displayed in Plate 2. This indicates that there was a higher amount of vegetation in Very Good – Excellent condition in 2014 than 2007 and less in Very Poor condition. However, it should be noted that the reserves surveyed in each assessment year were different and so this information should be considered within this context.



Overall, the condition of bushland within the City's reserves has improved since 2007.

Comparison of Viability Scores from 2007 to 2014

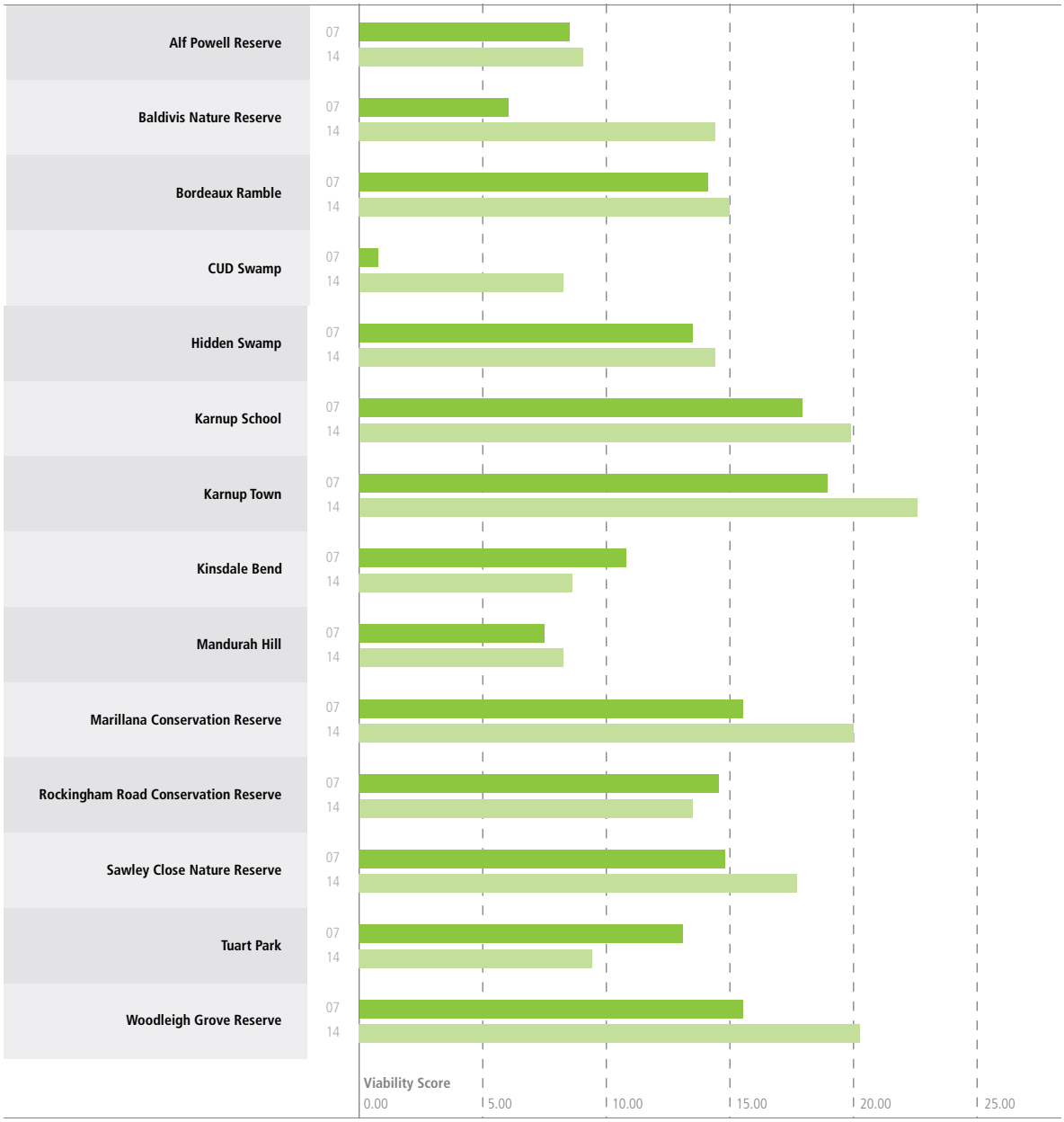


Plate 3 **Comparison of viability scores between the previous survey and the current survey**

5.2.2 Viability scores

A comparison of the viability scores given to the reserves assessed in both 2007 and 2014 is displayed in Plate 3.

The majority of reserves surveyed have increased in viability since 2007.

5.2.3 Management priorities

A comparison of management priorities for the reserves assessed in both 2007 and 2014 was undertaken and is detailed in Table 23.

Table 23 **Comparison of management priorities between previous and current assessment**

Reserve	Management Priority 2007	Management Priority 2014	Comments
Alf Powell Reserve	TBA	Medium	Previously this reserve was TBA because the priority was dependent on whether the City decided to retain it as a reserve.
Baldivis Nature Reserve	High	High	
Bordeaux Ramble	Medium	Medium	
CUD Swamp	High	High	
Hidden Swamp	High	Medium	Reserve is well managed, and requires maintenance of area rather than intensive upgrade works.
Karnup School Site	Medium	High	The purpose of this reserve requires further consideration, which may change the management priority from medium to high.
Karnup Townsite	Medium	Medium	
Kinsdale Bend	Medium	High	This reserve is considered to be a high management priority because of the degraded areas adjacent to a high conservation area.
Mandurah Hill	TBA	Medium	Previously this reserve was TBA because the management priorities depend on the main objectives of this site. This site can be managed for both infrastructure, conservation and recreation and the management priority has been allocated 'medium'.
Marillana Conservation Reserve	High	Medium	The previous management priority was 'high' due to its ecological values; however there are few immediate threats to this reserve and it is now rated as 'medium'. The reserve should be managed as part of a larger conservation reserve.
Rockingham Road Conservation Reserve	Low	Medium	The previous assessment did not consider the northern section of this reserve which is degraded and requires more intensive management to achieve conservation outcomes.
Sawley Close Nature Reserve	High	High	
Tuart Park	Medium	Low	The bushland areas of this reserve are relatively small, with the majority of the site being used for recreation.
Woodleigh Grove Reserve	High	Medium	This reserve is in relatively good condition and has limited immediate threats, besides weeds.

5.3 Reserve summary information

A summary sheet for each reserve is provided in this section, as well as mapping of the vegetation type, condition, significant weed locations and infrastructure.

Please note for weed control timings:

- Regularly
- Occasionally

MEDIUM PRIORITY

Alf Powell Reserve

Willmott Drive, Cooloongup

Alf Powell Reserve (14.24 ha) contains 4.76 ha of bushland, consisting of *Xanthorrhoea* and *Acacia* shrublands. The bushland is degraded with substantial invasion of weedy species (including introduced Eucalypts). This bushland retains native shrub species, including large numbers of grasstrees and has the potential to regenerate with management.

This reserve also encompasses a 7.6 ha area of cleared parkland which consists of lawns with planted Peppermint and Eucalyptus trees.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Castor Oil Plant *(Ricinus communis)*	●							●	●●	●●	●●	●●	Glyphosate 10ml/L or Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
English Ivy *(Hedera helix)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate cut and paint
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Garden Nasturtium *(Tropaeolum majus)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●●	●●	●●	●●	●●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)
Pepper Tree *(Schinus terebinthifolius)*	●●	●●	●									●●	Glyphosate 10ml/L, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Victorian Tea-tree *(Leptospermum laevigatum)*	●	●	●	●	●	●	●●	●●	●●	●●	●	●	Triclopyr/Picloram, Glyphosate spot spray, manual removal

Conservation significant species

- None recorded.

Fauna habitat

Woodland	Limited Black Cockatoo foraging habitat. Habit for bushland birds and small reptiles, including burrowing species.

Infrastructure

Access Point (5), Carpark (1), Gate (2), Park Bench (1), Recreation (3), Rubbish Bin (2), Utility (12)

Signage

Naming (1), Regulation (1)

Fence

Post:	1282 m	Bollards & bollards with cross-post
Fence:	995 m	Approx 1/2 in good condition (rest poor)

Paths

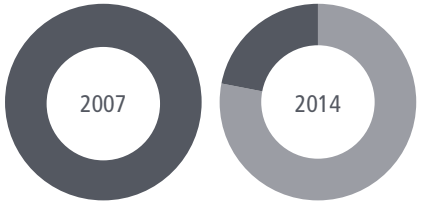
Concrete:	525 m	Approx. 3/4 in good condition
Limestone:	222 m	Good condition
Soil/sand:	207 m	Unauthorised track, use should be discouraged

Major threat/issue	Action	Priority
Rubbish dumping.	Rubbish removal from bushland areas.	Medium
Unauthorised BMX tracks.	Monitoring.	Low
Large infestations of **Euphorbia terracina* (Geraldton Carnation Weed) grassy weeds.	Weed control required throughout bushland.	High
	Revegetation of sections, starting in areas adjacent to best quality vegetation.	High
Introduced Eucalypts throughout bushland.	Continue spraying along edge of lawn areas to prevent grasses invading bushland.	Medium
Loose wires and broken fence.	Repairing and replacing wire on fences in poor condition.	Low

Comparison to 2007

Viability ↑ 2007: 8.5 | 2014: 9.06

Bushland condition rating (%)



0 30 60 90 120 150
Metres

N

HIGH PRIORITY

Anstey Q Wetland

Warnbro Sound Ave, Secret Harbour

Anstey Q Wetland (10.13 ha) includes areas of landscaped lawns and bushland. The bushland areas include damplands in swales of dunes, Tuart woodlands and shrublands on undulating dunes. The vegetation is generally in good or excellent condition. The dune on the western side of the site is the most degraded area in need of management. Anstey Q Wetland includes 1.3 ha of parkland, with landscaped lawns and a circular walking trail. The walking trail circles an area of fenced bushland.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●●	●●	●●	●●	●●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)
Pepper Tree *(Schinus terebinthifolius)*	●●	●●	●									●●	Glyphosate 10ml/L, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Red Ink Plant *(Phytolacca octandra)*										●●	●●	●●	Glyphosate 10ml/L
Rose Pelargonium *(Pelargonium capitatum)*						●●	●●	●●	●●	●●			Glyphosate 10ml/L Mets 0.05g
Spear Thistle *(Cirsium vulgare)*				●	●●	●●	●●	●●	●●	●			Glyphosate (10ml/L) and Metsulfuron 0.05g
Typha *(Typha orientalis)*	●●	●●	●							●	●	●●	Glyphosate paint or during flowering period cut 15cm below water surface

Conservation significant species

- Contains Threatened Ecological Community 'Sedgelands in Holocene Dune Swales'
- Potential breeding/roosting habitat for Black Cockatoos including a number of nesting boxes within large Tuarts.

Fauna habitat

Tuart woodlands	Potential Black Cockatoo foraging, roosting and breeding.
Tall shrublands	Habitat for bushland birds and reptiles.
Wetlands (sedgeland and forest)	Birds and quenda, macroinvertebrates, refugia in summer months.

Infrastructure

Drain Outlet (1), Park Bench (1), Rubbish Bin (1), Utility (4)

Fence

Post (bollards): 699 m Good condition
Fence(around wetland): 1,351 m Good condition

Signage

Information (1), Regulation (1)

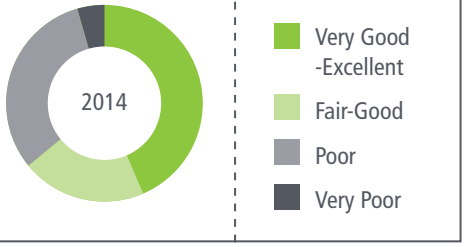
Paths

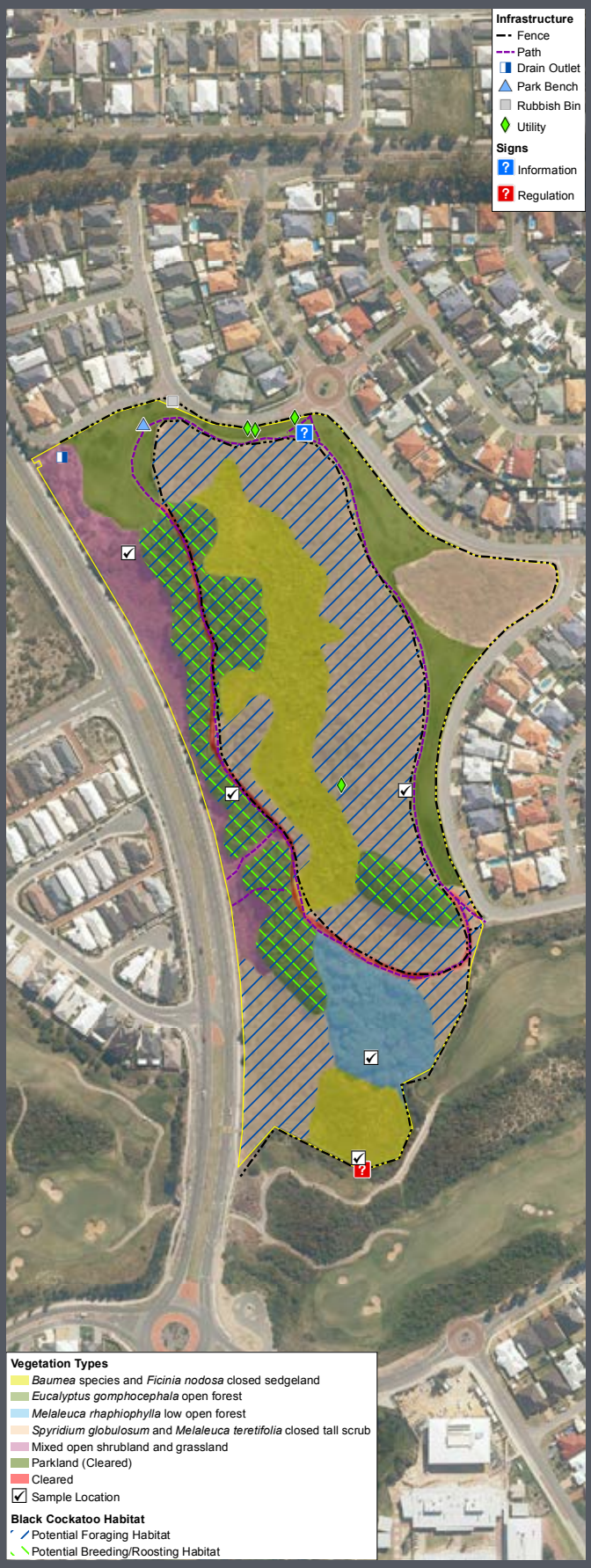
Concrete: 1,117 m Good condition
Soil/sand: 94 m Unauthorised tracks

Major threat/issue	Action	Priority
Degraded dunes dominated by weeds occur along the western boundary of reserve.	Weed control and revegetation on dune along western boundary.	Medium
Unauthorised access to bushland, particularly in the south and west of the site which has led to trampling and there is evidence of an old campfire under the *Melaleuca* woodland.	Fence TEC sedgeland and *Melaleuca* woodland in south of reserve to prevent access.	High
Patches of weeds within the Threatened Ecological Community, including Palms.	Control of palms within TEC sedgeland.	Medium

Comparison to 2007

Bushland condition rating (%) 2014





0 25 50 75 100 125
Metres

N

HIGH PRIORITY

Baldivis Nature Reserve

Baldivis Road, Baldivis

Baldivis Nature Reserve (14.03 ha) contains good to excellent condition bushland, which consists of Jarrah-Marri-*Banksia*-Sheoak woodland. Jarrah is more dominant on the eastern side of the site with Marri more dominant on the higher, western side of the site.

On the eastern side of the site there are recreational facilities including barbeques, picnic tables and a children's playground adjacent to heritage buildings. A number of walking trails pass through the bushland, including a nature walk with interpretive signs.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Arum Lily *(Zantedeschia aethiopica)*							●	●	●				Glyphosate 10ml/L Metsulfuron 0.05g
Century Plant *(Agave americana)*	●	●	●	●	●	●	●	●	●	●	●	●	Tordon, manual removal
Double Gee *(Emex australis)*					●	●	●	●					Glyphosate 10ml/L
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Hesperantha falcata							●	●					Spot spray metsulfuron methyl 0.2 g/15 L + Pulse
Rose Pelargonium *(Pelargonium capitatum)*						●	●	●	●	●			Glyphosate 10ml/L Mets 0.05g
Watsonia *(Watsonia meriana)*									●				Glyphosate 10ml/L

Conservation significant species

- Potential foraging/roosting/breeding habitat for threatened Black Cockatoos.

Fauna habitat

Woodland	Excellent fauna habitat for mammals, bushland birds and reptiles.

Infrastructure

Bubble-Up (1), Gate (6), Park Bench (1), Picnic Table (2), Recreation (2), Toilet (2)

Signage

Information (5), Naming (3)

Fence

Post: 206 m

Paths

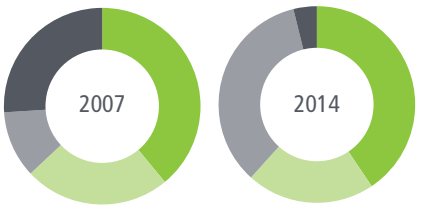
Firebreak:	322 m	Approx. 2m wide, trees remaining
Mulch:	182 m	Overgrown and uneven
Soil/sand:	1,690 m	

Major threat/issue	Action	Priority
Infestations of Watsonia through reserve, particularly north-east.	Ongoing weed management, particularly of Watsonia	High
Impacts, including rubbish dumping, from new developments to west of site.	Ensure fencing is replaced along the western boundary, and potential impacts from adjacent construction zone are managed	High
Degraded signs on trail, difficult to read.	Upgrade interpretive signs	Medium

Comparison to 2007

Viability ↑ 2007: 6.29 | 2014: 13.78

Bushland condition rating (%)



0 25 50 75 100 125
Metres

N

MEDIUM PRIORITY

Bordeaux Ramble

Bordeaux Ramble, Port Kennedy

Bordeaux Ramble is a very small reserve (2.02 ha) within a residential area. The reserve consists of a fenced patch of bushland circled by a walking path and an edging of lawn. There is a raised boardwalk that crosses the centre of the bushland, leading to a gazebo with park benches. The bushland is in excellent condition.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)
Rose Pelargonium *(Pelargonium capitatum)*						●	●	●	●	●			Glyphosate 10ml/L Mets 0.05g

Conservation significant species

- Threatened Ecological Community: 'Sedgelands in Holocene Dune Swales'.

Fauna habitat

Shrublands	Good quality habitat, particularly for reptiles and birds.
Sedgelands	

Infrastructure
Gazebo (1), Park Bench (4), Utility (13)

Signage
Information (3)

Fence

Fence:	789 m	Bent mesh
Low limestone wall:	141 m	

Paths

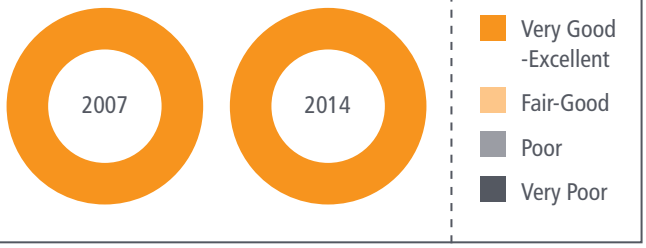
Boardwalk:	80 m	Good condition
Concrete:	668 m	Good condition

Major threat/issue	Action	Priority
TEC signs have fallen over and need replacing.	Repair and upgrade TEC signs.	Medium
Wire mesh of fence bent in a number of locations, would allow access by dogs to the wetland.	Repair bent sections of fence mesh.	Medium
Occasional infestation of Rose Geranium and Geraldton Carnation Weed around the edge of vegetation, weedy grasses within bushland.	Control weeds, including **Euphorbia terracina* throughout site.	High

Comparison to 2007

Viability ↑ 2007: 13.5 | 2014: 15

Bushland condition rating (%)



0 10 20 30 40 50
Metres

N

HIGH PRIORITY

CUD Swamp

Warnbro Sound Ave, Secret Harbour

Cud Swamp is a small reserve (2.56 ha) within a residential area that contains a number of walking trails, patches of lawn, a lookout and a children's playground.

The bushland within the reserve is fragmented by the trails and is predominantly degraded. The bushland varies from low coastal shrub species on dunes to *Melaleuca* woodland within low-lying dampland. The dampland areas have conservation value but require management to improve their condition and prevent further degradation. The reserve includes 0.31 ha of dampland vegetation within the centre of the site.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)

Conservation significant species

- None recorded.

Fauna habitat

Shrublands on dunes	Degraded, habitat for birds and reptiles.
Wetlands (*Melaleuca* forest)	Very small area, degraded, requires management. Potential habitat for quenda.

Infrastructure

Gate (1), Lookout (2), Park Bench (6), Recreation (1), Rubbish Bin (2), Utility (2)

Signage

Naming and Regulation (1)

Fence

Post (bollard):	511 m	Perimeter
Private fence:	38 m	Private property

Paths

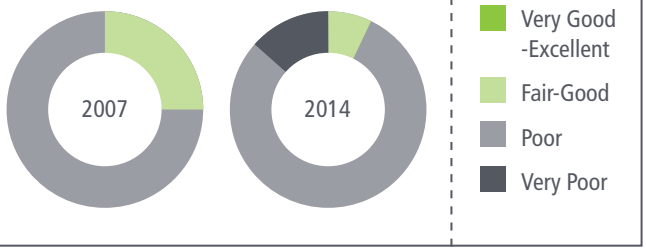
Mulch:	191 m	
Concrete:	288 m	
Limestone:	371 m	Path to lookout eroding, very poor condition

Major threat/issue	Action	Priority
Weeds outcompeting the native vegetation.	Weed control and revegetation within bushland areas, starting with the *Melaleuca rhaphiophylla* wetland.	High
Limestone path and lookout in poor condition. Safety hazard.	Repair limestone paths and lookout.	High
Public access to the dampland areas leading to further degradation of the area (requires fencing).	Fencing of bushland.	High

Comparison to 2007

Viability ↑ 2007: 0.75 | 2014: 8.38

Bushland condition rating (%)



0 10 20 30 40 50
Metres

N

HIGH PRIORITY

Dixon Road Conservation Precinct

Dixon Road, Rockingham

Dixon Road Conservation Precinct is a large area of remnant bushland (61.45 ha) with connections to Lakes Cooloongup and Walyungup to the south and Leda Conservation Reserve to the east. It is part of Bush Forever Site 356 and is also an environmental offset site. The reserve contains both Tuart woodlands and *Acacia rostellifera* shrublands, with limestone trails throughout used for cycling and walking. There is a European heritage site (abbatoir) on the western side, which is in disrepair and has been fenced off. A management plan was prepared for this reserve in 2013, in accordance with environmental offset conditions.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Black Berry Nightshade *(Solanum nigrum)*	●						●	●	●	●	●	●	Glyphosate 10ml/L/ Fluroxypyr, Kamba 5ml/L
Bridal Creeper *(Asparagus asparagoides)*							●	●					Glyphosate (10ml/L) and Metsulfuron 0.05g
Castor Oil Plant *(Ricinus communis)*	●							●	●	●	●	●	Glyphosate 10ml/L or Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)
Slender Thistle *(Carduus pycnocephalus)*						●	●	●	●	●	●		Glyphosate (10ml/L) and Metsulfuron 0.05g
Three-cornered Garlic *(Allium triquetrum)*						●	●						Glyphosate (10ml/L) and Metsulfuron 0.05g

Conservation significant species

- Potential Threatened Ecological Community 'Woodland over Sedgelands in Holocene Dune Swales'
- Flora: *Pimelea calcicola* (Priority 3)
- Fauna: potential foraging /breeding /roosting habitat for Black Cockatoos.

Fauna habitat

Woodland	Contains good quality fauna habitat with connections to other conservation areas.
Shrublands	

Infrastructure

Access Point (6), Gate (5), Other (1), Rubbish Bin (2), Utility (1)

Signage

Information (7), Naming (3), Regulation (7)

Fence

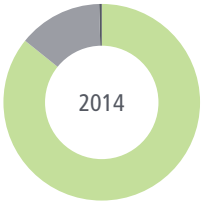
Post: 9,258 m — Mainly good condition but some wires missing

Paths

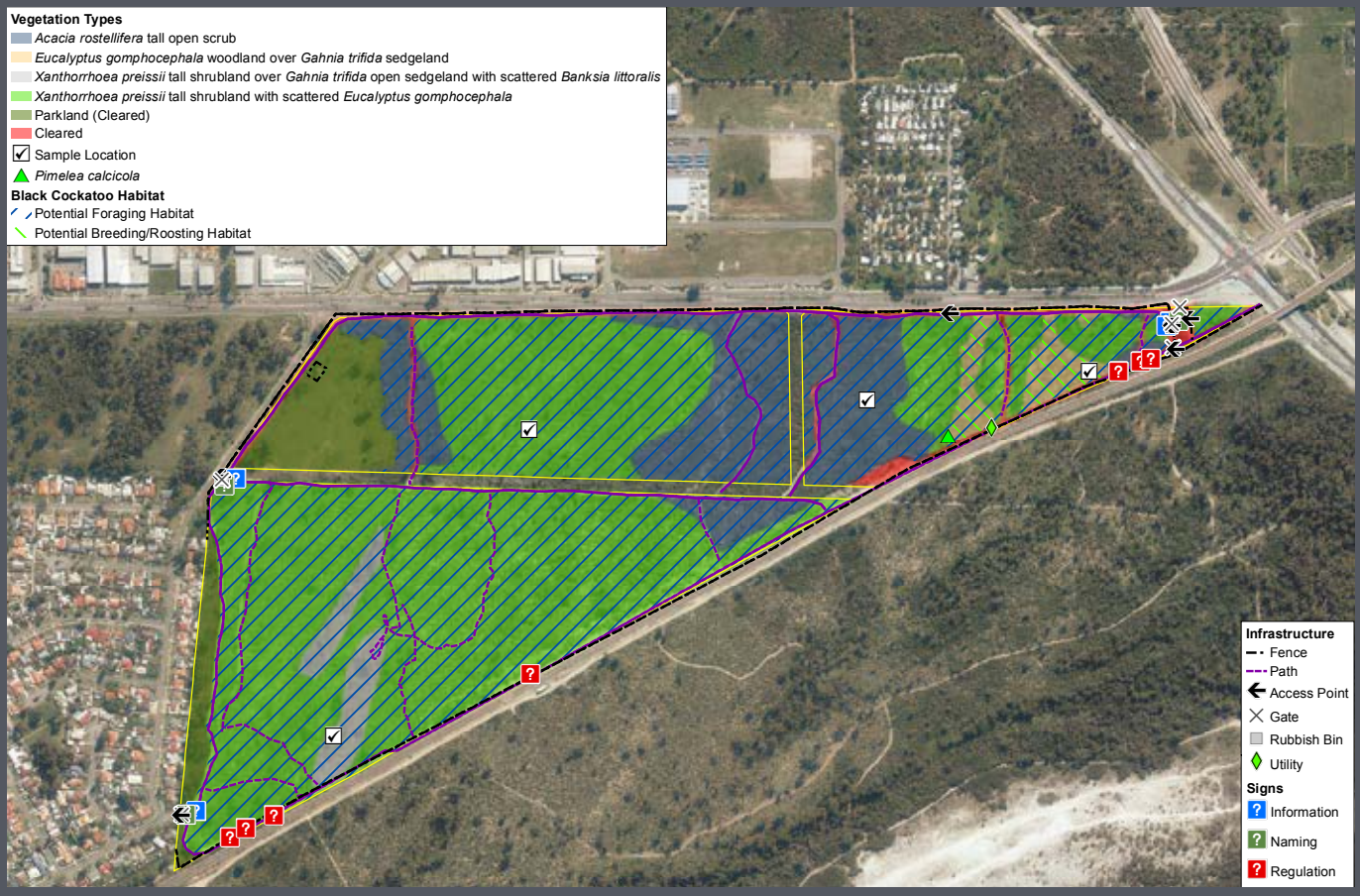
Limestone: 14,115 m — Good condition
Soil/sand: 843 m — In good condition, also some unauthorised tracks

Major threat/issue	Action	Priority
Areas dominated by weeds outcompeting natives.	Weed control, especially *Euphorbia terracina* and grassy weeds.	High
Degradation of bushland, including frequent fires.	Revegetation in degraded areas.	Medium
Unauthorised access to bushland and proliferation of tracks.	Revegetate, block and brush unauthorised tracks.	High
High frequency of fires that may have changed vegetation composition.	Prepare and implement fire management plan.	Medium
Decline and death of Tuart trees.	Monitor Tuart health to ensure further decline does not occur.	Medium
Heritage site in disrepair.	Determine management options.	Low

Bushland condition rating (%)



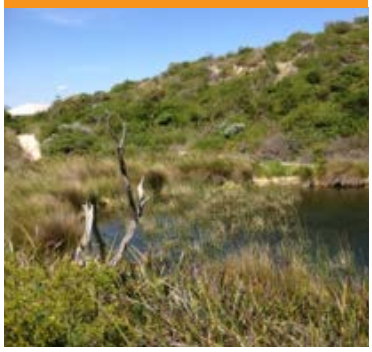
Very Good -Excellent
Poor
Fair-Good
Very Poor



0 60 120 180 240 300
Metres

N

MEDIUM PRIORITY



Hidden Swamp

Secret Harbour Blvd, Secret Harbour

Hidden Swamp is a small coastal reserve (3.24 ha) adjacent to a residential area, containing sandy walking trails and a lookout. Within the reserve is a lake surrounded by fringing sedgeland, which connects through toa larger lake in Secret Harbour Foreshore.

The coastal scrub within the reserve is generally in good condition and ranges from shrubland on the steep dunes to a sedgeland community. The reserve includes 0.11 ha of open water, with 0.05 ha of fringing sedgeland surrounding the lake.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Dune Onion Weed *(Trachyandra divaricata)*						●	●	●	●				Glyphosate 10mL/L
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)
Olive *(Olea europaea)*	●	●	●	●	●	●							Glyphosate (cut and paint) or Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30
Rose Pelargonium *(Pelargonium capitatum)*						●	●	●	●	●			Glyphosate 10ml/L Mets 0.05g
Typha *(Typha orientalis)*	●	●	●							●	●	●	Glyphosate paint or during flowering period cut 15cm below water surface
Veldt Daisy *(Dimorphotheca ecklonis)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L

Conservation significant species

- Threatened Ecological Community 'Sedgelands in Holocene Dune Swales'.

Fauna habitat

Open water	Waterbird habitat, lake connects through to adjacent larger lake.
Sedgelands	Bushland birds and reptiles, habitat refuge.
Shrublands with perching habitat	Bushland birds, high numbers of honeyeaters noted.

Infrastructure
Gate (2), Lookout (1)

Signage
Information (4), Naming (3), Regulation (7)

Fence

Boardwalk:	42 m	Stairs to lookout
Mulch:	94 m	Mulch
Soil/sand:	734 m	

Paths

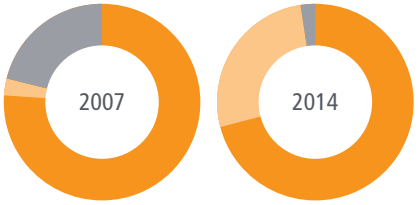
Low limestone wall:	77 m	Along road
Private fences:		Along properties

Major threat/issue	Action	Priority
Rubbish dumping.	Erect signs informing public of sensitive conservation area and TEC.	High
High risk of erosion in dunes. At present there does not appear to be any major issue, but vigilance required to make sure no proliferation of unauthorised tracks.	Brushing and infill planting of unauthorised tracks on north east side of reserve.	High
Weed invasion adjacent to road and lake.	Ongoing weed management.	Medium

Comparison to 2007

Viability ↑ 2007: 13.18 | 2014: 14.28

Bushland condition rating (%)



0 10 20 30 40 50
Metres

N

HIGH PRIORITY

Karnup School Site

Baldivis and Karnup Road, Baldivis

Karnup School Site is a small (2 ha) reserve located on the southern side of Karnup Road. This reserve is predominantly native bushland (Jarrah-Marri-*Banksia*-Sheoak woodland) but also contains a carpark and cleared picnic area with planted trees. The historic site was the former location of Karnup School and Teachers Quarters; an information sign is present within the picnic area. The picnic area is cleared with weedy grasses and herbs in the understorey, and planted Peppermint (*Agonis flexuosa*) as shade trees. The reserve is part of Bush Forever Site 376.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Hottentot Fig *(Carpobrotus edulis)*						●	●	●	●	●			Glyphosate 10ml/L
Rose Pelargonium *(Pelargonium capitatum)*						●	●	●	●	●			Glyphosate 10ml/L Mets 0.05g
Tagasaste *(Chamaecytisus palmensis)*			●	●	●	●	●	●	●				Metsulfuron 0.05g, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30

Conservation significant species

- Potential foraging/breeding/roosting habitat for Black Cockatoos.

Fauna habitat

Woodland	High value fauna habitat with good connectivity.

Infrastructure

Carpark (1), Gate (1), Gazebo (2), Picnic Table (2), Recreation (1), Utility (1)

Signage

Information (1), Regulation (3)

Fence

Fence:	395 m	
Post (bollard):	77 m	Some in poor condition

Paths

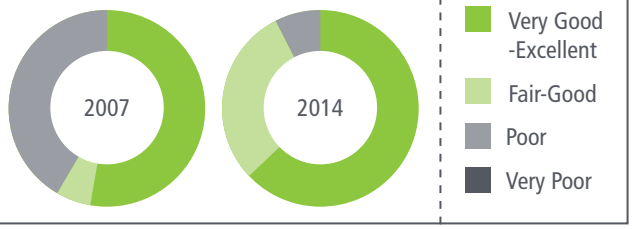
Mulch:	977 m	Includes paths in adjacent reserves
Soil/sand:	108 m	

Major threat/issue	Action	Priority
Picnic area is rundown and is lacking toilet facilities.	Purpose of the reserve needs to be assessed, if for recreation/as a picnic area then bathrooms should be built.	Medium
Information signs are damaged and hard to read.	Information signs need upgrading.	Medium
Isolated area – dumping of rubbish could be a problem.	Upgrading of bollards around carpark to prevent access to bushland.	High
Weeds throughout bushland, including Watsonia, Tagasaste. Small site surrounded by private property, which can be a source of weeds.	Control Tagasaste infestations around carpark and weed control throughout bushland.	High

Comparison to 2007

Viability ↑ 2007: 17.83 | 2014: 19.87

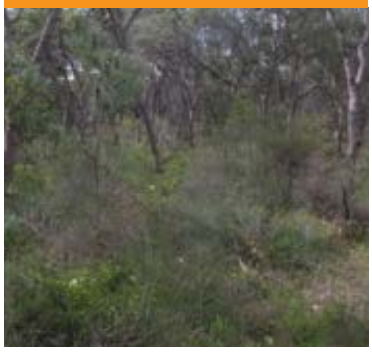
Bushland condition rating (%)



0 10 20 30 40 50
Metres

N

MEDIUM PRIORITY



Karnup Townsite

Karnup Road, Baldivis

Karnup Townsite (12.86 ha) is a bushland reserve in excellent condition, with significant conservation value in relation to fauna habitat and floral species diversity. There is one firebreak that passes through the centre of the reserve that is used as a walking trail, with connections to an interpretive trail that is located directly adjacent to the reserve within the Tramway. The Tramway reserve is contiguous with Karnup Townsite and management should be consolidated.The reserve contains Jarrah-Marri-*Banksia* woodland, with changes in soil and fire regimes leading to minor changes in vegetation structure and composition across the site. This reserve is part of Bush Forever Site 376.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Hottentot Fig *(Carpobrotus edulis)*						●	●	●	●	●			Glyphosate 10ml/L

Conservation significant species

- Potential foraging/breeding/roosting habitat for Black Cockatoos.

Fauna habitat

Woodland	Excellent fauna habitat for a range of species, including large habitat trees. Good habitat connectivity. Very high value.

Infrastructure

Access Point (2), Gate (3), Other (2), Park Bench (3), Utility (2)

Signage

Information (11), Naming (3) (in adjacent reserve but should be managed holistically)

Fence

Fence:	377 m	Good condition
	566 m	Poor condition - fence burnt

Paths

Mulch:	977 m	Includes paths in reserves adjacent
Soil/sand:	108 m	

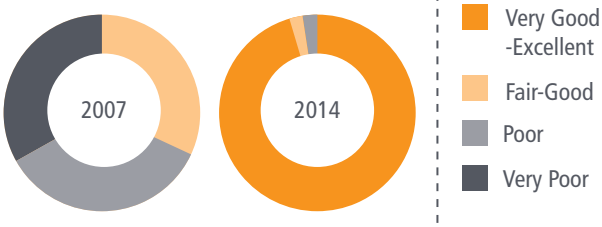
Major threat/issue	Action	Priority
Dieback spread - boot cleaning station is present at the entrance of the nature walk (Tramway), but may be more effective if it was placed directly at the access point.	Manage Karnup Townsite reserve in association with the Tramway reserve directly adjacent.	Medium
Weed incursion from the road reserve.	Manage weeds around edges.	High
Some fencing in disrepair.	Repair fence on boundary along Karnup Road and on eastern boundary.	High

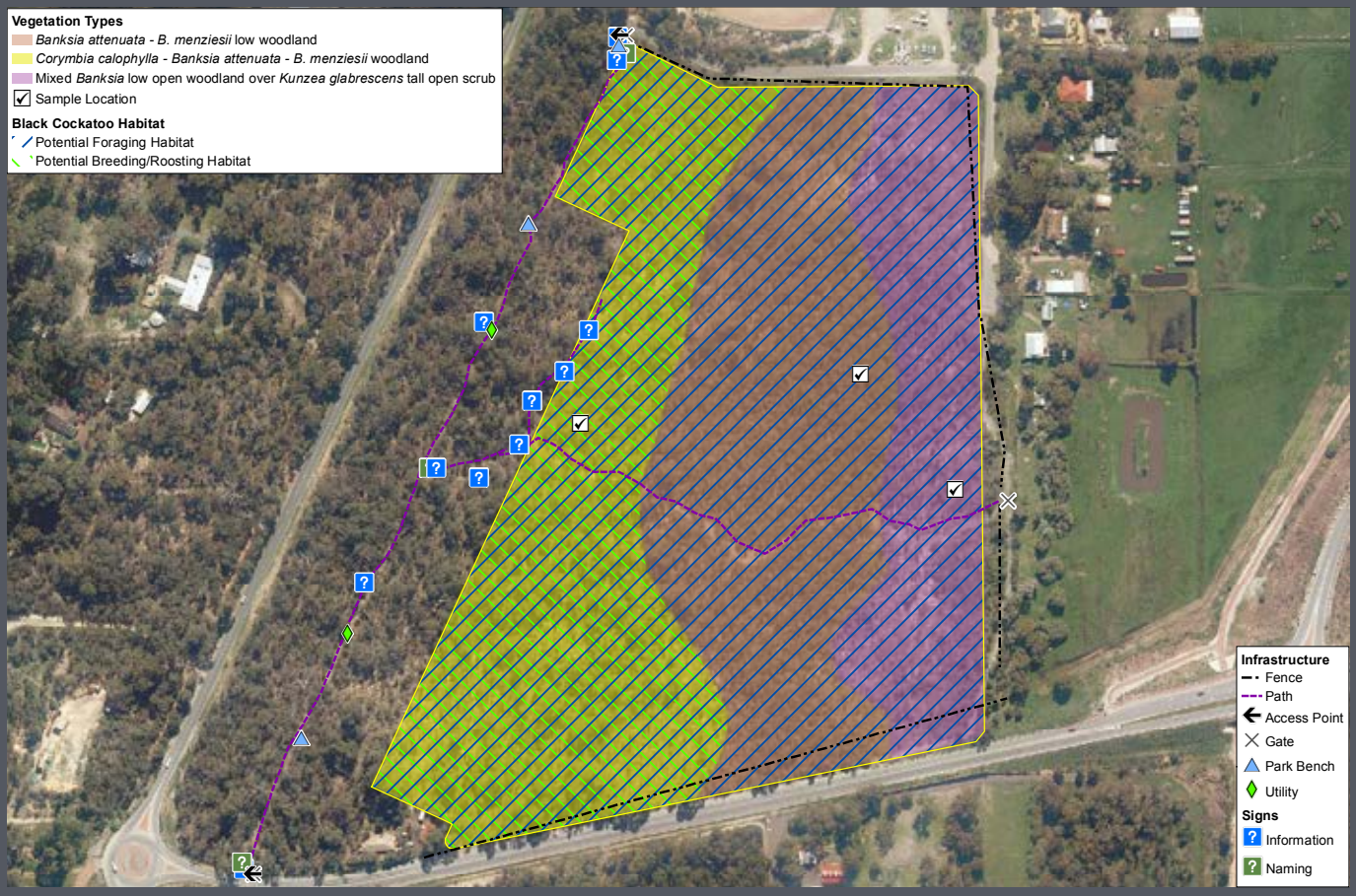
Comparison to 2007

Viability ↑ 2007: 18.8 | 2014: 22.42

Previous survey had been undertaken post-fire

Bushland condition rating (%)





0 25 50 75 100 125
Metres

N

HIGH PRIORITY

Kinsdale Bend

Port Kennedy

Kinsdale Bend is a very small reserve (0.56 ha) within a residential area. The reserve contains some cleared areas, including lawns and landscaped areas that have been planted with native species on the western side.The eastern part of the reserve contains bushland, including a sedgeland within a low-lying dampland. Above the dampland is a dune with coastal shrubland, areas of which are degraded with limited native vegetation cover. Some revegetation works have been undertaken on this dune. There is a walking trail around the west side of the bushland and a small viewing platform overlooking the dampland.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)

Conservation significant species

- Threatened Ecological Community: 'Sedgelands in Holocene Dune Swales'.

Fauna habitat

Shrublands	Good quality habitat, particularly for reptiles and small birds.
Sedgelands	

Infrastructure
Gate (1), Lookout (1), Utility (6)

Signage
Information (3)

Fence

Fence:	130 m
Low limestone wall:	80 m
Private fences:	87 m

Paths

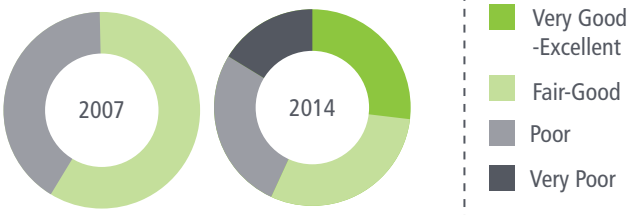
Concrete:	193 m	Good condition
Firebreak:	86 m	Good condition

Major threat/issue	Action	Priority
Degraded dunes adjacent to TEC.	Continue weed control and revegetation of dune above TEC.	Medium
TEC signs degraded.	Replace TEC signs.	High

Comparison to 2007

Viability ↑ 2007: 13.5 | 2014: 15

Bushland condition rating (%)



0 7 14 21 28 35
Metres

N

HIGH PRIORITY

Lewington Reserve

Lewington Road, Rockingham

Lewington Reserve is a large (21 ha) reserve situated within coastal dunes. While the majority of this reserve is bushland, recreational areas occur in the south-west of the site and include lawns, children's playgrounds and parkland.

The bushland area of the reserve has been disturbed in the past and includes previously cleared areas and an old rail trail. The reserve supports coastal shrubland vegetation with patches of Tuarts. Weed infestations are present through the reserve.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Bridal Creeper *(Asparagus asparagoides)*							●	●					Glyphosate (10ml/L) and Metsulfuron 0.05g
Century Plant *(Agave americana)*	●	○	○	○	○	○	○	○	○	○	●	●	Tordon, manual removal
Narrowleaf Cottonbush *(Gomphocarpus fruticosus)*	○	○	○	○	○	○	○	○	●	●	●	●	Glyphosate 10ml/L cut paint, manually remove
Pepper Tree *(Schinus terebinthifolius)*	●	●	○									●	Glyphosate 10ml/L, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Rose Pelargonium *(Pelargonium capitatum)*						●	●	●	●	●			Glyphosate 10ml/L Mets 0.05g
Veldt Daisy *(Dimorphotheca ecklonis)*	○	○	○	○	○	○	○	○	○	○	○	○	Glyphosate 10ml/L
Victorian Tea-tree (Leptospermum laevigatum)	○	○	○	○	○	○	●	●	●	●	○	○	Triclopyr/Picloram, Glyphosate spot spray, manual removal

Conservation significant species

- None recorded.

Fauna habitat

Shrublands	Tuart woodland and shrubland good habitat for bushland birds and reptiles.
Woodlands	

Infrastructure

Gate (3), Other (3), Park Bench (2), Recreation (1), Rubbish Bin (1), Utility (5)

Signage

Information (1), Naming and Regulation (1), Regulation (3)

Fence

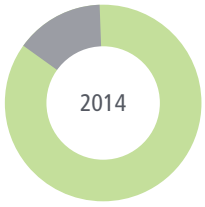
Post: 1,260 m Around perimeter

Paths

Limestone: 932 m
Soil/sand: 983 m Includes unauthorised tracks

Major threat/issue	Action	Priority
Substantial weed infestations, particularly of Pepper Tree *(Schinus terebinthifolius)*.	Large scale weed monitoring program required, with emphasis on the infestations of *Schinus terebinthifolius* throughout the site.	High
Degraded vegetation.	Revegetation with native species, conducted in conjunction with the weed management program.	High
Rubbish and dumped material throughout site.	Rubbish removal, particularly along southern boundary.	Medium

Bushland condition rating (%)



Very Good -Excellent
Fair-Good
Poor
Very Poor

0 50 100 150 200 250
Metres

N

MEDIUM PRIORITY

Mandurah Hill

Crystaluna Drive, Golden Bay

Mandurah Hill is a small reserve (1 ha) that is situated on a high dune. This site contains an antenna and associated buildings. There is a gated road up to the antenna site and access is restricted with a high security fence. From the carpark there is a steep walking trail that winds up the hill to a lookout with views over the surrounding area. The walking trail and lookout are utilised by local residents.

The rest of the site consists of coastal shrubland that is generally in good condition; however erosion on the steep, sandy slopes is an issue in some areas.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Fumitory *(Fumaria capreolata)*						●	●	●	●				Metsulfuron 0.05g/Pulse
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)

Conservation significant species

- None recorded.

Fauna habitat

Shrubland	Habitat for small bushland birds.

Infrastructure

Access Point (1), Carpark (2), Gate (1), Lookout (1), Other (1), Park Bench (4), Utility (2)

Signage

Naming and Regulation (1)

Fence

Fence: 283 m Good condition

Paths

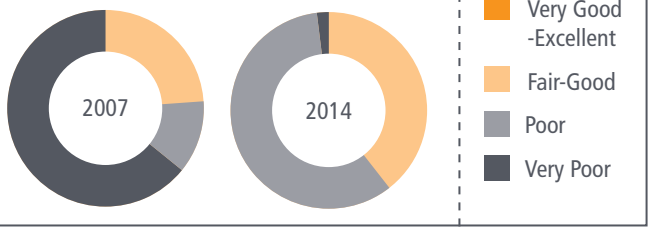
Firebreak: 164 m sandy
Bitumen: 102 m
Road: 121 m gated

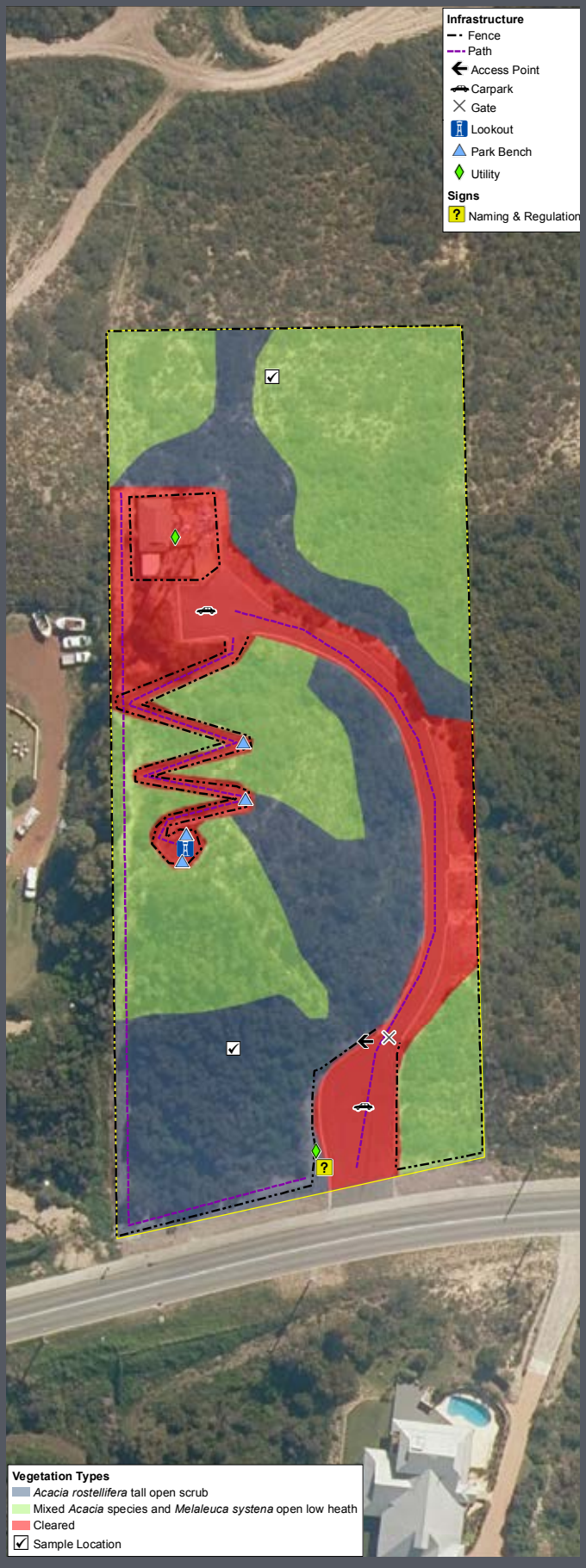
Major threat/issue	Action	Priority
Steep dunes, with erosion issues.	Continue ongoing erosion controls, including brushing of degraded, steep dunes.	Medium
Degraded vegetation, High rabbit use area, will affect any revegetation works.	Revegetation of degraded areas.	High
Litter at lookout.	Rubbish removal at lookout.	Low
Fences damaged around carpark and on north and east side.	Repair fences on northern and western boundary.	Low

Comparison to 2007

Viability ↓ 2007: 7.44 | 2014: 8.26

Bushland condition rating (%)

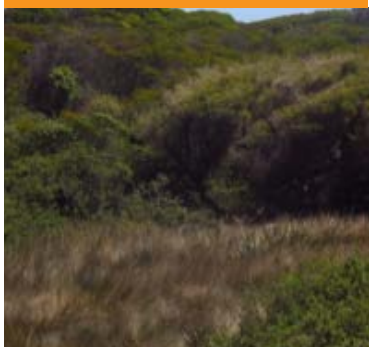




0 6.5 13 19.5 26 32.5
Metres

N

MEDIUM PRIORITY



Marillana Nature Reserve

Crystaluna Drive, Golden Bay

Marillana Nature Reserve is a small (1.27 ha) coastal reserve situated within a larger area of remnant vegetation. The vegetation within the reserve is in excellent condition and includes a Threatened Ecological Community. There is a 4WD track that runs past this reserve, with a small, overgrown track that runs into the reserve. No other tracks are present in the reserve and so public access is limited. The isolation of this reserve has assisted in the preservation of its ecological values.

Ideally, the vegetation surrounding the reserve should also be placed into conservation estate and these areas should be jointly managed to prevent degradation. If the surrounding area is developed, significant management measures will be required to prevent degradation of this reserve.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
None present.													

Conservation significant species

- Threatened Ecological Community 'Sedgelands in Holocene Dune Swales'
- Flora: *Sphaerolobium calcicola* (Priority 3).

Fauna habitat

Coastal shrubland on dunes	Vegetation is in excellent condition and provides excellent habitat for small birds, including honeyeater species.
Sedgeland	Includes habitat for larger mammals, including kangaroos and reptiles.

Infrastructure
N/A

Fence
N/A

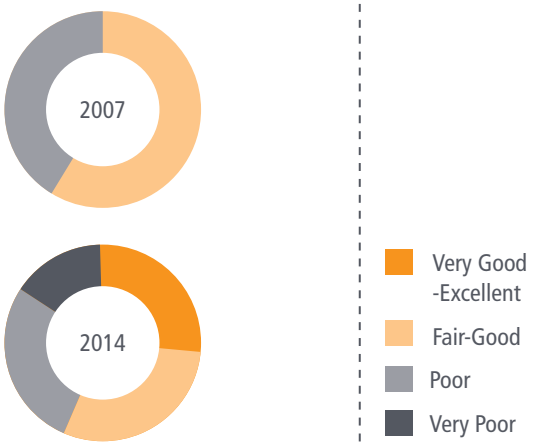
Signage
N/A

Paths
N/A

Comparison to 2007

Viability ↑ 2007: 15.5 | 2014: 20

Bushland condition rating (%)



Major threat/issue	Action	Priority
This reserve is an isolated patch of bush within a larger bushland area.	The management of this reserve needs to consider the surrounding natural areas. The entire coastal strip should be reserved and managed as one reserve to enable best use of resources.	High
At present there are no major tracks in the reserve, one small section of 4WD track which is regrowing. The lack of tracks is assisting in the conservation of this reserve. Access should be restricted.	Public access should continue to be prevented from this site, this will required management of access throughout the wider bushland.	High
Potential degradation of site from increased public use of area.	Erection of signs in surrounding area educating the community on the sensitivity of the environment and the importance of staying to tracks.	Medium

0 10 20 30 40 50
Metres

N

MEDIUM PRIORITY

Rockingham Road Conservation Reserve

Rockingham Road, Rockingham

Rockingham Road Conservation Reserve is a coastal reserve (6.67 ha) on the northern boundary of the City of Rockingham. The reserve includes recreational areas (parkland and picnic areas) as well as coastal shrubland on dunes. The southern section of shrubland is generally in good condition. Revegetation works have been undertaken within the more degraded areas. The northern section of dunes, around the northern carpark, is in a degraded condition. Revegetation works are required to improve the condition of this vegetation.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Black Berry Nightshade *(Solanum nigrum)*	●						●	●	●	●	●	●	Glyphosate 10ml/L/ Fluroxypyr, Kamba 5ml/L
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)

Conservation significant species

- None recorded.

Fauna habitat

Shrublands	Good habitat for bushland birds and sand dunes for burrowing reptiles.
Planted Eucalypts	In parkland, offer habitat to species including nesting birds.

Infrastructure

Carpark (1), Gate (2), Gazebo (3), Other (3), Park Bench (3), Recreation (3), Rubbish Bin (3), Toilet (1), Utility (3), Water Fountain (1)

Signage

Information (2), Regulation (10)

Fence

Fence:	1536 m	Fence through vegetation
Post:	608 m	overgrown

Paths

Concrete:	95 m	Some in poor condition
Soil/sand:	106 m	Some in poor condition

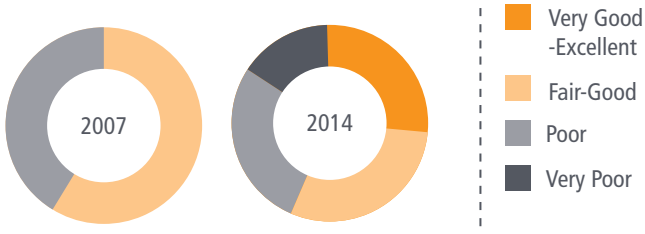
Major threat/issue	Action	Priority
Weeds are dominant in some sections.	Maintain revegetation in southern corner of the reserve, including weed and rabbit control.	Medium
Northern sector of site is highly degraded with some areas containing little native vegetation.	Consider revegetation of dunes in northern sector of site.	Medium
Erosion within coastal path in northern section.	Fix path.	Medium

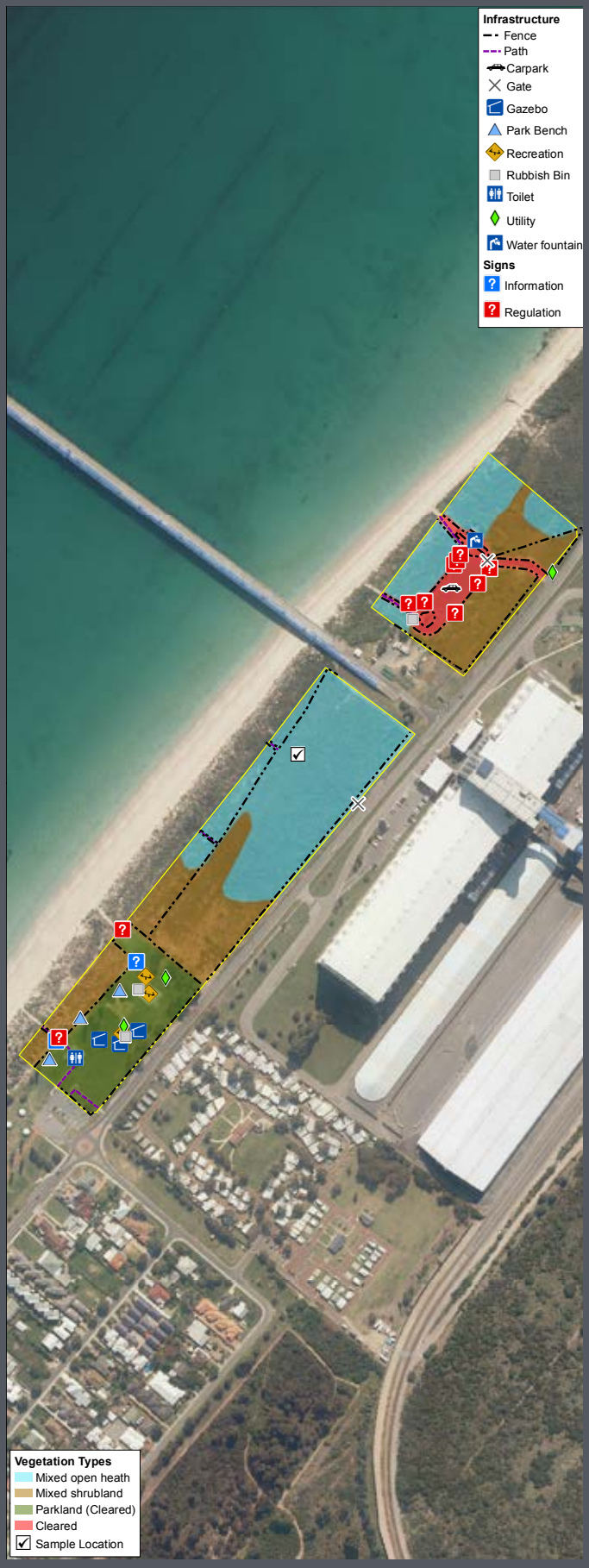
Comparison to 2007

Viability ↑ 2007: 14.52 | 2014: 13.62

Reserve area has increased since 2007 and includes a degraded area in the north

Bushland condition rating (%)





0 30 60 90 120 150
Metres

N

HIGH PRIORITY

Sawley Close Nature Reserve

Sawley Close, Golden Bay

Sawley Close (4.83 ha) is a bushland reserve that contains upland and wetland areas and has good habitat for fauna species. This reserve is directly north of Trenant Park and the vegetation between the two reserves is contiguous. The fencing in Sawley Close is in poor condition and there are a number of 4WD tracks through the site that are used for dumping rubbish.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Double Gee *(Emex australis)*					●	●	●	●					Glyphosate 10ml/L
Fig *(FIcus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Narrowleaf Cottonbush *(Gomphocarpus fruticosus)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L cut paint, manually remove

Conservation significant species

- Threatened Ecological Community 'Sedgelands in Holocene Dune Swales'
- Potential foraging/breeding/roosting habitat for Black Cockatoo species.

Fauna habitat

Woodland	Includes both Tuart woodland, which contains potential foraging habitat for Black Cockatoo species and *Melaleuca* woodland in wetlands.
Shrubland	Includes both *Acacia* shrubland on tall dunes and low-lying shrublands in damplands. Provides diverse habitat for bushland birds and reptiles.

Infrastructure
None

Signage
None

Fence
Fence: Broken and loose in a number of areas

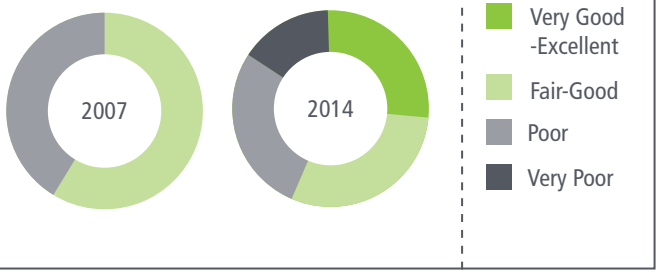
Paths
Firebreak: 1,226 m Some overgrown
Soil/sand: 146 m Some unauthorised tracks

Major threat/issue	Action	Priority
Unauthorised access, including 4WDs .	Fence reserve, particularly north-eastern boundary next to Mandurah Road and south-western, off Sawley Close.	High
Rubbish dumping throughout reserve.	Rubbish removal.	High
Invasive weeds throughout reserve.	Weed control, particularly *Ficus carica.*	High
Large number of tracks throughout reserve.	Consolidate tracks and block off unnecessary tracks.	Medium

Comparison to 2007

Viability ↑ 2007: 14.89 | 2014: 17.51

Bushland condition rating (%)



0 10 20 30 40 50
Metres

N

HIGH PRIORITY

Secret Harbour Foreshore

Secret Harbour Boulevard, Secret Harbour

Secret Harbour Foreshore is a large coastal reserve (66.98 ha) that runs parallel to Secret Harbour beach and includes a wide patch of remnant vegetation in the north of the reserve. The vegetation in the north of the reserve is in excellent condition; however much of the vegetation along the foredunes is degraded and weed coverage is high. This reserve is a highly utilised recreational area and there are large numbers of paths, picnic areas and other recreational nodes. There is an artificial lake in a parkland area in the centre of the site which is surrounded by landscaped patches of vegetation.

The City's Foreshore Strategy (2012) includes Secret Harbour Foreshore and the northern section of the reserve is part of Bush Forever Site 377.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Marram Grass *(Ammophila arenaria)*			●	●	●				●	●	●		Glyphosate 10ml/L

Conservation significant species

- None recorded.

Fauna habitat

Coastal shrublands on foredunes	Includes habitat for coastal species, including shorebirds.
Shrublands on taller dunes	Good habitat for bushland birds and reptiles.
Open water	Artificial wetland provides habitat for waterbird species and amphibians.

Infrastructure

Access Point (2), Carpark (2), Drain Outlet (1),Gate (3), Gazebo (1), Lookout (5), Other (10), Park Bench (18), Picnic Table (12), Recreation (5), Rubbish Bin (11), Toilet (1), Utility (4), Water Fountain (7)

Signage

Information (1), Naming (1), Naming and Regulation (14), Regulation (18)

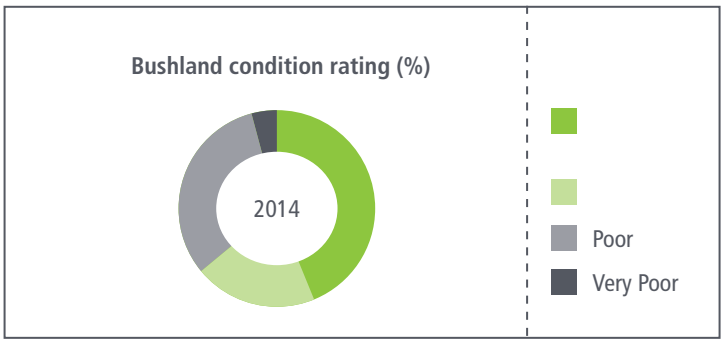
Fence

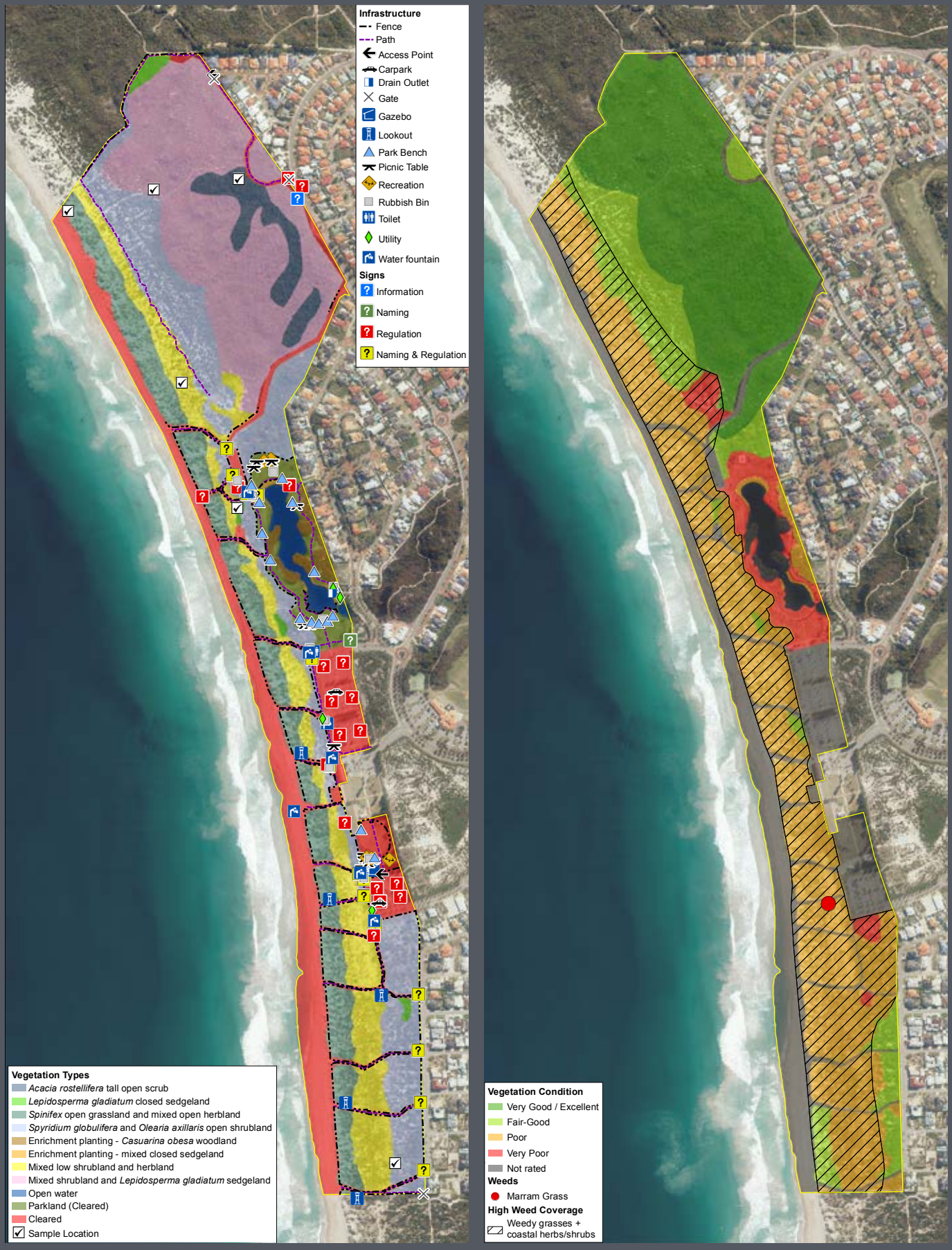
Fence:	7,674 m	Some poor condition
Post:	156 m	
Low limestone wall:	835 m	

Paths

Concrete:	2,404 m	
Firebreak:	413 m	
Limestone:	21 m	
Mulch:	44 m	
Soil/Sand:	1,149 m	Affected by sand accretion

Major threat/issue	Action	Priority
Trampling of dunes, particularly in northern section of reserve, Significant weed infestation on foredunes.	Revegetate dunes, including weed control in site preparation. Revegetate edges adjacent to good quality vegetation.	High
Rubbish.	Remove rubbish in artificial lake.	High





0 60 120 180 240 300

Metres

N

HIGH PRIORITY

Shoalwater Foreshore

Arcadia Drive, Shoalwater

Shoalwater Foreshore is a narrow reserve (47.38 ha) adjacent to the beach. The reserve has high recreational usage and includes a number of facilities, including Penguin Island Café, picnic benches and gazebos.The vegetation within the reserve has been degraded by past activities and is weedy; however there has been some natural regeneration as well as assisted revegetation which have improved the vegetation condition. The City's Foreshore Strategy (2012) includes Shoalwater Foreshore and the reserve is part of Bush Forever Site 355.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Dune Onion Weed *(Trachyandra divaricata)*						●	●	●	●				Glyphosate 10ml/L
Garden Nasturtium *(Tropaeolum majus)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L
Geraldton Carnation Weed *(Euphorbia terracina)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L or (metsulfuron 0.02g amongst natives)
Olive *(Olea europaea)*	●	●	●	●	●	●				●	●	●	Glyphosate (cut and paint) or Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30
Pepper Tree *(Schinus terebinthifolius)*	●	●	●									●	Glyphosate 10ml/L, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30

Conservation significant species

- None recorded.

Fauna habitat

Coastal shrublands on foredunes	Includes habitat for coastal species, including shorebirds.
Shrublands on taller dunes	Good habitat for bushland birds and reptiles.

Infrastructure

Bubble-up (3), Carpark (4), Drain Outlet (4), Gate (2), Gazebo (4), Other (3), Park Bench (30), Recreation (3), Rubbish Bin (13), Toilet (1), Utility (10), Water fountain (2)

Signage

Information (19), Naming (4), Naming and Regulation (14), Regulation (12)

Fence

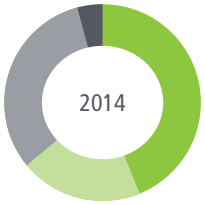
Fence:	2,480 m	Some poor condition
Post:	388 m	
Low limestone wall:	27 m	

Paths

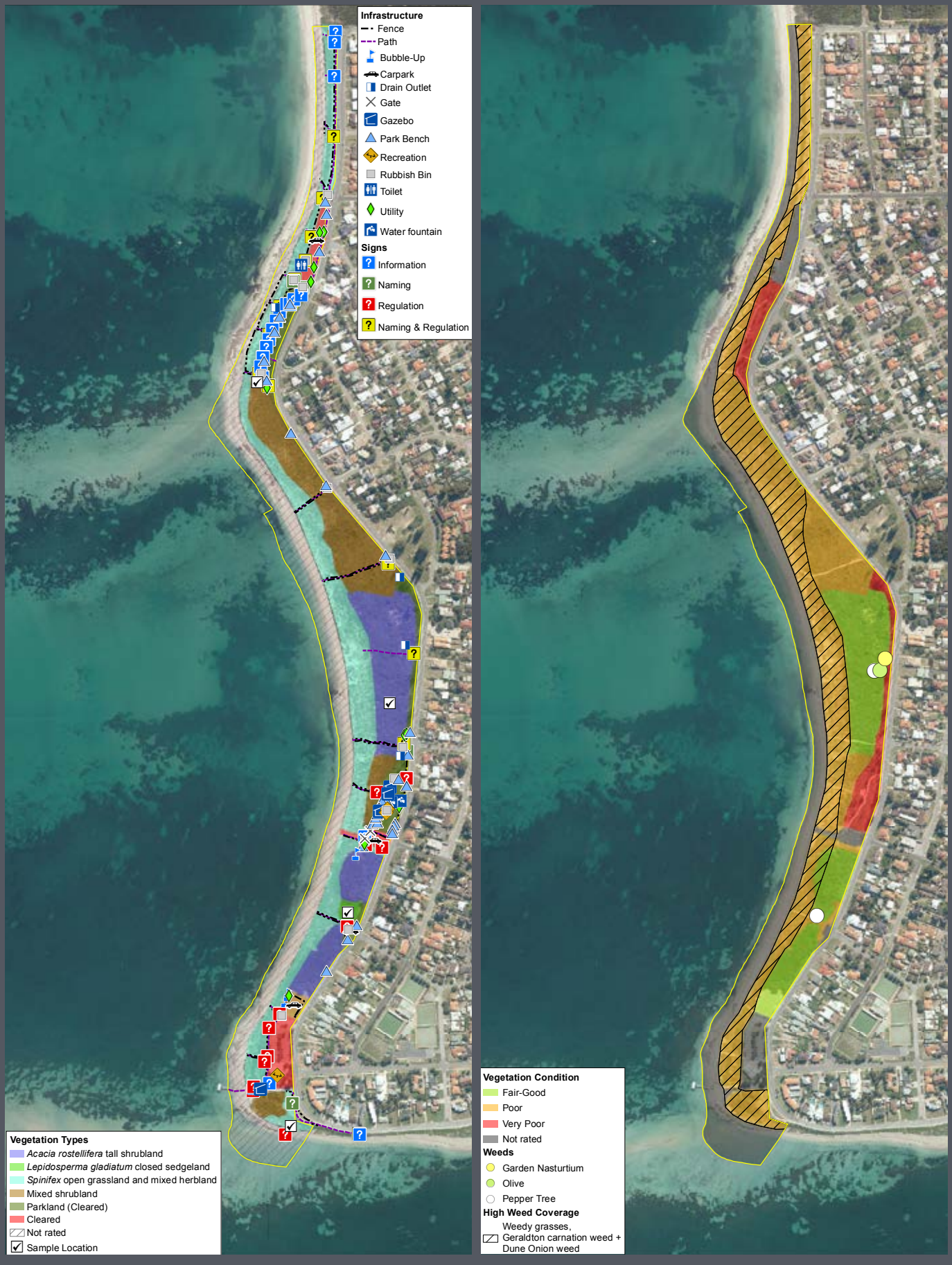
Boardwalk:	43 m	
Concrete:	1,390 m	
Limestone:	211 m	
Soil/sand:	603 m	Affected by sand accretion

Major threat/issue	Action	Priority
Significant weed infestation along dunes.	Revegetation of degraded dunes, including weed control.	Medium
Degraded dunes lacking vegetation cover leading to coastal erosion.	Discourage trampling through dunes by signs informing the public of the sensitive nature of the environment and by fencing sensitive areas.	High
Scour from drains impacting vegetation.	Engineering solutions may need to be considered.	Medium

Bushland condition rating (%)



- Very Good -Excellent
- Fair-Good
- Poor
- Very Poor



0 50 100 150 200 250
Metres

N

HIGH PRIORITY

Tamworth Hill Swamp

Safety Bay Road and Nairn Drive, Baldivis

Tamworth Hill Swamp is a large (66 ha) reserve. A management plan has been prepared for this environmental offset site, which includes measures such as revegetation. The implementation of this plan has commenced and is an ongoing commitment. The reserve has high value as it contains a Conservation Category Wetland, is part of Bush Forever Site 356 and the Rockingham Lakes Regional Park. The reserve is adjacent to a large area of bushland to the north and therefore forms part of a fauna habitat corridor. Approximately 19.53 ha of the reserve has been previously cleared and contains only a few scattered native trees. The revegetation of this area is included in the commitments of the management plan.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Arum Lily *(Zantedeschia aethiopica)*							●	●	●				Glyphosate 10ml/L Metsulfuron 0.05g
Apple of Sodom *(Solanum linnaeanum)*	●						●	●	●	●	●	●	Glyphosate 10mL/L, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Castor Oil Plant *(Ricinus communis)*	●							●	●	●	●	●	Glyphosate 10ml/L or Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Narrowleaf Cottonbush *(Gomphocarpus fruticosus)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L cut paint, manually remove
Oleander *(Nerium oleander)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate (cut and paint) or Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Pampas Grass *(Cortaderia selloana)*							●	●	●	●	●		Fusilade 10ml/L
Red Ink Plant *(Phytolacca octandra)*										●	●	●	Glyphosate 10ml/L
Typha*(Typha orientalis)*	●	●	●							●	●	●	Glyphosate paint or during flowering period cut 15cm below water surface

Conservation significant species

- None recorded.

Fauna habitat

Woodland Sedgeland	Includes Flooded Gum Woodland and *Melaleuca* woodland in depressions, offers habitat for a variety of mammal, bird, reptile and amphibian species that require wetland habitat, as well as macroinvertebrate species.

Major threat/issue	Action	Priority
Cleared area around perimeter of reserve, which is dominated by weeds. BMX track and rubbish dumping.	Continue to implement the Management Plan and ensure that the outcomes are met, including the revegetation commitments.	High
Significant weed infestations within wetland, including aggressive weeds such as *Cortaderia selloana.*	Control the aggressive weeds present in the wetland, including *Cortaderia selloana, Ficus carica, Gomphocarpos fructicosus.*	High

Infrastructure

Access Point (3), Gate (3)

Fence

Fence: 4,003 m Perimeter fence in good condition, some old farm fencing through wetland

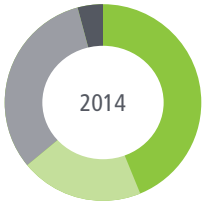
Signage

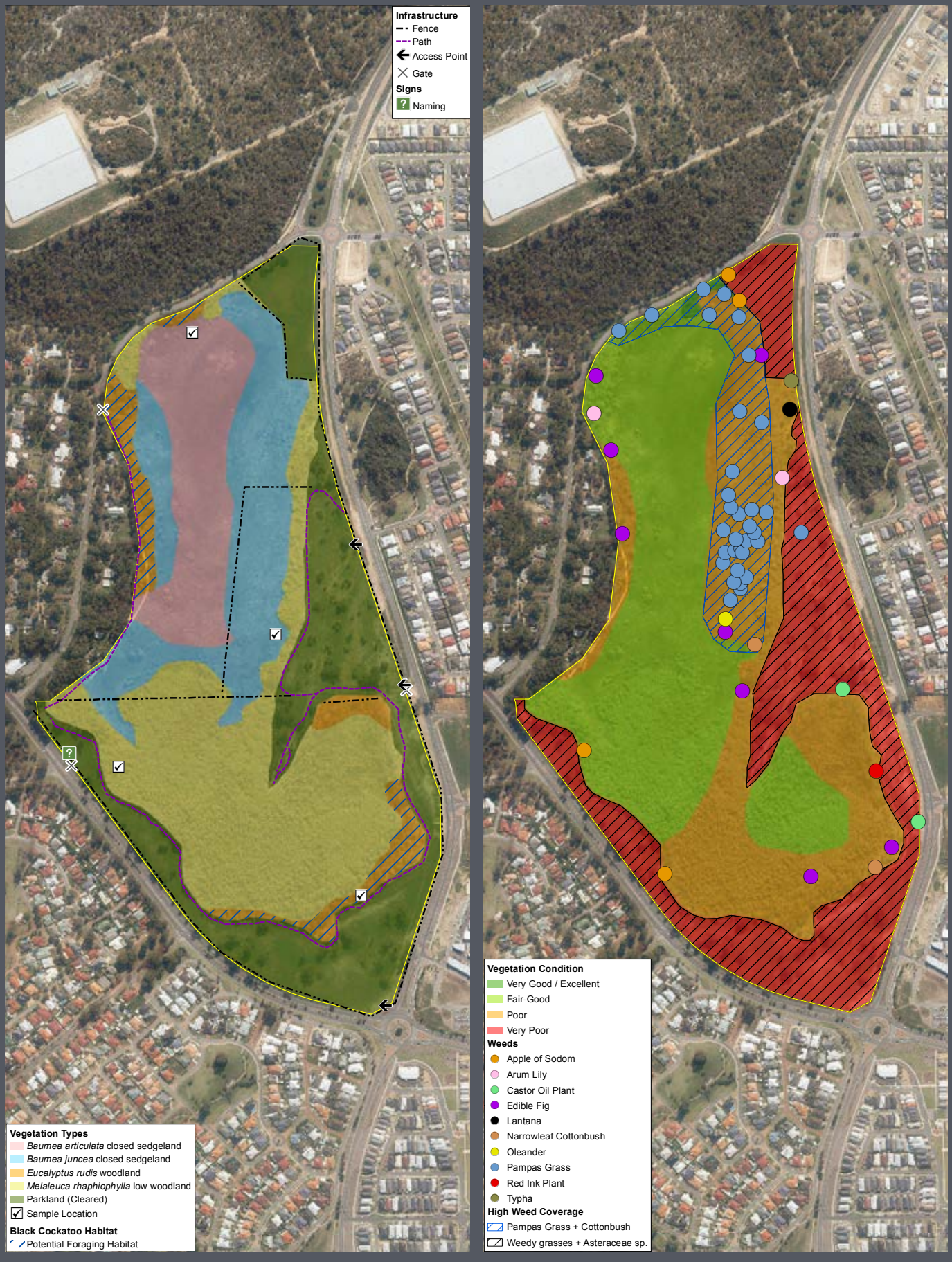
Naming (1)

Paths

Soil/sand: 2,248 m
Firebreak: 659 m

Bushland condition rating (%)





0 50 100 150 200 250
Metres

N

MEDIUM PRIORITY

Trenant Park

Dampier Drive, Golden Bay

Trenant Park (7.47 ha) encompasses a wetland which is comprised of a number of vegetation types including TEC sedgeland and *Melaleuca* woodland. Fringing the wetland on higher ground to the west is a patch of Tuart woodland. There are a number of large, old Tuarts in the reserve, some of which have artificial nesting boxes attached. The reserve has high value as fauna habitat, particularly as there is a direct connection with Sawley Close to the north.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Fig *(*Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Narrowleaf Cottonbush *(*Gomphocarpus fruticosus)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L cut paint, manually remove

Conservation significant species

- Threatened Ecological Community 'Sedgelands in Holocene Dune Swales'
- Potential foraging/breeding/roosting habitat for Black Cockatoos.

Fauna habitat

Sedgeland	Includes sedgelands in damplands which offers habitat for a variety of mammal, bird, reptile and amphibian species that require wetland habitat, as well as macroinvertebrate species.
Woodlands	Includes Tuart woodland which provides habitat for a number of bushland birds, including potential foraging/breeding/ roosting habitat for Black Cockatoos. Also includes *Banksia* woodland and *Melaleuca* woodland in damplands.

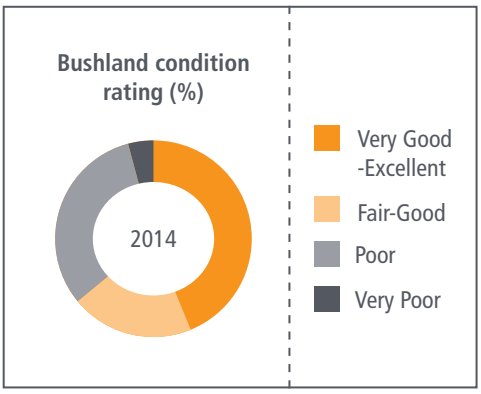
Infrastructure
Access Point (3), Gate (3)

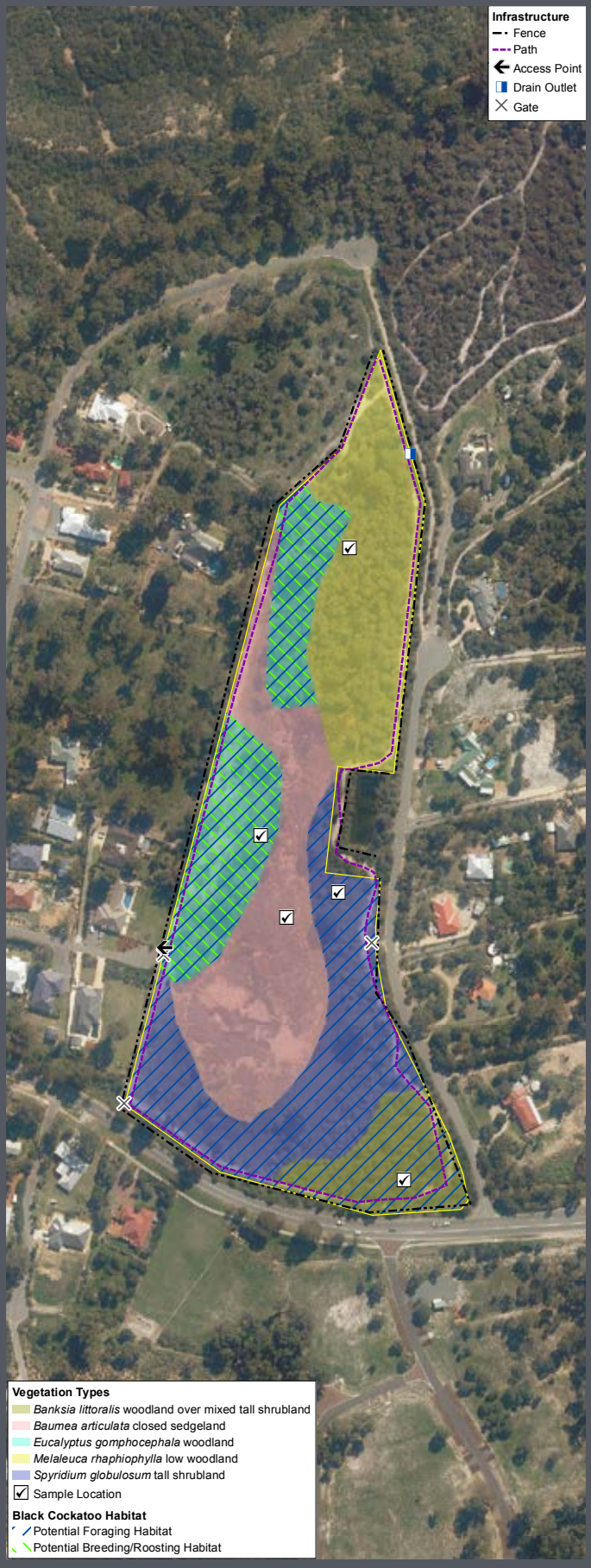
Signage
Naming (1)

Fence
Fence: 936 m Poor condition
Private fences: 574 m Western edge

Paths
Firebreak: 1,466 m Around perimeter of reserve, cleared earth

Major threat/issue	Action	Priority
Aggressive weeds in wetland.	Continue weed control within wetland and revegetation following weed control.	High
Potential for impact from 4WD vehicles.	Eastern fence needs maintaining, as well as fence along Dampier Drive, which has been cut in a number of places.	Medium
Potential for weed spread from gardens adjacent to reserve.	Erect signs to educate neighbours and the public about the sensitive environment, include information about the potential issues associated with dumped garden waste.	High
Rubbish dumping.	Rubbish removal.	Medium

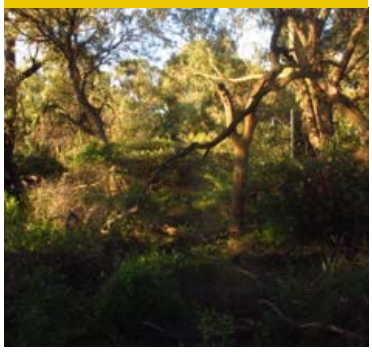




0 25 50 75 100 125
Metres

N

LOW PRIORITY



Tuart Park

Anstey Road, Secret Harbour

Tuart Park (4.63 ha) is located within a residential area and is popular for recreation. The reserve has picnic areas, a children's playground and sporting ovals.

The vegetation at the site occurs in small patches at the centre of the reserve, and has been impacted by fragmentation and edge effects. The vegetated areas include Tuart woodlands and landscaped, planted areas.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/ Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Narrowleaf Cottonbush *(Gomphocarpus fruticosus)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L cut paint, manually remove
Three-cornered Garlic *(Allium triquetrum)*						●	●						Glyphosate (10ml/L) and Metsulfuron 0.05g

Conservation significant species

- Potential foraging/breeding/roosting habitat for Black Cockatoos.

Fauna habitat

Woodland	Habitat for bushland birds, small fragmented areas of woodlands over shrublands.
Open water	Aquatic habitat, for waterbirds and amphibians.

Infrastructure

Access Point (2), Bubble-up (3), Gazebo (2), Other (2), Park Bench (4), Picnic Table (5), Recreation (5), Rubbish Bin (7), Toilet (1), Utility (7), Water Fountain (1)

Signage

None

Fence

Fence:	60 m	Good condition
Bollards:	791 m	Perimeter
Low limestone wall:	58 m	Good condition

Paths

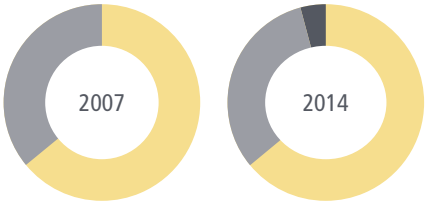
Concrete: 1,072 m Good condition

Major threat/issue	Action	Priority
Erosion around drains, safety issue.	Repair subsidence at stormwater drains.	Medium
High use area, causing trampling of native vegetation, spread of weeds.	Continue weed control around edges of bushland areas.	Medium

Comparison to 2007

Viability ↓ 2007: 12.79| 2014: 9.49

Bushland condition rating (%)



0 10 20 30 40 50
Metres

N

MEDIUM PRIORITY

Woodleigh Grove Reserve

Foxton Green, Baldivis

Woodleigh Grove Reserve (9.2 ha) is a vegetated wetland that is generally in good to excellent condition. The wetland has been rated as an Environmental Protection Policy and a Resource Enhancement wetland, as well as being within Bush Forever Site 495. The wetland is fenced and around the outside of the fence there is a strip of lawn with scattered native trees and planted species. The centre of the wetland is comprised of sedgeland, which is fringed by *Melaleuca* woodland. Fringing the wetland on higher ground is Tuart woodland.

This reserve contains walk trails on the northern and southern sides of the wetland, in addition to the "Settlers Hills Tree Walk" interpretive historical trail in the parkland area surrounding the wetland.

Major weeds	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Treatment
Cape Gooseberry *(Physalis peruviana)*	●	●	●	●	●	●	●	●	●	●	●	●	Glyphosate 10ml/L
Fig *(Ficus carica)*	●	●	●	●	●	●	●	●	●	●	●	●	Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30, Glyphosate spot spray
Pampas Grass *(Cortaderia selloana)*							●	●	●	●	●		Fusilade 10ml/L
Pepper Tree *(Schinus terebinthifolius)*	●	●	●									●	Glyphosate 10ml/L, Basal Bark with Triclopyr/Picloram (Garlon) and Diesel 1:30
Typha *(Typha orientalis)*	●	●	●							●	●	●	Glyphosate paint or during flowering period cut 15cm below water surface

Conservation significant species

- Potential foraging/breeding/roosting habitat for Black Cockatoos.

Fauna habitat

Sedgelands	Habitat for reptile and birds species. Likely summer refugia.
Woodlands	Includes both *Melaleuca* woodland and Tuart woodland, likely to be used by quenda and a variety of reptile and bird species.

Infrastructure
Access Point (2), Gate (4), Utility (7)

Signage
Information (4), Naming (1)

Fence
Fence: 1340 m Mainly good condition, some old farm fence through wetland

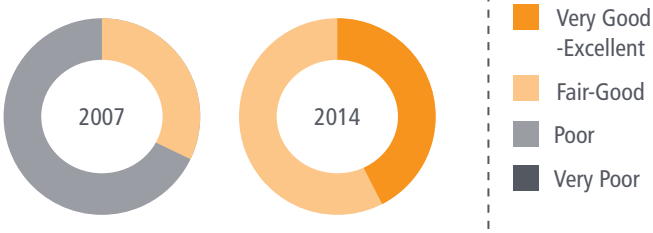
Paths
Firebreak: 304 m Good condition
Soil/sand: 329 m Some unauthorised tracks

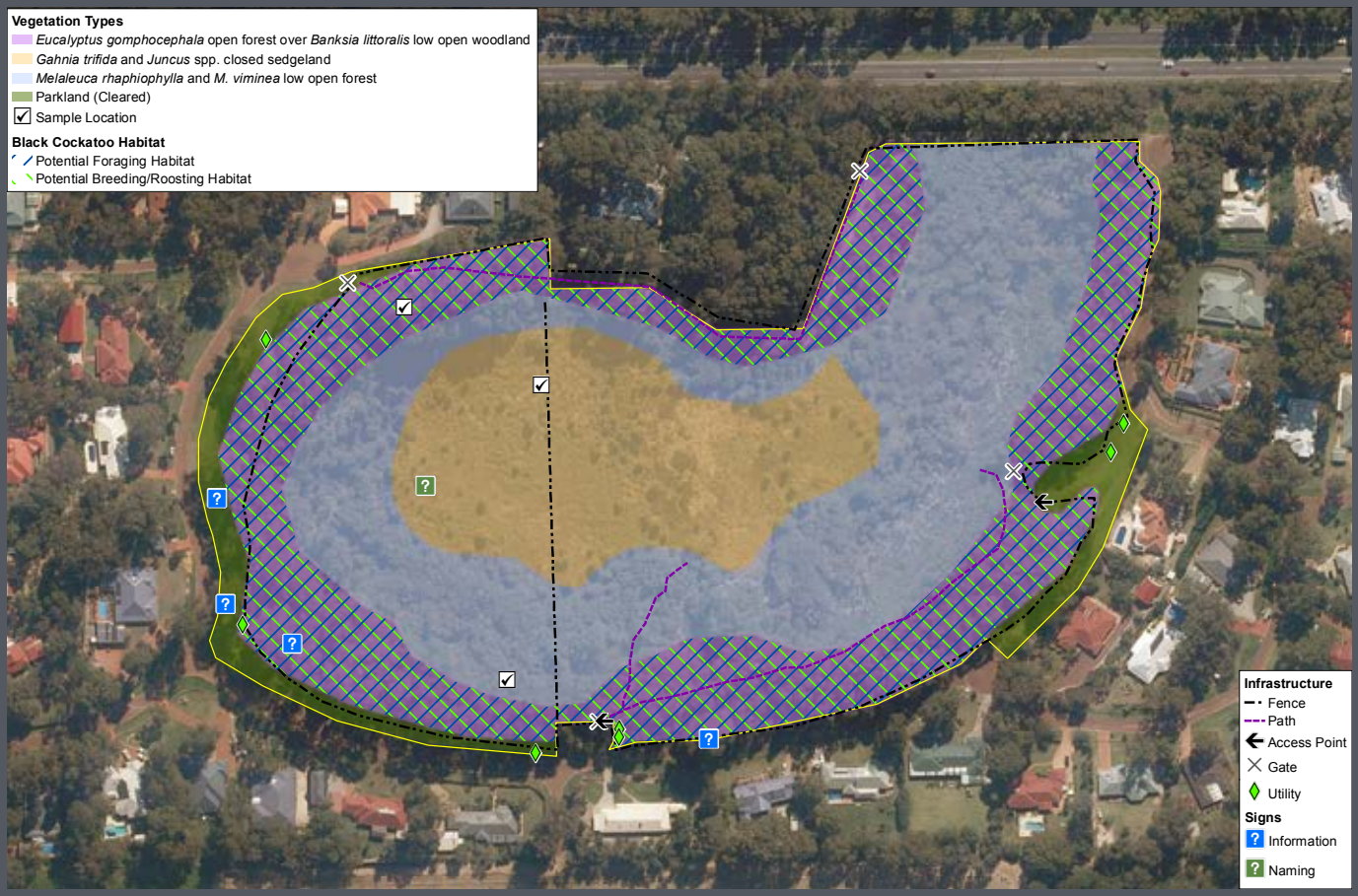
Major threat/issue	Action	Priority
Aggressive weeds in wetland require ongoing management.	Continue weed control within wetlands.	High
	Ongoing monitoring to ensure Cortaderia selloana does not recover.	Medium
Death of trees on south side of wetland.	Continue monitoring.	Low

Comparison to 2007

Viability ↑ 2007: 15.46 | 2014: 20.20

Bushland condition rating (%)





0 20 40 60 80 100
Metres

N

6. Implementation

Based on the prioritisation process and taking into account resource availability, a number of specific management actions have been considered a priority for funding. These recommendations and potential costs and timing are detailed in Table 24. The costs and timing are indicative only and will require more detailed analysis prior to commencing works.

Table 24 **Proposed management implementation**

Reserve	Proposed management actions	Potential costs	Priority
Alf Powell Reserve	1. Weed control, focusing on revegetation areas and edges of reserve.	4,000	High
	2. Revegetation of sections, starting in areas adjacent to best quality vegetation.	7,000	High
	3. Repairing and replacing wire on fences in poor condition.	2,000	Low
	4. Continue spraying along edge of lawn areas to prevent grasses invading bushland.	500	Medium
	5. Rubbish removal from bushland areas.	Use existing City employees, and encourage community involvement in caring for the reserve	Medium
Anstey Q Wetland	1. Weed control and revegetation on dune along western boundary.	9,000	Medium
	2. Fence TEC sedgeland and *Melaleuca* woodland in south of reserve to prevent access.	7,000	High
	3. Control of palms within TEC sedgeland.	1,000	Medium
Baldivis Nature Reserve	1. Ongoing weed management, particularly of Watsonia.	13,000	High
	2. Ensure fencing is replaced along the western boundary, and potential impacts from adjacent construction zone are managed.	Should be borne by construction company	High
	3. Upgrade Naturewalk signs.	2,000	Medium
Bordeaux Ramble	1. Repair and upgrade TEC signs.	500	Medium
	2. Repair bent sections of fence mesh.	2,000	Medium
	3. Control weeds, including * *Euphorbia terracina* throughout site.	8,500	High
CUD Swamp	1. Weed control and revegetation within bushland areas, starting with the *Melaleuca rhaphiophylla* wetland.	3,500 (predominantly weed control in 2015, some tubestock planting)	Medium
	2. Repair limestone paths and lookout.	Not within 2015	High
	3. Fencing of bushland.	6,500	High
Dixon Road Conservation Precinct	1. Weed control, especially Euphorbia terracina and grassy weeds.	10,000	High
	2. Revegetation of vegetation adjacent to the TEC.	21,500	Medium
	3. Control of access to prevent proliferation of tracks. Block access to sandy track that runs north-south in north part of site and sand tracks in south-west corner. Revegetate tracks.	5,000	Medium
	4. Prepare and implement fire management plan.	-	High
	5. Monitor Tuart health to ensure further decline does not occur.	-	Medium
	6. Determine management options for the heritage site (abattoir).	-	Low
Hidden Swamp	1. Erect signs informing public of sensitive conservation area and TEC.	500	High
	2. Brushing and infill planting of unauthorised tracks on north east side of reserve.	200	High
	3. Ongoing weed management.	2,000	Medium

Table 24 **Proposed management implementation** *cont.*

Reserve	Proposed management actions	Potential costs	Priority
Karnup School Site	1. Purpose of the reserve needs to be assessed, if for recreation/as a picnic area then bathrooms should be built.	-	Medium
	2. Information signs need upgrading.	1,000	Medium
	3. Upgrading of bollards around carpark to prevent access to bushland.	500	High
	4. Control Tagasaste infestations around carpark and weed control throughout bushland.	3,500	High
Karnup Townsite	1. Manage Karnup Townsite reserve in association with the tramway reserve directly adjacent.	-	Medium
	2. Manage weeds around edges.	6,000	High
	3. Repair fence on boundary along Karnup Road and on eastern boundary.	10,000	High
Kinsdale Bend	1. Continue revegetation of dune above TEC.	5,000	Medium
	2. Repair TEC signs.	2,000	High
Lewington Reserve	1. Large scale weed monitoring program required, with emphasis on the infestations of *Schinus terebinthifolius* throughout the site.	4,000	High
	2. Revegetation with native species, conducted in conjunction with the weed management program.	6,000	High
	3. Rubbish removal, particularly along southern boundary.	Use existing City employees and encourage community involvement in caring for the reserve	Medium
Mandurah Hill	1. Continue ongoing erosion controls, including brushing of degraded, steep dunes.	1,000	Medium
	2. Revegetation of degraded areas.	4,000 (including weed spraying and revegetation using tubestock)	High
	3. Rubbish removal at lookout.	Use existing City employees and encourage community involvement in caring for the reserve	Low
	4. Repair fences on northern and western boundary.	Will require budget in future	Low
Marillana Conservation Reserve	1. The management of this reserve needs to consider the surrounding natural areas. The entire coastal strip should be reserved and managed as one reserve to enable best use of resources.	-	High
	2. Public access should continue to be prevented from this site, this will required management of access throughout the wider bushland.	-	High
	3. Erection of signs in surrounding area educating the community on the sensitivity of the environment and the importance of staying to tracks.	500	Medium
Rockingham Road Conservation Reserve	1. Maintain revegetation in southern corner of the reserve, including weed and rabbit control.	4,000	Medium
	2. Consider revegetation of dunes in northern sector of site.	5,000	Medium
	3. Fix eroded path in northern section of the site.	2,000	Medium

Table 24 **Proposed management implementation** *cont.*

Reserve	Proposed management actions	Potential costs	Priority
Sawley Close Nature Reserve	1. Fence reserve, particularly north-eastern boundary next to Mandurah Road and south-western, off Sawley Close.	5,000 (include gates for access)	High
	2. Rubbish removal.	Use existing City employees and encourage community involvement in caring for the reserve	High
	3. Weed control, particularly *Ficus carica* and *Cortaderia selloana*.	1,000 (will require budget in subsequent years)	High
	4. Consolidate tracks and block off unnecessary tracks.	Use existing City employees and logs/ branches	Medium
Shoalwater Foreshore	1. Revegetate dunes, including weed control in site preparation. Revegetate edges adjacent to good quality vegetation.	7,500 (includes weed control and tubestock planting)	High
	2. Remove rubbish in artificial lake.	Use existing City employees and encourage community involvement in caring for the reserve	High
Tamworth	1. Revegetation of degraded dunes, including weed control.	8,000 (includes weed control and tubestock planting)	Medium
	2. Discourage trampling through dunes by signs informing the public of the sensitive nature of the environment and by fencing sensitive areas.	1,000 (to focus on small section south of café)	High
Hill Swamp	1. Continue to implement the Management Plan and ensure that the outcomes are met, including the revegetation commitments.	53,500	High
	2. Control the aggressive weeds present in the wetland, including Cortaderia selloana, *Ficus carica, Gomphocarpos fructicosus.*	8,500	High
Trenant Park	1. Continue weed control within wetland and revegetation following weed control.	19,000	High
	2. Eastern fence need maintaining, as well as fence along Dampier Rd, which has been cut in a number of places.	2,000	Medium
	3. Erect signs to educate neighbours and the public about the sensitive environment, include information about the potential issues associated with dumped garden waste.	1,000	High
	4. Rubbish removal.	Use existing City employees and encourage community involvement in caring for the reserve	Medium
Tuart Park	1. Repair subsidence at stormwater drains.	5,000	Medium
	2. Continue weed control around edges of bushland areas.	4,000	Medium
Woodleigh Grove Reserve	1. Continue weed control within wetlands.	10,000	High
	2. Ongoing monitoring to ensure *Cortaderia selloana* does not recover.	2,000	Medium

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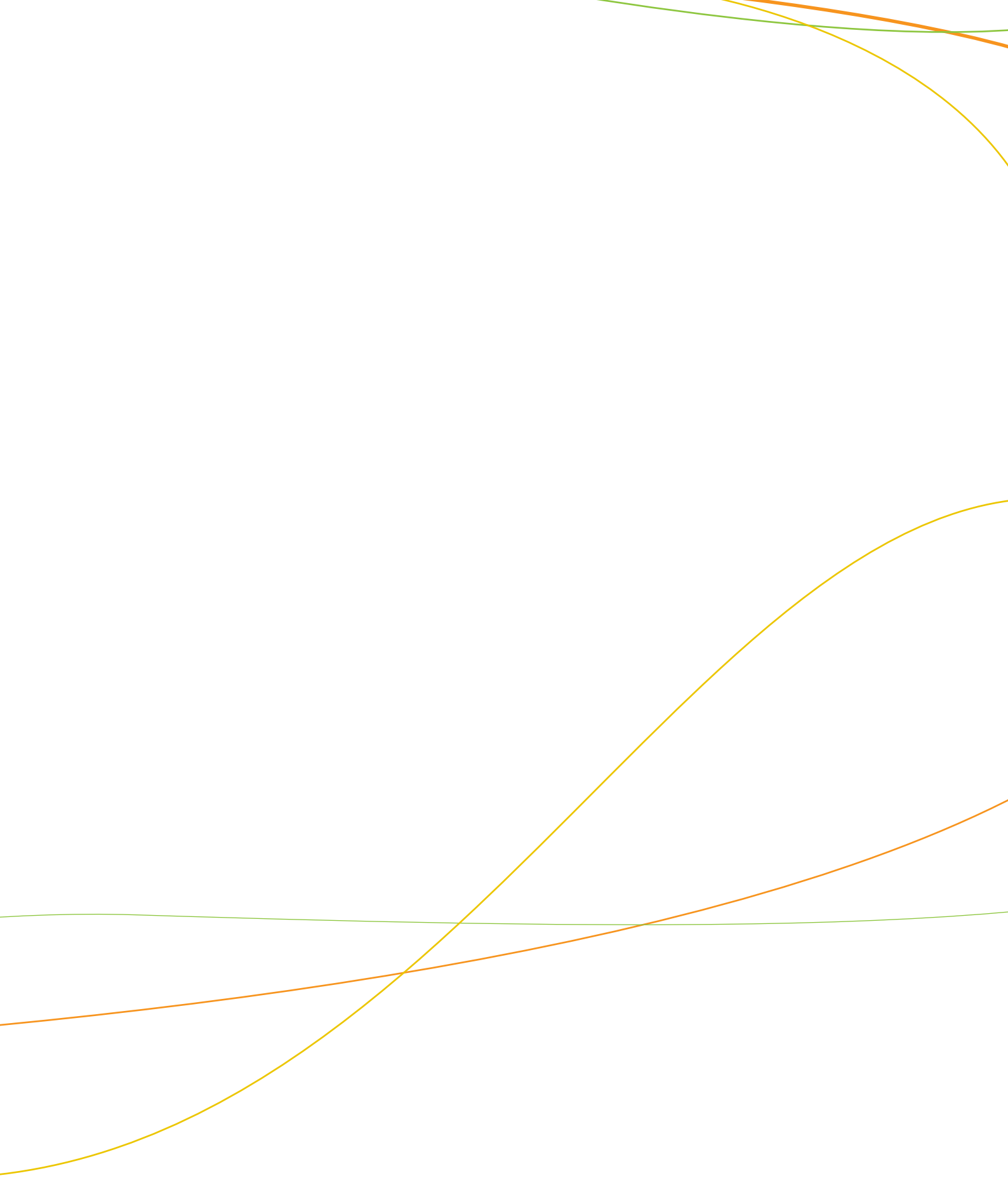

Appendices

Appendix A Legislation, Background Information and Conservation Codes

Federal Environment Protection and Biodiver sity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance (MNES).

There are currently nine MNES protected under the EPBC Act, these include:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

State Wildlife Conservation Act 1950

The *Wildlife Conservation Act 1950* (WC Act) provides for the conservation and protection of wildlife. It is administered by the DPaW and applies to both flora and fauna. Any person wanting to capture, collect, disturb or study fauna requires a permit to do so. A permit is required under the WC Act if removal of threatened species is required.

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) provides for the declaration of Declared Pests by the Department of Agriculture and Food Western Australia (DAFWA) which are prohibited organisms or organisms for which a declaration under Section 22(2) is in force.

The BAM Act replaces the repealed *Agriculture and Related Resources Protection Act 1976* (ARRP Act).

Vegetation and Flora

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State WC Act is the primary wildlife conservation legislation in Western Australia.

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the review of the National Strategy for the Conservation of Australia's Biological Diversity (ANZECC 2000) and in EPA Position Statement No. 2 on environmental protection of native vegetation in Western Australia (EPA 2000).

From a purely biodiversity perspective and taking no account of any other land degradation issues, there are a number of key criteria now being applied to the clearing of native vegetation in Western Australia (EPA 2000).

- The "threshold level" below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30 percent of the pre-European extent of the vegetation type.
- A level of 10 percent of the original extent is regarded as being a level representing Endangered.
- Clearing which would put the threat level into the class below should be avoided.
- From a biodiversity perspective, stream reserves should generally be in the order of at least 200 metres (m) wide.

The extent of remnant native vegetation has been assessed by Shepherd et al. (2002) and the Government of Western Australia (2013), based on broadscale vegetation association mapping by Beard (1979).

Conservation significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TEC) are protected under the EPBC Act administered by the Department of the Environment (DotE) (formerly the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)). The DPaW also maintains a list of TECs for Western Australia; some of which are also protected under the EPBC Act. TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable (Table B.1).

Possible TECs that do not meet survey criteria are added to the DPaW Priority Ecological Community (PEC) List under Priorities 1, 2 and 3 (Table B.2). These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation.

Table A.1 **Conservation codes and definitions for Threatened Ecological Communities endorsed by the Western Australian Minister for the Environment and listed under the *Environment Protection and Biodiversity Conservation Act 1999***

Status	Description
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (EN)	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable (VU)	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.
Western Australia conservation categories	
Presumed Totally Destroyed (PD)	The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Table A.2 Conservation categories and definitions for Priority Ecological Communities as listed by the Department of Parks and Wildlife

Category	Description
Priority 1	Poorly known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority 2	Poorly known ecological communities. Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority 3	Poorly known ecological communities. (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
Priority 4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.
Priority 5	Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Other significant vegetation

Vegetation may be significant for a range of reasons, other than a statutory listing as a TEC or because the extent is below a threshold level. The EPA (2004) states that significant vegetation may include vegetation that includes the following:

- Scarcity
- Unusual species
- Novel combinations of species
- A role as a refuge
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of the range of a unit (particularly, a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- A restricted distribution.

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Conservation significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the WC Act can warrant referral to the DotE and/or the EPA. According to the DPaW (WA Herbarium): "Threatened flora are plants which have been assessed as being at risk of extinction. In Western Australia the term Declared Rare Flora (DRF) is applied to Threatened flora due to the laws regarding threatened flora conservation. The WC Act is the primary wildlife conservation legislation in the State and the Minster for the Environment can declare taxa (species, subspecies or variety) as "Rare Flora" if they are considered to be in danger of extinction, rare or otherwise in need of special protection." For the purposes of this report, flora listed by the WC Act as DRF is described as Threatened.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act (Table B.3). The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN).

The State conservation level of fauna species and their significance status is assessed under the State WC Act (*Wildlife Conservation (Specially Protected Fauna) Notice 2010(2)*). This Act uses a set of Schedules (Table B.4) but also classifies species using some of the IUCN categories. Schedule 3 fauna species are those which are "subject to an agreement between the Government of Australia and the Governments of Japan, China and the Republic of Korea relating to the protection of migratory birds, are declared to be fauna that is in need of special protection".

In Western Australia, the DPaW also maintains a list of Priority listed flora species. Conservation codes for Priority species are assigned by the DPaW to define the level of conservation significance (Table B.4). Priority species are not currently protected under the WC Act.

For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DPaW Priority species are considered conservation significant.

Table A.3 Conservation categories and definitions for *Environment Protection and Biodiversity Conservation Act 1999* listed flora and fauna species

Conservation category	Definition
Extinct	Taxa not definitely located in the wild during the past 50 years.
Extinct in the Wild	Taxa known to survive only in captivity.
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	Taxa facing a very high risk of extinction in the wild in the near future.
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term.
Near Threatened	Taxa that risk becoming Vulnerable in the wild.
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened.

Table A.4 **Conservation codes and descriptions for Western Australian flora and fauna**

Code	Conservation category	Description
Wildlife Conservation Act 1950		
T	Schedule 1 under the WC Act	*Threatened Fauna (Fauna that is rare or is likely to become extinct).* *Threatened Flora (Declared Rare Flora – Extant).* *Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.* *CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild.* *EN: Endangered – considered to be facing a very high risk of extinction in the wild.* *VU: Vulnerable – considered to be facing a high risk of extinction in the wild.*
X	Schedule 2 under the WC Act	*Presumed Extinct Fauna.* *Presumed Extinct Flora (Declared Rare Flora – Extinct).* *Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.*
IA	Schedule 3 under the WC Act	*Birds protected under an international agreement.* *Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.*
S	Schedule 4 under the WC Act	*Other specially protected fauna.* *Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.*

Table A.4 **Conservation codes and descriptions for Western Australian flora and fauna** *cont.*

Code	Conservation category	Description
DPaW Priority Listed		
1	Priority One: Poorly-known taxa	*Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.*
2	Priority Two: Poorly-known taxa	*Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.*
3	Priority Three: Poorly-known taxa	*Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.*
4	Priority Four: Rare, Near Threatened and other taxa in need of monitoring	*(a) Rare. Taxa 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 taxa are usually represented on conservation lands.* *(b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.* *(c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.*
5	Priority 5: Conservation Dependent taxa	*Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.*

Migratory species listed under the EPBC Act

The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II).
- Migratory species included in annexes established under the Japan–Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA).
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA).

Other significant flora and fauna

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than as Threatened (Declared Rare) Flora or Priority Flora. The EPA (2004) states that significant flora may include taxa that have:

- A keystone role in a particular habitat for threatened species or supporting large populations representing a significant proportion of the local regional population of a species
- Relic status
- Anomalous features that indicate a potential new discovery
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- The presence of restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism/a restricted distribution
- Being poorly reserved.

The application of the degree of significance may apply at a range of scales.

Introduced plants (weeds)

Declared Pests

The Department of Agriculture and Food Western Australia (DAFWA) maintains a list of Declared Pests for Western Australia that have been declared under the BAM Act. If a Pest is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to comply with the specific category of control. Declared Pests are gazetted under categories, which define the action required. The category may apply to the whole of the State, districts, individual properties or even paddocks. Categories of control are defined in Table B.5. Among the factors considered in categorising Declared Pests are:

- The impact of the plant on individuals, agricultural production and the community in general
- Whether it is already established in the area
- The feasibility and cost of possible control measures.

Table A.5 **Department of Agriculture and Food (Western Australia) Categories for Declared Pests under the *Biosecurity and Agriculture Management Act 2007***

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they 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 which currently is free of that pest.

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

- Invasiveness
- Impacts
- Potential for spread
- Socio-economic and environmental values.

Australian state and territory governments have identified thirty two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012 (Australian Government 2012).

Environmental weeds

"Environmental weeds are plants that establish themselves in natural ecosystems (marine, aquatic and terrestrial) and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade" (CALM 1999). The Environmental Weed Strategy for Western Australia (EWSWA) was published in 1999. This document provides direction and an approach to tackling environmental weeds in WA (CALM 1999). Following on from this strategy (in 2008), in an effort to address invasive weeds and implement an integrated approach to weed management on DPaW managed lands in WA, the Weed Prioritisation Process was developed. A series of workshops were held in each of the nine DPaW regions with the purpose of scoring all weeds which occurred in each of the DPaW regions according to the following key attributes:

- Potential distribution and impact
- Invasiveness
- Current distribution
- Feasibility of control
- Weed management ability
- Weed risk.

This process resulted in the following five ratings for each weed species:

- Very high (VH)
- High (H)
- Medium (M)
- Low (L)
- Negligible (N).

The suggested management actions for each species range from no action required (the weed species ranking is as low as to not warrant any investment in regional strategic management actions), through targeted control to reduce infestation or spread, to species requiring state-wide eradication. A total of 1350 weeds were rated through this process as high, moderate, mild or low, with 34 weed species being rated as high.

The prioritisation for individual weeds within a DPaW region should be treated as a guide and does not diminish any other requirements of land managers or developers e.g. Declared Plants requirements of the BAM Act or Ministerial requirements under Part IV of the EP Act.

Appendix A *cont.*

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Appendix B Flora Data

Table B.1 **Description of vegetation types recorded in the reserves during the field survey**

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Alf Powell Reserve	VT1	*Xanthorrhoea preissii* open heath	Open heath of *Xanthorrhoea preissii* over very open sedgeland of *Lepidosperma spp.*, *Lomandra maritima* over open grassland of **Lagurus ovatus, *Avena barbata, *Ehrharta calycina* over low herbland of *Conostylis spp. *Euphorbia terracina, *Scabiosa atropurpurea.*	1.55	*Xanthorrhoea preissii* closed heath
	VT2	*Acacia rostellifera* shrubland	Shrubland of *Acacia rostellifera* over very open shrubland of *Templetonia retusa, Xanthorrhoea preissii, Acacia rostellifera* over open grassland of **Avena barbata, *Bromus diandrus, *Lagurus ovatus* over open herbland of **Euphorbia terracina, *Scabiosa atropurpurea, *Lysimachia arvensis* with scattered planted *Eucalyptus spp.*	3.21	Not mapped
	C	Cleared	School buildings and carparks.	1.86	
	PC	Parkland cleared	parks and school grounds.	7.62	Parkland
Anstey Q Wetland	VT1	*Eucalyptus gomphocephala* open forest	Open forest of *Eucalyptus gomphocephala* over tall open shrubland of *Spyridium globulosum* over very open shruland of *Acanthocarpus preissii, Olearia axillaris, Phyllanthus calycinus* over very open herbland of *Hardenbergia comptoniana, Daucus glochidiatus, *Euphobia terracina* over open sedgeland of *Lepidosperma gladiatum, Schoenus grandifloras.*	1.48	
	VT2	*Spyridium globulosum* and *Melaleuca teretifolia* closed tall scrub	Tall open scrub of *Spyridium globulosum, Melaleuca teretifolia* and *M. lanceolata* over low shrubland of *Olearia axillaris, Logania vaginalis* over sedgeland of *Ficinia nodosa* and herbland of *Muehlenbeckia adpressa* and *Hardenbergia comptoniana.*	3.93	
	VT3	*Baumea species* and *Ficinia nodosa* closed sedgeland	Closed sedgeland of *Baumea articulata, Baumea sp.* and *Ficinia nodosa* over very open herbland of *Centella asiatica, Lobelia alata, *Sonchus asper* and very open grassland of *Poa porphyroclados, Sporobolus virginicus.*	1.84	
	VT4	Mixed open shrubland and grassland	Open shrubland of *Spyridium globulosum, Acacia saligna, Jacksonia sternbergiana* over shrubland of *Anthocercis littorea, Acacia lasiocarpa, Olearia axillaris* over herbland of **Euphorbia terracina, Opercularia vaginata, Romulea rosea* over very open sedgeland of *Lomandra maritima, Desmocladus fasciculatus* of open grassland of **Avena barbata, *Lagurus ovatus, Austrostipa flavescens.*	0.78	
	VT5	*Melaleuca rhaphiophylla* low open forest	Low open forest of *Melaleuca rhaphiophylla.*	0.62	
	PC	Parkland cleared		1.30	
	C	Cleared		0.18	
Baldivis Nature Reserve	VT1	*Corymbia calophylla, Allocasuarina fraseriana* and *Banksia species* open forest	Low Open Forest of *Corymbia calophylla, Allocasuarina fraseriana* and *Banksia attenuata* over open shrubland of *Acacia puchella* over open low heath of *Hibbertia hypericoides, Gompholobium tomentosum, Stirlingia latifolia* over very open herbland of *Thysanotus sp., Xanthosia huegelii, Burchardia congesta.*	7.26	Marri-Sheoak-*Banksia* woodland
	VT2	*Eucalyptus marginata, Allocasuarina fraseriana* and *Banksia species* open forest	Open forest of *Banksia attenuata, Eucalyptus marginata Allocasuarina fraseriana* over open shrubland of *Acacia pulchella, Xanthorrhoea preissii* over very open shrubland of *Hibbertia hypericoides, Pimelea rosea* over herbland of *Sowerbaea laxiflora, Caesia micrantha, Burchardia congesta* over grassland of **Ehrharta calycina, *Briza maxima.*	0.92	Jarrah-Sheoak-*Banksia* woodland
	C	Cleared		4.69	Parkland
	PC	Parkland-cleared		1.16	Parkland

Appendix B *cont.*

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Bordeaux Ramble	VT1	*Xanthorrhoea preissii* open heath	Tall open shrubland of *Xanthorrhoea preissii* over open heath of *X. preissii, Jacksonia furcellata, Spyridium globulosum* over very open shrubland of *Acacia saligna, Leucopogon parviflorus, Phyllanthus calycinus* over very open herbland of **Anagallis arvensis, Conostylis candicans, Opercularia vaginata* over sedgeland of *Lepidosperma gladiatum, Baumea juncea, Lomandra maritima* over very open grassland of **Lagurus ovatus, *Avena barbata.*	7.26	*Xanthorrhoea preissii, Jacksonia furcellata* closed heath
	VT2	Mixed shrubland and sedgeland	Tall open shrubland of *Xanthorrhoea preissii, Jacksonia furcellata, Hakea prostrata* over very open shrubland of *Acacia lasiocarpa, Conostylis aculeata, Adriana quadripartita* over sedgeland of *Baumea juncea, Lomandra maritima, Lepidosperma gladiatum* over very open grassland of **Eragrostis curvula, Austrostipa sp.* over very open herbland of *Opercularia vaginata, Thysanotus sp. *Euphorbia terracina.*	0.92	*Xanthorrhoea preissii, Jacksonia furcellata* open heath over *Baumea juncea, B. preissii, Ficinia nodosa* open sedgeland
	VT3	Mixed closed sedgeland	Tall open shrubland of *Xanthorrhoea preissii* over closed sedgeland of B*aumea juncea, Lepidosperma spp., Ficinia nodosa.*	4.69	
	PC	Parkland cleared		1.16	
CUD Swamp	VT1	*Melaleuca rhaphiophylla* low woodland	Low woodland of *Melaleuca rhaphiophylla* over tall open shrubland of *Olearia axillaris* over open shrubland of *Spyridium globulosum, Solanum symonii* over sedgeland of *Lepidosperma gladiatum* over very open herbland of *Centella asiatica, Sonchus hydrophilus* and *Hardenbergia comptoniana.*	0.31	*Melaleuca rhaphiophylla* woodland
	VT2	Mixed *Acacia* shrubland	Tall open scrub of *Acacia rostellifera* over open shrubland of *Acacia saligna* over low shrubland of *Diplolaena dampieri, Acacia lasiocarpa, Phyllanthus calycinus* over very open grassland of *Poa porphyroclados, Austrostipa flavescens, *Lolium rigidum, *Lagurus ovatus.*	1.09	Mixed *Acacia* shrubland
	VT3	*Acacia rostellifera* tall shrubland (includes enrichment planting	Tall shrubland of *Acacia rostellifera.*	0.40	Planted areas of *Acacia rostellifera* and *Eucalyptus* species
	L	Lawn		0.27	Parkland
	C	Cleared		0.53	
Dixon Road Conservation Precinct	VT1	*Acacia rostellifera* tall open scrub	Tall open scrub of *Acacia rostellifera, Spyridium glabrescens* over shrubland of *Xanthorrhoea preissii* over open shrubland of P*hyllanthus calycinus, Conostylis aculeata, Acanthocarpus preissii* over grassland of **Lagurus ovatus, *Bromus diandrus, *Lysimachia arvensis* over very open herbland of **Euphorbia terracina, Clematis linearifolia, Hardenbergia comptoniana.*	11.61	
	VT2	*Xanthorrhoea preissii* tall shrubland over *Gahnia trifida* open sedgeland with scattered *Banksia littoralis*	Shrubland of *Xanthorrhoea preissii* over open sedgeland of *Gahnia trifida* over grassland of **Avena barbata, *Lagurus ovatus* with scatted *Banksia littoralis* and *Eucalyptus gomphocephala.*	1.92	
	VT3	*Eucalyptus gomphocephala* woodland over *Gahnia trifida* sedgeland	Woodland of *Eucalyptus gomphocephala* over sedgeland of *Gahnia trifida* over herbland of **Euphorbia terracina, Hardenbergia comptoniana, Clematis linearifolia.*	1.67	

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Dixon Road Conservation Precinct cont.	VT4	*Xanthorrhoea preissii* tall shrubland with scattered *Eucalyptus gomphocephala*	Shrubland of *Xanthorrhoea preissii, Acacia rostellifera* over very open shrubland of *Phyllanthus calycinus, Conostylis aculeata* and herbland of **Euphorbia terracina,Clematis linearifolia, Hardenbergia comptoniana*. over grassland of **Avena barbata, *Lagurus ovatus* with scattered *Eucalyptus gomphocephala*.	39.22	
	PC	Parkland cleared		4.77	
	C	Cleared		2.26	
Hidden Swamp	OW	Open water		0.11	
	VT1	Mixed sedgeland (fringing vegetation)	Sedgeland of *Juncus sp., Lepidosperma gladiatum, Typha orientalis* over herbland of *Centella asiatica.*	0.05	Flooded Gum woodland
	VT2	Mixed closed sedgeland	Sedgeland of *Lepidosperma gladiatum, Ficinia nodosa, Baumea juncea* over herbland of *Centella asiatica, Samolus junceus.*	0.13	*Baumea juncea, Juncus kraussii, Ficinia nodosa, Lepidosperma gladiatum* closed sedgeland
	VT3	Mixed closed heath	Closed Heath of *Spyridium globulosum, Olearia axillaris* and *Alyxia buxifolia* over low shrubland of *Scaevola crassifolia, Acanthocarpus preissii, Hibbertia cuneiformis* over very open sedgeland of *Lepidosperma gladiatum* over very open herbland of *Conostylis candicans, Senecio condylus* and *Hardenbergia comptoniana.*	2.95	*Alyxia busifolia, Spyridium globulosum, Olearia axillaris* closed heath
Karnup School Site	VT1	*Corymbia calophylla - Eucalyptus marginata* woodland over *Banksia menziesii, B. attenuata* and *Allocasuarina fraseriana* low woodland	Woodland of *Corymbia calophylla - Eucalyptus marginata* over low woodland of *Banksia menziesii, B. attenuata* and *Allocasuarina fraseriana* over shrubland of *Macrozamia fraseri, Acacia pulchella* over low shrubland of *Hibbertia hypericoides, Gompholobium tomentosum, Petrophile linearis* over sedgeland of *Desmocladus spp., Mesomelaena pseudostygia, Dasypogon bromellifolius* over very open grassland of **Briza maxima, *Ehrharta calycina* over very open herbland of *Burchardia congesta, Drosera sp., Hardenbergia comptoniana.*	1.63	Marri-Jarrah-*Banksia* woodland
	C	Cleared		0.09	
	PC	Parkland cleared		0.27	Picnic area planted with *Agonis flexuosa*
Karnup Townsite	VT1	*Corymbia calophylla -Banksia attenuata - B. menziesii* woodland	Woodland of *Corymbia calophylla Banksia attenuata, B. menziesii* over open shrubland of *Xanthorrhoea preisii, Macrozamia fraseri* over low shrubland of *Hibbertia hypericoides, Bossiaea eriocarpa, Leucopogon propinquus* over open sedgeland of *Desmocladus flexuosus, Tetraria octandra* over very open herbland of *Drosera sp., Kennedia prostrata, Hardenbergia comptoniana.*	5.26	Marri and mixed *Banksia* woodland
	VT2	Mixed *Banksia* low open woodland over *Kunzea glabrescens* tall open scrub	Low open woodland of *Banksia menziesii, B. ilicifolia, Nuytsia floribunda* over tall open scrub of *Kunzea glabrescens* over sedgeland of *Dasypogon bromellifolius, Desmocladus flexuosus, Lyginia imberbis, Phlebocarya ciliata* very open grassland of **Ehrharta calycina, *Briza maxima* over very open herbland of **Ursinia anthemoides, Drosera erythrohiza, Podotheca spp.*	2.82	*Banksia* woodland over *Kunzea glabrescens* closed tall scrub
	VT3	*Banksia attenuata - B. menziesii* low woodland	Low woodland of *Banksia menziesii, B. attenuata* over tall shrubland of *Kunzea glabrescens, Jacksonia furcellata* over low shrubland of *Conostylis aculeata, Hibbertia hypericoides* over sedgeland of *Dasypogon bromellifolius, Desmocladus flexuosus.*	4.89	

Appendix B *cont.*

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Kinsdale Bend	VT1	*Baumea* closed sedgeland	Closed sedgeland of *Baumea juncea, B. preissii, Ficinia nodosa* over very open herbland of *Centella asiatica.*	0.02	*Baumea juncea, B. preissi, Ficinia nodosa* closed sedgeland
	VT2	*Acacia rostellifera* closed heath	Tall shrubland of *Acacia rostellifera, Spyridium globulosum* over closed heath of *Acacia rostellifera, Olearia axillaris, Jacksonia furcellata* over very open shrubland of *Phyllanthus calycinus* over very open herbland of *Conostylis candicans, *Euphorbia terracina* and *Hardenbergia comptoniana.*	0.27	*Acacia rostellifera, Jacksonia furcellata* open low heath
	VT3	*Xanthorrhoea preissii* tall open scrub	Tall open scrub of *Xanthorrhoea preissii, Acacia saligna* over open shrubland of *Jacksonia furcellata, Olearia axillaris, Acacia rostellifera* over shrubland of *Eremophila glabra subsp. albicans, Adriana quadripartita, Acacia lasiocarpa* over very open sedgeland of *Baumea juncea.*	0.10	
	VT4	Enrichment planting		0.03	Enchrichment planting
	PC	Parkland cleared		0.15	Cleared
Lewington Reserve	VT1	*Eucalyptus gomphocephala* woodland over mixed shrubland	Woodland of *Eucalyptus gomphocephala* over tall open shrubland of *Acacia rostellifera* over open shrubland of *Schinus terebinthifolius, Melaleuca lanceolata, Olearia axillaris* over very open shrubland of *Xanthorrhoea preissii, Acacia lasiocarpa* over very open herbland of *Euphorbia terracina, *Asparagus asparagoides* over grassland of *Ehrharta calycinus, *Avena barbata, *Bromus diandrus.*	6.91	N/A
	VT2	*Acacia rostellifera* shrubland	Tall open scrub of *Acacia rostellifera* over open shrubland of *Spyridium globulosum, Agonis flexuosa* over very open *sedgeland of Dianella revoluta, Lomandra maritima* over grassland of *Avena barbata *Lagurus ovatus,* over very open herbland of *Euphorbia terracina, Conostylis aculeata, Clematis linearifolia.*	10.84	N/A
	C	Cleared		0.67	
	PC	Parkland cleared		2.58	
Mandurah Hill Reserve	VT1	Mixed *Acacia* species and *Melaleuca systena* open low heath	Open shrubland of *Acacia rostellifera* over open low heath of *Acacia cyclops, Melaleuca systena, A. lasiocarpa* over very over very open sedgeland of *Desmocladus flexuosus, Lomandra maritima* over very open grassland of *Austrostipa flavescens, *Bromus diandrus, *Lolium rigidum* over open herbland of *Conostylis candicans, Acanthocarpus preissii, Hardenbergia comptoniana.*	0.43	Mixed *Acacia, Melaleuca systena* open low heath
	VT2	*Acacia rostellifera* tall open scrub	Tall open scrub of *Acacia rostellifera* over shrubland of *Acacia rostellifera, Spyridium globulosum* over low shrubland of *Trymalium ledifolium, Melaleuca systena, Phyllanthus calycinus* over herbland of *Fumaria caprelata, *Pelargonium capitatum, Clematis linearifolia* over sedgeland of *Lomandra maritima, Conostylis candicans.*	0.34	
	C	Cleared		0.23	Cleared

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Marillana Conservation Reserve	VT1	Mixed closed heath	Tall open shrubland of *Acacia rostellifera* over closed heath of *Olearia axillaris, Spyridium globulosum* over low shrubland of *Scaevola crassifolia, Clematis linearifolia, Hardenbergia comptoniana* over sedgeland of *Lepidosperma gladiatum, Baumea juncea.*	1.15	*Acacia* shrubland over *Spyridium globulosum, Olearia axillaris, Hibbertia cuneiformis* closed heath
	VT2	Mixed sedgland	Closed sedgeland of *Juncus krausii, Baumea juncea, Ficinia nodosa* over very open herbalnd of *Centella asiatica.*	0.12	*Baumea juncea, Juncus krausii, Ficinia nodosa* closed sedgeland
Rockingham Road Conservation Reserve	VT1	Mixed open heath	Open heath of *Acacia rostellifera, Scaevola crassifolia, Hakea prostrata* over open shrubland of *Acanthocarpus preissii* over very open sedgeland of *Lepidosperma gladiatum* over grassland of **Bromus diandrus *Avena barbata* over open herbland of *Conostylis candicans, *Euphobia terracina, Clematis linearifolia.*	2.93	*Acacia cyclops, Scaevola crassifolia, Hakea prostrata* open heath
	VT2	Mixed shrubland	Shrubland of *Acacia rostellifera, Scaevola crassifolia,* over open shrubland of *Acanthocarpus preissii* over grassland of **Bromus diandrus *Avena barbata.*	2.15	
	C	Cleared		0.41	Cleared
	PC	Parkland cleared		1.17	Cleared
Sawley Close Nature Reserve	VT1	*Melaleuca rhaphiophylla* woodland	Woodland of *Melaleuca rhaphiophylla* with *Cassytha sp.* over tall open shrubland of *Acacia cyclops, Spyridium glabrescens* over closed sedgeland of *Baumea juncea, Gahnia trifida, Lepidosperma longitudinale* and very open herbland of *Muehlenbeckia adpessa, Fumaria capreolata.*	0.95	*Melaleuca rhaphiophylla* woodland
	VT2	*Eucalyptus gomphocephala* open woodland over *Banksia littoralis* low woodland	Woodland of *Eucalyptus gomphocephala* and *Banksia littoralis* over tall shrubland of *Spyridium globulosum, Melaleuca rhaphiophylla* over very open sedgeland of *Lepidosperma longitudinale* over grassland of **Briza maxima, B. minor* very open herbland of **Euphobia terracina, *Lysimachia arvensis.*	0.66	*Eucalyptus gomphocephala* open woodland over *Banksia littoralis* low woodland
	VT3	*Melaleuca rhaphiophylla* and *Banksia littoralis* low open woodland over mixed tall open scrub	Low open woodland of *Melaleuca rhaphiophylla, Banksia littoralis* over tall open scrub of *Spyridium globulosum, Viminaria juncea, Kunzea glabrescens* over sedgeland of *Baumea juncea* over very open herbland of *Thysanotus triandrus, *Ursinia anethemioides, *Sonchus oleraceus.*	2.01	*Melaleuca rhaphiophylla* Woodland over *Viminaria juncea, M. rhaphiophylla, Spyridium globulosum* tall open scrub
	VT4	*Acacia rostellifera* tall shrubland	Tall shrubland of *Acacia rostellifera* over open heath of *Acanthocarpus preissii, Melaleuca systena* over very open sedgeland of *Lomandra maritima, Desmocladus sp.* and very open grassland of **Lolium sp., Austrostipa flavescens, *Bromus diandrus* over very open herbland of **Crassula glomerata, *Centranthus macrosiphon, *Cerastium glomeratum* with *Clematis linearifolia, Hardenbergia comptoniana.*	0.67	*Acacia* shrubland
		Cleared		0.53	Cleared

Appendix B *cont.*

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Secret Harbour Foreshore	C	Cleared	Lawns and carparks.	14.08	
	OW	Open water		1.20	
	PC	Parkland cleared		2.47	
	VT1	Mixed low shrubland and herbland	Shrubland of *Olearia axillaris, Scaevola crassifolia, Spyridium globulosum, *Pelargonium capitatum* over very open sedgeland of *Lepidosperma gladiatum* and very open grassland of *Spinifex longifolius* over open herbland of **Trachyandra divaricata, Carpobrotus virescens, Cassytha sp.*	8.68	
	VT2	Spinifex open grassland and mixed open herbland	Open grassland of *Spinifex longifolius, S. hirsutus* and open shrubland of *Olearia axillaris, *Tetragonia decumbens* over open herbland of **Arctotheca populifolia, *Cakile maritima.*	8.84	
	VT3	*Lepidosperma gladiatum* closed sedgeland	Closed sedgeland of *Lepidosperma gladiatum, Juncus sp., Ficinia nodosa* over open open herbland of *Cassytha spp., Cuscuta epithyum, Centella asiatica.*	0.53	
	VT4	*Spyridium globulifera* and *Olearia axillaris* open shrubland	Shrubland of *Spyridium globulosum, Olearia axillaris, Acacia saligna* over low shrubland of *Acacia cyclops, *Pelargonium capitatum, Scaevola crassifolia* over open herbland of *Crassula glomerata, Trachyandra divaricata, Scaevola candicans* over open grassland of **Bromus diandrus, *Lagurus ovatus.*	13.12	
	VT5	Mixed shrubland and *Lepidosperma gladiatum* sedgeland	Tall open shrubland of *Acacia rostellifera, A. cyclops, A. saligna* over open heath of *Spyridium globulosum, Olearia axillaris, Myoporum insulare* over low shrubland of *Acanthocarpus preissii, *Pelargonium capitatum, Scaevola crassifolia* over grassland of **Bromus diandrus, *Lagurus ovatus* over herbland of **Lysimachia arvensis, Clematis linearifolia, Hardenbergia comptoniana.*	14.78	
	VT6	*Acacia rostellifera* tall open scrub	Tall open scrub of *Acacia rostellifera* over sedgeland of *Lepidosperma gladiatum*, over herbland of *Cassytha spp.*	2.31	
	VT7	Enrichment planting - mixed closed sedgeland	Fringing sedgeland of *Juncus kraussii* and *Ficinia nodosa.*	0.16	
	VT8	Enrichment planting - *Casuarina obesa* woodland	*Casuarina obesa* woodland.	0.82	
Shoalwater Foreshore	VT1	Mixed shrubland	Shrubland of *Acacia rostellifera, Scaevola crassifolia, Olearia axillaris*, over open low heath of *Acanthocarpus preissii, Rhagodia baccata, *Pelargonium capitatum* over very open sedgeland of *Lepidosperma gladiatum* over very open grassland *Spinifex hirsutus* over *herbland* of *Cassytha spp.*	3.78	
	VT2	*Acacia rostellifera* tall shrubland	Tall open scrub of *Acacia rostellifera, Spyridium globulosum* over open shrubland of *Myoporum insulare* and *Acanthocarpus preissii* over herbland of **Fumaria capreolata, *Euphorbia terracina, *Soncus oleraceus* over very open sedgeland of *Lepidosperma gladiatum* with *Clematis linearifolia, Hardenbergia comptoniana.*	3.78	
	VT3	*Spinifex* open grassland and mixed herbland	Low shrubland of *Olearia axillaris, *Tetragonia decumbens, Acanthocarpus preissii* over grassland of *Spinifex longifolius, S. hirsutus* over very open herbland of **Euphorbia terracina Crassula glomerata.*	6.97	
	VT4	*Lepidosperma gladiatum* closed sedgeland	Closed sedgeland of *Lepidosperma gladiatum* over shrubland of **Tetragonia decumbens* over very open grassland of *Spinifex longifolius.*	1.20	
	S	Open sand (beach)		7.64	
	PC	Parkland cleared		1.83	

Reserve	Type	Name	Description	Extent (ha)	Equivalent 2007 assessment vegetation type
Tamworth Hill Swamp	VT1	*Baumea juncea* closed sedgeland	Closed sedgeland of *Baumea juncea* over very open herbland of *Lobelia anceps, Centella asiatica, Triglochin striata*	12.14	
	VT2	*Baumea articulata* closed sedgeland	Closed sedgeland of *Baumea articulata* and *B. juncea*	8.82	
	VT3	*Melaleuca rhaphiophylla* low woodland	Low woodland of *Melaleuca rhaphiophylla* over sedgeland of *Gahnia trifida, Baumea articulata, B. juncea* over herbland of *Centella asiatica, *Carduus pycnocephalus*	21.61	
	VT4	*Eucalyptus rudis* woodland	Woodland of *Eucalyptus rudis* over sedgeland of *Baumea articulata* and grassland of **Bromus diandrus, *Cenchrus clandestinum* over herbland of **Fumaria capreolata*	4.17	
	PC	Parkland cleared		19.53	
Trennant Park Nature Reserve	VT1	*Banksia littoralis* woodland over mixed tall shrubland	Woodland of *Banksia littoralis* over tall open scrub of *Banksia littoralis, Kunzea glabrescens, Spyridium glabrescens* over open shrubland of *Trymalium ledifolium* over grassland of **Briza maxima, B. minor, Ehrharta calycina* over very open herbland of *Tricoryne elatior, Trachymene pilosa, *Ursinia anthemioides*	0.71	
	VT2	*Spyridium globulosum* tall shrubland	Tall open scrub of *Spyridium globulosum, VIminaria juncea, Melaleuca rhaphiophylla* over sedgeland of *Baumea juncea, Lepidosperma longitudinale, Dianella revoluta* and grassland of **Briza maxima, Austrostipa sp., Ehrharta calycina* over herbland of *Tricoryne elatior, *Lysimachia arvensis, Microtis sp.*	1.84	
	VT3	*Baumea articulata* closed sedgeland	Closed sedgeland of *Baumea articulata*	1.90	
	VT4	*Eucalyptus gomphocephala* woodland	Woodland of *Eucalyptus gomphocephala* over tall shrubland of *Spyridium globulosum* over sedgeland of *Baumea juncea, Lepidosperma longitudinale,* over grassland of **Avena barbata*	1.40	
	VT5	*Melaleuca rhapiophylla* low woodland	Low woodland of *Melaleuca rhaphiophylla* over tall shrubland of *Spyridium globulosum* over sedgeland of *Baumea juncea* over very open herbland of **Fumaria capreolata, Muehlenbeckia adpressa*	1.62	
Tuart Park	OW	Open water		0.12	Artificial lake
	PC	Parkland cleared		2.40	Parkland
	VT1	Eucalyptus gomphocephala open forest over mixed Banksia woodland	Open forest of *Eucalyptus gomphocephala* over woodland of *Banksia littoralis, B. ilicifolia* over tall open shrubland of *Spyridium globulosum, Acacia rostellifera, B. sessilis* over open shrubland of *A. rostellifera, Melaleuca systena, Hakea prostrata* over very open shrubland of *Hibbertia hypericoides, Acacia pulchella,* over open sedgeland of *Desmocladus flexuosus* and grassland of *Ehrharta calycina, E. longiflora* with *Clematis linearifolia, Hardenbergia comptoniana*	1.89	Tuart woodland, mixed *Banksia* woodland
	VT2	Enrichment planting		0.22	
Woodleigh Grove Reserve	PC	Parkland cleared		0.62	
	VT1	*Gahnia trifida* and *Juncus spp.* closed sedgeland	Closed sedgeland of *Gahnia trifida, Juncus acutus, Juncus sp.* With tall open shrubland of *Melaleuca rhaphiophylla*	1.86	*Juncus acutus, J. amabilis, Gahnia trifida* closed sedgeland
	VT2	*Melaleuca rhaphiophylla* low open forest	Low open forest of *Melaleuca rhaphiophylla* over sedgeland of *Gahnia trifida, Juncus acutus, Juncus sp.*, over herbland of *Centella asiatica*	3.65	*Melaleuca rhaphiophylla, M. viminea, Eucalyptus botyroides* woodland

Appendix B *cont.*

Table B.2 **Significant flora species recorded as occurring or potentially occurring within the City of Rockingham**

Family	Taxon	Status		Description	Habitat	Source	
		Federal	State			DPaW Databases	Naturemap
Apocynaceae	*Parsonsia diaphanophleba*		P4	Woody climber, to 10 m high. Flowers white/cream and pink, Jan to Feb or Apr to Jun or Sep.	Alluvial soils. Along rivers.	●	
Aponogetonaceae	*Aponogeton hexatepalus*		P4	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Flowers green-white, Jul to Oct.	Mud. Freshwater: ponds, rivers, claypans.	●	
Brassicaceae	*Cardamine paucijuga*		P2	Slender erect annual, herb, to 0.4 m high.	Flowers white, Sep to Oct. In moist to dry habitats.	●	
Cyperaceae	*Cyathochaeta teretifolia*		P3	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Flowers brown.	Grey sand, sandy clay. Swamps, creek edges.	●	
Cyperaceae	*Schoenus capillifolius*		P3	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Flowers green, Oct to Nov.	Brown mud. Claypans.	●	
Euphorbiaceae	*Beyeria cinerea subsp. cinerea*		P3			●	●
Euphorbiaceae	*Stachystemon sp. Keysbrook* (R. Archer 17/11/99)		P1			●	
Fabaceae	*Acacia benthamii*		P2	Shrub, ca 1 m high. Flowers yellow, Aug to Sep.	Sand. Typically on limestone breakaways.	●	●
Fabaceae	*Acacia lasiocarpa var. bracteolata long peduncle variant* (G.J. Keighery 5026)		P1	Shrub, 0.4-1.5 m high. Flowers yellow, May or Aug.	Grey or black sand over clay. Swampy areas, winter wet lowlands.	●	
Fabaceae	*Dillwynia dillwynioides*		P3	Decumbent or erect, slender shrub, 0.3-1.2 m high. Flowers red and yellow/orange, Aug to Dec.	Sandy soils. Winter-wet depressions.	●	
Fabaceae	*Jacksonia sericea*		P4	Low spreading shrub, to 0.6 m high. Flowers orange, usually Dec or Jan to Feb.	Calcareous and sandy soils.	●	●
Fabaceae	*Sphaerolobium calcicola*		P3	Slender, multi-stemmed, scandent or erect shrub, to 1.5 m high. Flowers orange-red, Jun or Sep to Nov.	White-grey-brown sand, sandy clay over limestone, black peaty sandy clay. Tall dunes, winter-wet flats, interdunal swamps, low-lying areas.	●	●

Family	Taxon	Status		Description	Habitat	Source	
		Federal	State			DPaW Databases	Naturemap
Haemodoraceae	*Conostylis pauciflora subsp. pauciflora*		P4	Rhizomatous, stoloniferous perennial, grass-like or herb, 0.1-0.35 m high. Flowers yellow, Aug to Oct.	Grey sand, limestone. Hillslopes, consolidated dunes.	●	
Hemerocallidaceae	*Johnsonia pubescens subsp. cygnorum*		P2	Tufted perennial, herb, 0.15-0.25 m high. Flowers white-green, Sep.	Grey-white-yellow sand. Flats, seasonally-wet sites.	●	
Malvaceae	*Lasiopetalum membranaceum*		P3	Multi-stemmed shrub, 0.2-1 m high. Flowers pink-blue-purple, Sep to Dec.	Sand over limestone.	●	
Orchidaceae	*Caladenia huegelii*	En	T	Tuberous, perennial, herb, 0.25-0.6 m high. Flowers green and cream and red, Sep to Oct.	Grey or brown sand, clay loam. This species occurs in Banksia woodland on the Swan Coastal Plain.	●	
Orchidaceae	*Diuris drummondii*	VU	T	Tuberous, perennial, herb, 0.5-1.05 m high. Flowers yellow, Nov to Dec or Jan.	Low-lying depressions, swamps.	●	
Orchidaceae	*Diuris micrantha*		T	Tuberous, perennial, herb, 0.3-0.6 m high. Flowers yellow and brown, Sep to Oct.	Brown loamy clay. Winter-wet swamps, in shallow water.	●	
Orchidaceae	*Drakaea elastica*	CR	T	Tuberous, perennial, herb, 0.12-0.3 m high. Flowers red and green and yellow, Oct to Nov	White or grey sand. Low-lying situations adjoining winter-wet swamps.	●	
Portulaceae	*Calandrinia oraria*		P3	Annual herb, semi-erect to erect to 0.3m tall, thickened stem at base basal leaves fleshy (Obbens 2014)	Restricted to coastal habitat in low coastal heth or herbland on small white foredunes and up to 150m inland in larger dunes (Obbens 2014).	●	
Proteaceae	*Synaphea sp. Serpentine* (G.R. Brand 103)		T			●	
Sapindaceae	*Dodonaea hackettiana*		P4	Erect shrub or tree, 1-5 m high. Flowers yellow-green/red, mainly Jul to Oct.	Sand. Outcropping limestone.	●	●
Stylidiaceae	*Stylidium ireneae*		P4	Lax perennial, herb,0.1-0.28 m high, Leaves oblanceolate, 0.4-2 cm long, 1-3 (-5) mm wide, apex subacute to acuminate, margin entire, glandular. Scape glandular. Inflorescence racemose. Flowers pink, Oct to Dec.	Sandy loam. Valleys near creek lines, woodland, often with Agonis.	●	
Stylidiaceae	*Stylidium longitubum*		P3	Erect annual (ephemeral), herb, 0.05-0.12 m high. Flowers pink, Oct to Dec.	Sandy clay, clay. Seasonal wetlands.	●	●

Table B.2 **Significant flora species recorded as occurring or potentially occurring within the City of Rockingham** *cont.*

Family	Taxon	Status		Description	Habitat	Source	
		Federal	State			DPaW Databases	Naturemap
Stylidiaceae	*Stylidium paludicola*		P3	Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Flowers pink, Oct to Dec	Peaty sand over clay. Winter wet habitats. Marri and *Melaleuca* woodland, *Melaleuca* shrubland.	●	
Thymelaeaceae	*Pimelea calcicola*		P3	Erect to spreading shrub, 0.2-1 m high. Flowers pink, Sep to Nov.	Sand. Coastal limestone ridges.	●	

Table B.3 **Flora species recorded within the reserves during the field survey**

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Aizoaceae	*Carpobrotus*	*edulis*	Hottentot Fig	*M									●	●								●	●		
Aizoaceae	*Carpobrotus*	*virescens*	Coastal Pigface			●					●							●		●					
Aizoaceae	*Tetragonia*	*decumbens*	Sea Spinach	*		●			●		●									●	●				
Alliaceae	*Allium*	*triquetrum*	Three-cornered Garlic	*M						●														●	
Anacardiaceae	*Schinus*	*terebinthifolius*		*M	●	●									●						●	●			●
Anarthriaceae	*Lyginia*	*imberbis*												●											
Apiaceae	*Apium*	*prostratum*																	●						
Apiaceae	*Centella*	*asiatica*				●			●		●	●					●			●		●	●		●
Apiaceae	*Daucus*	*glochidiatus*	Australian Carrot			●	●				●														
Apiaceae	*Eryngium*	*pinnatifidum subsp. pinnatifidum*	Blue Devils				●																	●	
Apiaceae	*Xanthosia*	*huegelii*					●						●												
Apocynaceae	*Alyxia*	*buxifolia*	Dysentery Bush								●								●		●				
Apocynaceae	*Gomphocarpus*	*fruticosus*	Narrowleaf Cottonbush	* DP											●				●			●	●	●	
Apocynaceae	*Nerium*	*oleander*	Oleander	*																		●			
Araceae	*Zantedeschia*	*aethiopica*	Arum Lily	*DP			●															●			
Araliaceae	*Hedera*	*helix*	Ivy	*	●																				
Araliaceae	*Trachymene*	*pilosa*	Native Parsnip				●						●	●									●	●	
Asparagaceae	*Acanthocarpus*	*preissii*				●			●	●	●	●			●	●		●	●	●	●			●	
Asparagaceae	*Agave*	*americana*	Century Plant	*			●								●										

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Asparagaceae	*Asparagus*	*asparagoides*	Bridal Creeper	*DP/ WoNS						●					●										
Asparagaceae	*Chamaescilla*	*corymbosa*	Blue Squill										●	●											
Asparagaceae	*Lomandra*	*maritima*			●	●		●	●	●		●			●	●		●	●					●	
Asparagaceae	*Sowerbaea*	*laxiflora*	Purple Tassels				●						●	●										●	
Asparagaceae	*Thysanotus*	*arenarius*						●																	
Asparagaceae	*Thysanotus*	*sp.*						●				●				●									●
Asparagaceae	*Thysanotus*	*sparteus*				●								●											
Asparagaceae	*Thysanotus*	*triandrus*																	●						
Asphodelaceae	*Asphodelus*	*fistulosus*	Onion Weed	*	●					●					●			●			●				
Asphodelaceae	*Trachyandra*	*divaricata*		*		●		●	●	●	●	●				●		●		●	●		●		●
Asteraceae	*Arctotheca*	*calendula*	Cape Weed	*	●	●				●	●	●	●	●				●	●	●	●	●	●		
Asteraceae	*Arctotheca*	*populifolia*	Dune Arthotheca	*														●		●					
Asteraceae	*Asteridea*	*pulverulenta*	Common Bristle Daisy			●																			
Asteraceae	*Brachyscome*	*iberidifolia*												●											
Asteraceae	*Carduus*	*pycnocephalus*	Slender Thistle	*		●				●												●			
Asteraceae	*Centaurea*	*melitensis*	Maltese Cockspur	*M									●						●						
Asteraceae	*Cirsium*	*vulgare*	Spear Thistle	*		●																			●
Asteraceae	*Conyza*	*sp.*								●	●										●				●
Asteraceae	*Conyza*	*sumatrensis*																				●			
Asteraceae	*Cotula*	*turbinata*	Funnel Weed	*	●								●												
Asteraceae	*Craspedia*	*sp. Yalgorup National Park (G. J. Keighery 14449)*												●											
Asteraceae	*Crepis*	*foetida*		*						●															

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Asteraceae	*Dimorphotheca*	*ecklonis*		*						●	●				●										
Asteraceae	*Gazania*	*linearis*		*	●																●				
Asteraceae	*Hypochaeris*	*glabra*	Smooth Catsear	*	●		●	●		●			●	●								●	●		
Asteraceae	*Lactuca*	*serriola*	Prickly Lettuce	*M		●			●	●					●					●	●	●		●	
Asteraceae	*Lagenophora*	*huegelii*												●											
Asteraceae	*Millotia*	*myosotidifolia*					●																		
Asteraceae	*Olearia*	*axillaris*	Coastal Daisybush			●		●	●	●	●	●		●	●	●	●	●		●	●	●			
Asteraceae	*Pithocarpa*	*cordata*									●			●											
Asteraceae	*Podolepis*	*gracilis*	Slender Podolepis				●						●	●											
Asteraceae	*Podotheca*	*chrysantha*	Yellow Podotheca											●											
Asteraceae	*Podotheca*	*gnaphalioides*	Golden Long-heads											●											
Asteraceae	*Senecio*	*condylus*	Coastal Groundsel		●	●		●			●	●					●	●		●					
Asteraceae	*Senecio*	*pinnatifolius*																				●	●		
Asteraceae	*Sonchus*	*asper*	Rough Sowthistle	*		●			●									●		●	●				●
Asteraceae	*Sonchus*	*hydrophilus*	Native Sowthistle					●	●																
Asteraceae	*Sonchus*	*oleraceus*	Common Sowthistle	*		●	●	●		●	●	●		●	●	●			●			x		●	●
Asteraceae	*Taraxacum*	*officinale*	Dandelion	*		●									●									●	●
Asteraceae	*Ursinia*	*anthemoides*	Ursinia	*			●						●	●					●				●		
Brassicaceae	*Brassica*	*tournefortii*	Mediterranean Turnip	*	●		●		●	●					●	●		●				●			

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Brassicaceae	*Cakile*	*maritima*	Sea Rocket	*																●					
Brassicaceae	*Diplotaxis*	*muralis*	Wall Rocket	*												●					●				
Brassicaceae	*Lobularia*	*maritima*	Sweet Alyssum	*																	●				
Brassicaceae	*Raphanus*	*raphanistrum*	Wild Radish	*							●											●			
Campanulaceae	*Lobelia*	*anceps*	Angled Lobelia			●													●			●	●		
Campanulaceae	*Lobelia*	*tenuior*	Slender Lobelia			●										●								●	
Campanulaceae	*Wahlenbergia*	*capensis*		*			●						●	●									●		
Campanulaceae	*Wahlenbergia*	*preissii*					●																		
Caprifoliaceae	*Centranthus*	*macrosiphon*		* H															●						
Caprifoliaceae	*Scabiosa*	*atropurpurea*	Purple Pincushion	*M	●										●				●				●		
Caryophyllaceae	*Cerastium*	*glomeratum*	Mouse Ear Chickweed	*							●			●					●	●			●	●	
Caryophyllaceae	*Petrorhagia*	*dubia*		*	●			●		●				●	●	●			●				●		
Caryophyllaceae	*Polycarpon*	*tetraphyllum*	Fourleaf Allseed	*														●					●		
Caryophyllaceae	*Silene*	*gallica var. quinquevulnera*	French Catchfly	*										●					●				●		
Casuarinaceae	*Allocasuarina*	*fraseriana*	Sheoak				●						●	●	●										
Casuarinaceae	*Casuarina*	*obesa*	Swamp Sheoak	pl																●					
Chenopodiaceae	*Atriplex*	*isatidea*									●														
Chenopodiaceae	*Rhagodia*	*baccata*				●		●	●	●	●	●				●		●			●				
Chenopodiaceae	*Salsola*	*australis*																							
Colchicaceae	*Burchardia*	*congesta*					●						●	●											
Convolvulaceae	*Cuscuta*	*epithyum*	Lesser Dodder	*												●		●		●					
Crassulaceae	*Crassula*	*colorata*					●	●										●							

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Crassulaceae	*Crassula*	*glomerata*		*				●	●	●	●	●			●	●	●	●	●	●	●		●	●	
Cupressaceae	*Callitris*	*preissii*	Rottnest Island Pine						●		●				●					●					
Cyperaceae	*Baumaea*	*articulata*	Jointed Rush			●																●	●		●
Cyperaceae	*Baumea*	*juncea*	Bare Twigrush					●		●	●	●					●		●			●	●		●
Cyperaceae	*Baumea*	*preissii*									●	●													
Cyperaceae	*Cyperus*	*congestus*	Dense Flat-sedge								●														
Cyperaceae	*Cyperus*	*tenuiflorus*	Scaly Sedge	*							●														
Cyperaceae	*Ficinia*	*nodosa*	Knotted Club Rush			●		●	●	●	●	●					●	●		●	●		●		
Cyperaceae	*Gahnia*	*trifida*	Coast Saw-sedge			●				●	●								●			●			●
Cyperaceae	*Isolepis*	*cernua car. Setiformis*								●															●
Cyperaceae	*Lepidosperma*	*calcicola*								●					●										
Cyperaceae	*Lepidosperma*	*gladiatum*	Coast Sword-sedge			●		●	●	●	●	●					●	●	●	●	●		●		
Cyperaceae	*Lepidosperma*	*longitudinale*	Pithy Sword-sedge							●			●						●			●	●		●
Cyperaceae	*Lepidosperma*	*pubisquameum*						●		●															
Cyperaceae	*Lepidosperma*	*sp.*			●		●								●										
Cyperaceae	*Lepidosperma*	*squamatum*							●																
Cyperaceae	*Mesomelaena*	*pseudostygia*											●												
Cyperaceae	*Schoenus*	*grandiflorus*	Large Flowered Bogrush			●	●							●									●	●	
Cyperaceae	*Tetraria*	*octandra*												●											
Dasypogonaceae	*Calectasia*	*narragara*											●	●											

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Dasypogonaceae	*Dasypogon*	*bromeliifolius*	Pineapple Bush				●						●	●											
Dilleniaceae	*Hibbertia*	*cuneiformis*	Cutleaf Hibbertia	r,s					●		●					●	●			●			●		
Dilleniaceae	*Hibbertia*	*hypericoides*	Yellow Buttercups				●						●	●										●	
Dilleniaceae	*Hibbertia*	*racemosa*	Stalked Guinea Flower							●															
Droseraceae	*Drosera*	*erythrohiza*	Red Ink Sundew				●							●											
Droseraceae	*Drosera*	*sp.*											●												
Ericaceae	*Astroloma*	*ciliatum*	Candle Cranberry										●												
Ericaceae	*Leucopogon*	*parviflorus*	Coast Beard-heath					●		●					●		●	●	●						
Ericaceae	*Leucopogon*	*propinquus*					●						●	●											
Ericaceae	*Lysinema*	*pentapetalum*												●											
Euphorbiaceae	*Adriana*	*quadripartita*	Bitter Bush			●						●													
Euphorbiaceae	*Euphorbia*	*peplus*	Petty Spurge	*																●	●				
Euphorbiaceae	*Euphorbia*	*terracina*	Geraldton Carnation Weed	*M	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Euphorbiaceae	*Ricinus*	*communis*	Castor Oil Plant	*M	●					●												●			
Fabaceae	*Acacia*	*cochlearis*	Rigid Wattle								●														
Fabaceae	*Acacia*	*cyclops*	Coastal Wattle													●	●		●	●			●		
Fabaceae	*Acacia*	*huegelii*																							
Fabaceae	*Acacia*	*lasiocarpa var. lasiocarpa*	Panjang		●	●		●	●		●	●			●	●									
Fabaceae	*Acacia*	*pulchella*	Prickly Moses		●		●			●	●		●	●									●		●	●

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Fabaceae	*Acacia*	*pulchella var. glaberrima*	Prickly Moses																				●		
Fabaceae	*Acacia*	*rostellifera*	Summer-scented Wattle		●	●		●	●	●		●			●	●	●	●	●		●			●	
Fabaceae	*Acacia*	*saligna*	Orange Wattle		●	●		●	●	●	●	●			●			●	●			●	●		●
Fabaceae	*Acacia*	*stenoptera*					●						●												
Fabaceae	*Acacia*	*xanthina*	White-stemmed Wattle	pl											●										
Fabaceae	*Bossiaea*	*eriocarpa*					●						●	●											
Fabaceae	*Chamaecytisus*	*palmensis*	Tagasaste	*									●												
Fabaceae	*Daviesia*	*incrassata subsp. incrassata*											●												
Fabaceae	*Daviesia*	*physodes*											●												
Fabaceae	*Daviesia*	*triflora*											●	●											
Fabaceae	*Gastrolobium*	*capitatum*					●																		
Fabaceae	*Gompholobium*	*confertum*												●											
Fabaceae	*Gompholobium*	*tomentosum*	Hairy Yellow Pea				●	●					●	●		●									
Fabaceae	*Hardenbergia*	*comptoniana*	Native Wisteria		●	●	●	●	●	●	●	●	●	●		●	●	●	●	●				●	●
Fabaceae	*Hovea*	*pungens*	Devil's Pins											●											
Fabaceae	*Hovea*	*trisperma var. trisperma*					●							●											
Fabaceae	*Isotropis*	*cuneifolia*											●												
Fabaceae	*Jacksonia*	*furcellata*	Grey Stinkwood		●		●	●		●		●	●	●	●			●	●				●		●
Fabaceae	*Jacksonia*	*sternbergiana*	Stinkwood		●	●	●		●				●										●		

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Fabaceae	*Kennedia*	*coccinea subsp. coccinea*	Coral Vine	s						●															●
Fabaceae	*Kennedia*	*prostrata*	Scarlet Runner		●	●	●	●		●			●	●				●				●			
Fabaceae	*Lotus*	*sp.*		*									●	●											
Fabaceae	*Lupinus*	*cosentinii*		*H	●		●			●				●								●			
Fabaceae	*Medicago*	*polymorpha*	Burr Medic	*	●	●			●	●	●	●	●	●	●					●				●	
Fabaceae	*Melilotus*	*indicus*		*M	●			●	●	●	●	●							●				●	●	
Fabaceae	*Sphaerolobium*	*calcicola*		P3													●								
Fabaceae	*Templetonia*	*retusa*	Cockies Tongues		●					●					●										●
Fabaceae	*Trifolium*	*angustifolium var. angustifolium*	Narrowleaf Clover	*		●																			
Fabaceae	*Trifolium*	*campestre*	Hop Clover	*	●					●						●			●		●	●			
Fabaceae	*Trifolium*	*dubium*	Suckling Clover	*			●						●												
Fabaceae	*Trifolium*	*tomentosum*	Woolly Clover	*				●						●											
Fabaceae	*Vicia*	*sativa*	Common Vetch	*						●												●	●		
Fabaceae	*Viminaria*	*juncea*	Swishbush																●			●	●		
Geraniaceae	*Erodium*	*botrys*	Long Storksbill	*																		●			
Geraniaceae	*Erodium*	*circutarium*	Common Storksbill	*	●				●	●			●												
Geraniaceae	*Erodium*	*sp.*					●																		
Geraniaceae	*Geranium*	*molle*	Dove's Foot Cranesbill	*						●			●											●	
Geraniaceae	*Pelargonium*	*capitatum*	Rose Pelargonium	*	●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●	●
Geraniaceae	*Pelargonium*	*xdomesticum*		*									●												

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Goodeniaceae	*Dampiera*	*linearis*	Common Dampiera				●							●											
Goodeniaceae	*Scaevola*	*anchusifolia*			●	●		●	●																
Goodeniaceae	*Scaevola*	*canescens*	Grey Scaevola				●						●	●											
Goodeniaceae	*Scaevola*	*crassifolia*	Thick-leaved Fan-flower								●					●	●	●		●	●				
Goodeniaceae	*Scaevola*	*nitida*	Shining Fanflower													●									
Gyrostemonaceae	*Tersonia*	*cyathiflora*	Button Grass																					●	
Haemodoraceae	*Anigozanthos*	*manglesii*	Mangles Kangaroo Paw				●							●											
Haemodoraceae	*Conostylis*	*aculeata subsp. aculeata*	Prickly Conostylis		●		●					●	●	●	●									●	
Haemodoraceae	*Conostylis*	*aculeata subsp. preisii*								●					●										
Haemodoraceae	*Conostylis*	*candicans subsp. calcicola*				●		●	●		●	●					●	●		●					
Haemodoraceae	*Conostylis*	*candicans subsp. candicans*														●				●			●		
Haemodoraceae	*Haemodorum*	*sp.*																					●		
Haemodoraceae	*Haemodorum*	*spicatum*	Mardja																				●		
Haemodoraceae	*Phlebocarya*	*ciliata*											●	●											
Hemerocallidaceae	*Agrostocrinum*	*hirsutum*											●												
Hemerocallidaceae	*Caesia*	*micrantha*	Pale Grass-lily				●						●												
Hemerocallidaceae	*Corynotheca*	*micrantha*	Sand Lily				●						●	●											
Hemerocallidaceae	*Dianella*	*revoluta var. divaricata*	Blueberry Lily		●		●	●		●		●	●	●	●								●		●
Hemerocallidaceae	*Tricoryne*	*elatior*	Yellow Autumn Lily							●													●		●
Iridaceae	*Ferraria*	*crispa*	Black Flag	*M															●						

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Iridaceae	*Freesia*	*alba x leichtlinii*	Freesia	*			●						●												
Iridaceae	*Gladiolus*	*caryophyllaceus*	Wild Gladiolus	*M			●							●											
Iridaceae	*Hesperantha*	*falcata*		*			●																		
Iridaceae	*Ixia*	*polystachya*	Variable Ixia	*									●												
Iridaceae	*Patersonia*	*occidentalis*																					●		
Iridaceae	*Romulea*	*rosea*	Guildford Grass	*	●	●	●	●					●		●		●		●			●			
Iridaceae	*Watsonia*	*meriana var. bulbillifera*		*H			●						●												
Juncaceae	*Juncus*	*acutus*	Spiny Rush	*H																					●
Juncaceae	*Juncus*	*?amabilis*																							●
Juncaceae	*Juncus*	*kraussii subsp. australiensis*	Snogerup			●					●						●			●					
Juncaceae	*Juncus*	*pallidus*									●														
Juncaginaceae	*Triglochin*	*striata*																				●			
Lamiaceae	*Hemiandra*	*glabra*																		●					
Lamiaceae	*Hemiandra*	*pungens*	Snakebush			●			●				●	●											
Lamiaceae	*Lavandula*	*stoechas*	Italian Lavender	*															●						
Lauraceae	*Cassytha*	*flava subsp. flava*	Dodder Laurel													●									
Lauraceae	*Cassytha*	*racemosa*	Dodder Laurel																			●			
Lauraceae	*Cassytha*	*sp.*									●						●		●	●	●				●
Linaceae	*Linum*	*marginale*	Wild Flax			●		●																	
Loganiaceae	*Logania*	*vaginalis*	White Spray			●		●	●	●		●												●	●
Loganiaceae	*Phyllangium*	*paradoxum*												●											
Loranthceae	*Nuytsia*	*floribunda*	Christmas Tree											●			●								
Malvaceae	*Guichenotia*	*ledifolia*				●																			
Malvaceae	*Malva*	*parviflora*	Marshmallow	*		●	●			●										●					

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Malvaceae	*Thomasia*	*cognata*								●															
Molluginaceae	*Macarthuria*	*australis*												●											
Moraceae	*Ficus*	*carica*	Common Fig	*	●	●	●			●									●			●	●	●	●
Moraceae	*Ficus*	*sp.*		* pl									●												
Myrtaceae	*Agonis*	*flexuosa*	Peppermint	pl	pl						●	●	●		●										
Myrtaceae	*Beaufortia*	*elegans*		pl											●										
Myrtaceae	*Calothamnus*	*quadrifidus*			●					●					●										
Myrtaceae	*Calothamnus*	*sp.*		pl										●	●										
Myrtaceae	*Calytrix*	*fraseri*	Pink Summer Calytrix											●											
Myrtaceae	*Chamelaucium*	*uncinatum*	Geraldton Wax	*			●								●										●
Myrtaceae	*Corymbia*	*calophylla*	Marri				●						●									●			
Myrtaceae	*Eucalyptus*	*citriodora*	Lemon-scented Gum	*pl	●																				
Myrtaceae	*Eucalyptus*	*marginata*	Jarrah										●												
Myrtaceae	*Eucalyptus*	*platypus*		pl											●			●		●					
Myrtaceae	*Eucalyptus*	*rudis subsp. rudis*	Flooded Gum								●											●			
Myrtaceae	*Eucalyptus*	*sp.*		* pl	●										●										
Myrtaceae	*Eucalyptus*	*gomphocephala*	Tuart			●				●					●				●			●	●	●	●
Myrtaceae	*Hypocalymma*	*angustifolium var. angustifolium*	White Myrtle											●											
Myrtaceae	*Kunzea*	*glabrescens*	Spearwood				●		●				●	●	●				●				●		
Myrtaceae	*Leptospermum*	*laevigatum*	Coast Teatree	*H	●										●			●		●					
Myrtaceae	*Melaleuca*	*teretifolia*	Banbar			●													●			●			●
Myrtaceae	*Melaleuca*	*huegelii subsp. huegelii*	Chenille Honeymyrtle												●										
Myrtaceae	*Melaleuca*	*lanceolata*	Rottnest Teatree	d,p	●	●											●			●				●	

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Myrtaceae	*Melaleuca*	*rhaphiophylla*	Swamp Paperbark			●			●								●		●			●	●		●
Myrtaceae	*Melaleuca*	*systena*			●			●							●				●					●	
Oleaceae	*Olea*	*europaea*	Olive	*pl/H							●									●	●				
Onagraceae	*Oenothera*	*drummondii*	Beach Evening Primrose	*M							●							●		●	●				
Onagraceae	*Oenothera*	*stricta*	Common Evening Primrose	*		●														●					
Orchidaceae	*Caladenia*	*discoidea*	Dancing Orchid				●						●												
Orchidaceae	*Caladenia*	*flava subsp. flava*	Cowslip Orchid				●						●												
Orchidaceae	*Caladenia*	*latifolia*	Pink Fairy Orchid				●																	●	
Orchidaceae	*Caladenia*	*sp.*					●							●											
Orchidaceae	*Diuris*	*corymbosa*					●																		
Orchidaceae	*Elythranthera*	*brunonis*	Purple Enamel Orchid				●							●											
Orchidaceae	*Microtis*	*media subsp. densiflora*	Tall Mignonette Orchid											●											●
Orchidaceae	*Microtis*	*media subsp. media*	Tall Mignonette Orchid					●					●										●		
Orchidaceae	*Pterostylis*	*sanguinea*					●																		
Orchidaceae	*Pterostylis*	*sp.*											●	●											
Orchidaceae	*Pterostylis*	*vittata*	Banded Greenhood				●																		
Orchidaceae	*Pyrorchis*	*nigricans*	Red Beaks				●						●	●											

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Orchidaceae	*Thelymitra*	*crinita*	Blue Lady Orchid											●											
Orobanchaceae	*Bartsia*	*trixago*		*	●														●						
Orobanchaceae	*Orobanche*	*minor*	Lesser Broomrape	*		●	●	●	●	●			●			●						●	●	●	
Oxalidaceae	*Oxalis*	*corniculata*	Yellow Wood Sorrel	*											●										
Oxalidaceae	*Oxalis*	*glabra*		*									●												
Oxalidaceae	*Oxalis*	*pes-caprae*	Soursob	*			●		●	●						●		●	●			●		●	●
Papaveraceae	*Fumaria*	*capreolata*	Whiteflower Fumitory	*	●	●	●			●	●					●		●	●		●	●	●		
Papaveraceae	*Fumaria*	*muralis*	Wall Fumitory	*			●			●						●							●		●
Phoenicaceae	*Phoenix*	*sp.*	Palm			●																			
Phyllanthaceae	*Phyllanthus*	*calycinus*	False Boronia			●		●	●	●		●		●	●	●								●	
Phytolaccaceae	*Phytolacca*	*octandra*	Red Ink Plant	*		●																●			
Pittosporaceeae	*Billardiera*	*fusiformis*	Australian Bluebell																●				●		
Plantaginaceae	*Plantago*	*lanceolata*	Ribwort Plantain	*						●								●			●	●	●		
Poaceae	*Ammophila*	*arenaria*	Marram Grass	*																●					
Poaceae	*Amphipogon*	*laguroides*					●																		
Poaceae	*Austrostipa*	*flavescens*			●	●		●	●	●		●		●	●	●			●				●	●	
Poaceae	*Austrostipa*	*nitida*			●																				
Poaceae	*Avena*	*barbata*	Bearded Oat	*	●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●	●	●	●
Poaceae	*Briza*	*maxima*	Blowfly Grass	*			●						●	●					●			●	●	●	●
Poaceae	*Briza*	*minor*	Shivery Grass	*	●	●	●	●	●	●				●					●			●	●		●
Poaceae	*Bromus*	*diandrus*	Great Brome	*	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●
Poaceae	*Cenchrus*	*clandestinus*	Kikuyu Grass	*																	●	●			

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Poaceae	*Cenchrus*	*echinatus*	Burrgrass	*																					
Poaceae	*Cenchrus*	*setaceus*	Fountain Grass	*											●										
Poaceae	*Cortaderia*	*selloana*	Pampas Grass	*																		●			●
Poaceae	*Cynodon*	*dactylon*	Couch	*		●		●			●	●			●				●	●	●	●		●	
Poaceae	*Digitaria*	*sanguinalis*	Crab Grass	*															●						
Poaceae	*Ehrharta*	*calycina*	Perennial Veldt Grass	*	●		●	●	●	●		●	●	●	●			●	●			●	●	●	●
Poaceae	*Ehrharta*	*longiflora*	Annual Veldt Grass	*				●	●	●			●							●		●		●	
Poaceae	*Eragrostis*	*curvula*	African Lovegrass	*				●		●	●	●	●		●				●	●					
Poaceae	*Hordeum*	*leporinum*	Barley Grass	*			●			●									●						
Poaceae	*Lagurus*	*ovatus*	Hare's Tail Grass	*	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
Poaceae	*Lolium*	*multiflorum*	Italian Ryegrass	*						●															
Poaceae	*Lolium*	*perenne*	Perennial Ryegrass	*		●		●	●	●	●	●			●	●		●	●	●		●	●	●	
Poaceae	*Lolium*	*rigidum*	Wimmera Ryegrass	*						●								●			●				
Poaceae	*Phalaris*	*minor*	Lesser Canary Grass	*																					●
Poaceae	*Poa*	*porphyroclados*	Knotted Poa			●			●			●				●									

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Poaceae	*Polypogon*	*monspeliensis*	Annual Beardgrass	*						●															
Poaceae	*Spinifex*	*hirsutus*																		●	●				
Poaceae	*Spinifex*	*longifolius*	Beach Spinifex															●		●					
Poaceae	*Sporobolus*	*virginicus*	Marine Couch			●																			
Poaceae	*Stenotaphrum*	*secundatum*	Buffalo Grass	*							●				●						●	●			
Poaceae	*Vulpia*	*myuros*	Rat's Tail Fescue												●										
Polygalaceae	*Comesperma*	*confertum*						●						●											
Polygalaceae	*Comesperma*	*integerrimum*									●														
Polygalaceae	*Polygala*	*myrtifolia*	Myrtleleaf Milkwort	*M			●																		●
Polygonaceae	*Acetosella*	*vulgaris*		*																		●			
Polygonaceae	*Emex*	*australis*	Doublegee	* DP			●												●						
Polygonaceae	*Muehlenbeckia*	*adpressa*	Climbing Lignum			●				●									●			●	●		
Polygonaceae	*Rumex*	*crispus*	Curled Dock	*																			●		
Portulacaceae	*Calandrinia*	*brevipedata*	Short-stalked Purslane																						
Primulaceae	*Lysimachia*	*arvensis*	Pimpernel	*	●	●	●	●	●	●		●	●	●	●		●	●	●			●	●	●	●
Primulaceae	*Samolus*	*junceus*				●					●						●						●		
Proteaceae	*Adenanthos*	*cygnorum*	Common Woollybush											●											
Proteaceae	*Banksia*	*attenuata*	Slender Banksia				●						●	●											
Proteaceae	*Banksia*	*dallanneyi subsp. dallanneyi*	Couch Honeypot		●																			●	
Proteaceae	*Banksia*	*grandis*	Bull Banksia				●							●								●			

Appendix B *cont.*

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Proteaceae	*Banksia*	*ilicifolia*	Holly-leaved Banksia										●	●										●	
Proteaceae	*Banksia*	*littoralis*	Swamp Banksia							●									●				●	●	●
Proteaceae	*Banksia*	*menziesii*	Firewood Banksia				●						●	●											
Proteaceae	*Banksia*	*sessilis*	Parrot Bush				●												●					●	
Proteaceae	*Conospermum*	*triplinervium*	Tree Smokebush	s,p																			●		
Proteaceae	*Grevillea*	*crithmifolia*													●										
Proteaceae	*Grevillea*	*olivacea*		pl		●																			
Proteaceae	*Grevillea*	*preissii*							●																
Proteaceae	*Grevillea*	*vestita*									●														
Proteaceae	*Hakea*	*lissocarpha*	Honey Bush																				●		
Proteaceae	*Hakea*	*prostrata*	Harsh Hakea		●		●	●		●					●			●						●	
Proteaceae	*Hakea*	*varia*	Variable-leaved Hakea																●				●		
Proteaceae	*Petrophile*	*linearis*					●						●	●											
Proteaceae	*Stirlingia*	*latifolia*	Blueboy				●																		
Proteaceae	*Xylomelum*	*occidentale*	Woody Pear										●	●											
Ranunculaceae	*Clematis*	*linearifolia*			●	●				●					●	●	●	●	●	●				●	●
Ranunculaceae	*Ranunculus*	*muricatus*	Sharp Buttercup	*	●																				
Restionaceae	*Desmocladus*	*fasciculatus*				●	●						●	●											
Restionaceae	*Desmocladus*	*flexuosus*						●	●	●		●		●		●								●	
Restionaceae	*Hypolaena*	*exsulca*					●						●	●											
Rhamnaceae	*Spyridium*	*globulosum*	Basket Bush			●	●	●	●	●	●	●			●	●	●	●	●	●		●	●	●	●
Rhamnaceae	*Trymalium*	*ledifolium var. ledifolium*							●							●							●		

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Rubiaceae	*Galium*	*murale*	Small Goosegrass	*						●				●		●		●						●	
Rubiaceae	*Opercularia*	*hispidula*											●						●						●
Rubiaceae	*Opercularia*	*vaginata*			●	●	●	●	●							●						●			
Rutaceae	*Diplolaena*	*dampieri*	Southern Diplolaena	r,s		●			●											●					
Rutaceae	*Philotheca*	*spicata*											●	●											
Santalaceae	*Exocarpus*	*aphyllus*	Leafless Ballart								●								●	●					
Santalaceae	*Exocarpus*	*sparteus*	Broom Ballart					●	●			●				●			●		●		●		
Santalaceae	*Leptomeria*	*preissiana*															●				●				
Santalaceae	*Santalum*	*acuminatum*	Quandong													●									
Sapindaceae	*Dodonaea*	*hackettiana*	Hackett's Hopbush	P4						●															
Scrophulariaceae	*Dischisma*	*arenarium*									●					●	●								
Scrophulariaceae	*Eremophila*	*glabra subsp. albicans*	Tar Bush		●	●		●				●													
Scrophulariaceae	*Myoporum*	*caprarioides*	Slender Myoporum								●				●										
Scrophulariaceae	*Myoporum*	*insulare*	Blueberry Tree														●			●	●			●	
Scrophulariaceae	*Verbascum*	*virgatum*	Twiggy Mullein	*						●													●		
Solanaceae	*Anthocercis*	*ilicifolia*																					●		
Solanaceae	*Anthocercis*	*littorea*	Yellow Tailflower			●										●									
Solanaceae	*Physalis*	*peruviana*	Cape Gooseberry	*M																					●
Solanaceae	*Solanum*	*linnaeanum*		*DP/M																		●			

Appendix B *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Solanaceae	*Solanum*	*nigrum*	Black Berry Nightshade	*			●		●	●				●				●		●		●	●		●
Solanaceae	*Solanum*	*symonii*							●	●												●	●	●	●
Stylidiaceae	*Stylidium*	*brunonianum*	Pink Fountain Triggerplant				●																		
Stylidiaceae	*Stylidium*	*piliferum*	Common Butterfly Triggerplant				●						●	●											
Stylidiaceae	*Stylidium*	*schoenoides*	Cow Kicks				●						●	●											
Thymelaeaceae	*Pimelea*	*ferruginea*																			●				
Thymelaeaceae	*Pimelea*	*rosea subsp. rosea*	Rose Banjine				●						●	●									●	●	
Tropaeolaceae	*Tropaeolum*	*majus*	Garden Nasturtium	*	●																●				
Typhaceae	*Typha*	*orientalis*	Bulrush	*		●					●											●			●
Typhaceae	*Typha*	*sp.*		*													●								
Urticaceae	*Parietaria*	*debilis*	Pellitory								●									●				●	
Verbenaceae	*Lantana*	*camara*	Lantana	*WoNS																		●			
Violaceae	*Hybanthus*	*calycinus*					●			●			●	●										●	
Xanthorrhoeaceae	*Xanthorrhoea*	*brunonis*																							●
Xanthorrhoeaceae	*Xanthorrhoea*	*preissii*	Grass Tree		●		●	●		●		●		●	●								●		●
Zamiaceae	*Macrozamia*	*fraseri*					●						●	●									●		

* introduced pl: planted WoNS: Weed of National Significance DP: Declared Pest under the Biosecurity and Agriculture Management Act 2007

H: High M: Medium L: Low (Priority weed listing by DPaW) P: Priority listed by the Department of Parks and Wildlife

Table B.4 Locations of conservation significant flora species recorded within the reserves during the field survey

Reserve	Species	Status (DPaW listed)	Easting	Northing
Marillana Conservation Reserve	*Sphaerolobium calcicola*	Priority 3	382488	6412170
Dixon Road Conservation Precinct	*Pimelea calcicola*	Priority 3	385368	6427996

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Table B.5 Locations of significant or priority weed species recorded within the reserves during the field survey

Reserve	Species	Common Name	Easting	Northing	Count
Alf Powell Reserve	**Ficus carica*	Edible Fig	382753	6426001	5
Alf Powell Reserve	**Ficus carica*	Edible Fig	382723	6426160	1
Alf Powell Reserve	**Hedera helix*	English Ivy	382724	6426155	1
Alf Powell Reserve	**Leptospermum laevigatum*	Victorian Tea-tree	382754	6425996	1
Alf Powell Reserve	**Ricinus communis*	Castor Oil Plant	382760	6425678	2
Alf Powell Reserve	**Schinus terebinthifolius*	Pepper Tree	382757	6425998	1
Alf Powell Reserve	**Schinus terebinthifolius*	Pepper Tree	382696	6426214	1
Alf Powell Reserve	**Tropaeolum majus*	Garden Nasturtium	382755	6425993	2
Anstey Q Wetland	**Cirsium vulgare*	Spear Thistle	383600	6413622	1
Anstey Q Wetland	**Ficus carica*	Edible Fig	383600	6413627	1
Anstey Q Wetland	**Phoenix sp.*	**Phoenix sp.*	383653	6413483	2
Anstey Q Wetland	**Phoenix sp.*	**Phoenix sp.*	383653	6413518	2
Anstey Q Wetland	**Phoenix sp.*	**Phoenix sp.*	383601	6413577	3
Anstey Q Wetland	**Phytolacca octandra*	Red Ink Plant	383732	6413470	1
Anstey Q Wetland	**Schinus terebinthifolius*	Pepper Tree	383732	6413199	1
Anstey Q Wetland	**Schinus terebinthifolius*	Pepper Tree	383624	6413542	1
Anstey Q Wetland	**Typha orientalis*	Typha	383594	6413615	scattered
Baldivis Nature Reserve	**Agave americana*	Century Plant	389140	6425032	10+
Baldivis Nature Reserve	**Emex australis*	Double Gee	388789	6425117	1
Baldivis Nature Reserve	**Ficus carica*	Edible Fig	389068	6424887	1
Baldivis Nature Reserve	**Ficus carica*	Edible Fig	389058	6424886	1
Baldivis Nature Reserve	**Hesperantha falcata*		389130	6425033	scattered
Baldivis Nature Reserve	**Pelargonium capitatum*	Rose Pelargonium	388808	6425104	3
Baldivis Nature Reserve	**Watsonia meriana*	Bulbil Watsonia	389160	6425107	13
Baldivis Nature Reserve	**Watsonia meriana*	Bulbil Watsonia	389150	6425055	20+
Baldivis Nature Reserve	**Watsonia meriana*	Bulbil Watsonia	389136	6425037	many
Baldivis Nature Reserve	**Watsonia meriana*	Bulbil Watsonia	389000	6425105	6
Baldivis Nature Reserve	**Zantedeschia aethiopica*	Arum Lily	388821	6425036	1
Dixon Road Conservation Precinct	**Allium triquetrum*	Three-cornered Garlic	384234	6427574	small patch

Appendix B *cont.*

Reserve	Species	Common Name	Easting	Northing	Count
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385585	6428094	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385497	6428117	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385497	6428104	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385490	6428060	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385420	6428096	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385425	6428111	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385437	6428147	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385442	6428160	large patch
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385408	6428156	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385388	6428105	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385391	6428099	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385363	6428013	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385257	6428007	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385181	6428039	scattered
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	385144	6428021	scattered
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	384904	6427952	scattered
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	384596	6428089	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	384572	6428114	1
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	384543	6428074	scattered
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	384286	6427773	scattered
Dixon Road Conservation Precinct	**Asparagus asparagoides*	Bridal Creeper	384788	6427779	1
Dixon Road Conservation Precinct	**Carduus pycnocephalus*	Slender Thistle	385183	6427964	1
Dixon Road Conservation Precinct	**Ficus carica*	Edible Fig	385796	6428175	1
Dixon Road Conservation Precinct	**Ficus carica*	Edible Fig	384392	6428095	1

Reserve	Species	Common Name	Easting	Northing	Count
Dixon Road Conservation Precinct	**Ricinus communis*	Castor Oil Plant	385794	6428195	1
Dixon Road Conservation Precinct	**Ricinus communis*	Castor Oil Plant	385799	6428195	2
Dixon Road Conservation Precinct	**Ricinus communis*	Castor Oil Plant	385808	6428191	2
Dixon Road Conservation Precinct	**Solanum nigrum*	Black Berry Nightshade	385035	6428118	1
Dixon Road Conservation Precinct	**Solanum nigrum*	Black Berry Nightshade	384597	6428091	1
Hidden Swamp	**Dimorphotheca ecklonis*	Veld Daisy	382239	6413898	patch
Hidden Swamp	**Olea europaea*	Olive	382194	6413912	1
Hidden Swamp	**Typha orientalis*	Typha	382223	6413856	5m x 0.5 m
Karnup School Site	**Carpobrotus edulis*	Hottentot Fig	389377	6417407	1
Karnup School Site	**Carpobrotus edulis*	Hottentot Fig	389455	6417376	1
Karnup School Site	**Chamaecytisus palmensis*	Tagasaste	389372	6417405	1
Karnup School Site	**Chamaecytisus palmensis*	Tagasaste	389377	6417411	1
Karnup School Site	**Chamaecytisus palmensis*	Tagasaste	389379	6417412	1
Karnup School Site	**Chamaecytisus palmensis*	Tagasaste	389385	6417424	10+
Karnup School Site	**Pelargonium capitatum*	Rose Pelargonium	389429	6417341	1
Karnup School Site	**Watsonia meriana*	Bulbil Watsonia	389367	6417415	7 clumps
Karnup Townsite	**Carpobrotus edulis*	Hottentot Fig	389651	6417560	1
Lewington Reserve	**Agave americana*	Century Plant	381759	6429054	30
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382161	6429525	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382157	6429571	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382150	6429579	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382148	6429584	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382148	6429593	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382209	6429646	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382201	6429631	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382205	6429610	
Lewington Reserve	**Asparagus asparagoides*	Bridal Creeper	382198	6429604	
Lewington Reserve	**Dimorphotheca ecklonis*	Veld Daisy	381837	6429208	
Lewington Reserve	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	381926	6429218	
Lewington Reserve	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	381791	6429118	
Lewington Reserve	**Leptospermum laevigatum*	Victorian Tea-tree	382231	6429585	
Lewington Reserve	**Leptospermum laevigatum*	Victorian Tea-tree	381721	6428956	many
Lewington Reserve	**Leptospermum laevigatum*	Victorian Tea-tree	381753	6428908	
Lewington Reserve	**Leptospermum laevigatum*	Victorian Tea-tree	381727	6428982	
Lewington Reserve	**Pelargonium capitatum*	Rose Pelargonium	382148	6429586	5
Lewington Reserve	**Pelargonium capitatum*	Rose Pelargonium	381926	6428771	
Lewington Reserve	**Pelargonium capitatum*	Rose Pelargonium	381760	6429050	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382168	6429522	

Appendix B *cont.*

Reserve	Species	Common Name	Easting	Northing	Count
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382161	6429525	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382166	6429557	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382151	6429569	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382148	6429584	5
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382147	6429593	5
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382151	6429601	8
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382206	6429645	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382207	6429622	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382208	6429614	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382199	6429590	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381904	6429213	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381912	6429217	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381874	6429245	thicket
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381900	6429126	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381820	6429055	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381762	6428983	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381723	6428958	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381570	6428944	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381635	6428874	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381913	6428823	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381925	6428795	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381858	6428678	thicket
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381677	6428776	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381722	6428784	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381737	6429015	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381785	6429142	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381837	6429197	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381837	6429215	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381917	6429320	thicket
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381958	6429334	many
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	381994	6429403	
Lewington Reserve	**Schinus terebinthifolius*	Pepper Tree	382036	6429448	
Rockingham Road Conservation Reserve	**Solanum nigrum*	Black Berry Nightshade	382308	6430231	1
Sawley Close	**Emex australis*	Double Gee	384663	6412667	1
Sawley Close	**Ficus carica*	Edible Fig	384554	6412527	1
Sawley Close	**Ficus carica*	Edible Fig	384628	6412471	1
Sawley Close	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	384625	6412464	scattered throughout
Secret Harbour Foreshore	**Ammophila arenaria*	Marram Grass	382168	6413261	1
Shoalwater Foreshore	**Olea europaea*	Olive	378030	6425860	scattered
Shoalwater Foreshore	**Schinus terebinthifolius*	Pepper Tree	377909	6425389	2
Shoalwater Foreshore	**Schinus terebinthifolius*	Pepper Tree	378020	6425859	scattered

Reserve	Species	Common Name	Easting	Northing	Count
Shoalwater Foreshore	*Tropaeolum majus	Garden Nasturtium	378040	6425882	infestation
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387898	6422732	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387918	6422754	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387918	6422764	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387929	6422776	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387905	6422766	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387913	6422789	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387884	6422803	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387889	6422824	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387908	6422827	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387919	6422832	3
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387922	6422823	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387931	6422846	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387909	6422848	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387952	6422844	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387945	6422861	8
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387936	6422873	2
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387886	6422866	5
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387915	6422896	10
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387968	6422900	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387940	6422905	3
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387900	6422909	5
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	388035	6422862	5
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387895	6422934	4
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387903	6422979	20
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387959	6423073	3
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387917	6423095	10
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387934	6423204	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387915	6423276	2
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387887	6423320	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387858	6423280	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387846	6423329	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387748	6423281	1
Tamworth Hill Swamp	*Cortaderia selloana	Pampas Grass	387685	6423250	1
Tamworth Hill Swamp	*Ficus carica	Edible Fig	387922	6422557	many
Tamworth Hill Swamp	*Ficus carica	Edible Fig	387889	6422670	many
Tamworth Hill Swamp	*Ficus carica	Edible Fig	387958	6423203	scattered
Tamworth Hill Swamp	*Ficus carica	Edible Fig	387640	6423163	scattered
Tamworth Hill Swamp	*Ficus carica	Edible Fig	387669	6423020	scattered
Tamworth Hill Swamp	*Ficus carica	Edible Fig	387691	6422859	1
Tamworth Hill Swamp	*Ficus carica	Edible Fig	388054	6422200	scattered
Tamworth Hill Swamp	*Ficus carica	Edible Fig	388209	6422256	common

Appendix B *cont.*

Reserve	Species	Common Name	Easting	Northing	Count
Tamworth Hill Swamp	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	387946	6422645	many
Tamworth Hill Swamp	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	388177	6422217	scattered
Tamworth Hill Swamp	**Lantana camara*	Lantana	388013	6423098	1
Tamworth Hill Swamp	**Nerium oleander*	Oleander	387890	6422695	1
Tamworth Hill Swamp	**Phytolacca octandra*	Red Ink Plant	388179	6422403	1
Tamworth Hill Swamp	**Ricinus communis*	Castor Oil Plant	388115	6422559	scattered
Tamworth Hill Swamp	**Ricinus communis*	Castor Oil Plant	388260	6422305	scattered
Tamworth Hill Swamp	**Solanum linnaeanum*	Apple of Sodom	387916	6423307	1
Tamworth Hill Swamp	**Solanum linnaeanum*	Apple of Sodom	387895	6423357	patch
Tamworth Hill Swamp	**Solanum linnaeanum*	Apple of Sodom	387617	6422443	1
Tamworth Hill Swamp	**Solanum linnaeanum*	Apple of Sodom	387772	6422205	1
Tamworth Hill Swamp	**Typha orientalis*	Typha	388016	6423154	patch
Tamworth Hill Swamp	**Zantedeschia aethiopica*	Arum Lily	387999	6422967	1
Tamworth Hill Swamp	**Zantedeschia aethiopica*	Arum Lily	387637	6423090	2
Trenant Park	**Ficus carica*	Edible Fig	384444	6411965	1
Trenant Park	**Ficus carica*	Edible Fig	384425	6411945	1
Trenant Park	**Ficus carica*	Edible Fig	384451	6411908	2
Trenant Park	**Ficus carica*	Edible Fig	384430	6411810	6
Trenant Park	**Ficus carica*	Edible Fig	384431	6411826	2
Trenant Park	**Ficus carica*	Edible Fig	384394	6411849	scattered
Trenant Park	**Ficus carica*	Edible Fig	384401	6411792	1
Trenant Park	**Ficus carica*	Edible Fig	384495	6412210	1
Trenant Park	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	384459	6411918	5
Trenant Park	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	384437	6411819	2
Tuart Park	**Allium triquetrum*	Three-cornered Garlic	384115	6413645	1
Tuart Park	**Ficus carica*	Edible Fig	384145	6413810	1
Tuart Park	**Gomphocarpus fruticosus*	Narrowleaf Cottonbush	384181	6413766	1
Woodleigh Grove Reserve	**Cortaderia selloana*	Pampas Grass	387014	6422601	1
Woodleigh Grove Reserve	**Cortaderia selloana*	Pampas Grass	386790	6422396	2
Woodleigh Grove Reserve	**Ficus carica*	Edible Fig	386965	6422589	scattered throughout
Woodleigh Grove Reserve	**Ficus carica*	Edible Fig	386797	6422376	1
Woodleigh Grove Reserve	**Physalis peruviana*	Cape Gooseberry	387025	6422518	1
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	387018	6422597	1
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	386989	6422516	1
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	387030	6422590	1
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	387046	6422598	5
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	387041	6422583	scattered
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	387032	6422546	scattered
Woodleigh Grove Reserve	**Schinus terebinthifolius*	Pepper Tree	387030	6422503	scattered
Woodleigh Grove Reserve	**Typha orientalis*	Typha	386630	6422452	scattered

Table C.1 **Fauna species opportunistically recorded utilising the reserves during the field survey**

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh
Birds																									
Acanthizidae	*Gerygone*	*fusca*	Western Gerygone										●						●				●		
Acanthizidae	*Acanthiza*	*apicalis*	Inland Thornbill																●				●		
Acanthizidae	*Acanthiza*	*inornata*	Western Thornbill																		●				
Acanthizidae	*Smicrornis*	*brevirostris*	Weebill							●															
Anatidae	*Cygnus*	*atratus*	Black Swan																	●					
Anatidae	*Anas*	*superciliosa*	Pacific Black Duck																	●					
Anatidae	*Aythya*	*australis*	Hardhead								●														
Artamidae	*Cracticus*	*tibicen*	Australian Magpie		●	●																		●	
Artamidae	*Cracticus*	*nigrogularis*	Pied Butcherbird						●														●		
Cacatuidae	*Eolophus*	*roseicapillus*	Galah			●				●	●		●		●								●		
Cacatuidae	*Calyptorhycnhus*	*latirostris*	Carnaby's Black Cockatoo				●				●	●								●					
Cacatuidae	*Calyptorhycnhus*	*banksii naso*	Forest Red-tailed Black Cockatoo									●	●												
Campephagidae	*Coracina*	*novaehollandiae*	Black-faced Cuckoo-shrike						●	●			●		●			●		●	●				
Columbidae	*Ocyphaps*	*lophotes*	Crested Pigeon			●														●					
Columbidae	*Streptopelia*	*senegalensis*	Laughing Dove	*														●							
Columbidae	*Phaps*	*chalcoptera*	Common Bronzewing				●																●		
Corvidae	*Corvus*	*coronoides*	Australian Raven							●	●				●				●				●	●	
Halcyonidae	*Dacelo*	*novaeguineae*	Laughing Kookaburra				●						●												
Hirundinidae	*Hirundo*	*neoxena*	Welcome Swallow		●						●							●		●					
Hirundinidae	*Petrochelidon*	*nigricans*	Tree Martin															●							
Laridae	*Chroicocephalus*	*novaehollandiae*	Silver Gull								●							●		●					

Appendix C *cont.*

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh
Maluridae	*Malurus*	*splendens*	Splendid Fairy-wren							●					●								●		
Meliphagidae	*Lichenostomus*	*virescens*	Singing Honeyeater										●		●	●		●	●				●		
Meliphagidae	*Anthochaera*	*carunculata*	Red Wattlebird		●	●												●					●	●	
Meliphagidae	*Phylidonyris*	*novaehollandiae*	New Holland Honey-eater								●		●				●			●					
Meliphagidae	*Lichenostomus*	*ornatus*	Yellow-plumed Honeyeater												●		●								
Meliphagidae	*Phylidonyris*	*niger*	White-cheeked Honey-eater																		●		●		
Monarchidae	*Grallina*	*cyanoleuca*	Magpie-lark			●												●						●	
Pachycephalidae	*Colluricincla*	*harmonica*	Grey Shrike-thrush			●																	●		
Pachycephalidae	*Pachycephala*	*pectoralis*	Golden Whistler				●					●													
Pardalotidae	*Pardalotus*	*striatus*	Striated Pardalote				●					●													
Pelecanidae	*Pelecanus*	*conspicillatus*	Australian Pelican																		●				
Phalacrocoracidae	*Microcarbo*	*melanoleucos*	Little Pied Cormorant								●														
Psittacidae	*Barnardius*	*zonarius*	Australian Ringneck Parrot			●						●	●		●								●		
Rallidae	*Gallinula*	*tenebrosa*	Dusky Moorhen								●									●					
Rallidae	*Fulica*	*atra*	Eurasian Coot								●									●					
Rallidae	*Fulica*	*atra*	Eursasian Coot								●														
Rallidae	*Porphyrio*	*porphyrio*	Swamphen								●														
Rhipiduridae	*Rhipidura*	*albiscapa*	Grey Fantail							●		●			●	●	●								
Rhipiduridae	*Rhipidura*	*leucophrys*	Willy Wagtail					●	●	●	●				●			●		●					
Timaliidae	*Zosterops*	*lateralis*	Silvereye								●				●		●		●	●			●		
Mammals																									
Canidae	*Vulpes*	*vulpes*	Fox	*																			●		
Felidae	*Felis*	*catis*	Feral Cat	*									●												●
Leporidae	*Oryctolagus*	*cuniculus*	European Rabbit	*						●		●	●					●		●					

Family	Genus	Species	Common Name	Status	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh
Macropodidae	*Macropus*	*fulignosus*	Western Grey Kangaroo										●				●		●			●	●		
Peramelidae	*Isoodon*	*obesulus subsp. fusciventer*	Quenda			●	●		●	●	●	●	●						●				●		●
Reptiles																									
Diplodactylidae	*Strophurus*	*spinigerus spinigerus*	Spiny-tailed Gecko															●							
Elapidae	*Pseudonaja*	*affinis*	Dugite								●														
Scincidae	*Tiliqua*	*rugosa*	Bobtail			●					●		●		●	●		●			●		●		●

* introduced

Appendix C *cont.*

Table C.2 **Fauna habitat types recorded within the reserves**

Habitat Type	Sites	Conservation significant fauna likely to occur	Example Photo
Open water body and supportive fringing vegetation Artificial lakes and water bodies are often readily used by waterbirds, turtles, fish and other wildlife as a water resource. Those sites that have supportive riparian vegetation provide greater resources to wildlife particularly waterbirds for nesting, roosting, feeding and loafing. Water bodies that are partially dry or have areas of exposed mud flats provide habitat for migratory wader species. These areas are important as they provide feeding areas or resting locations for highly mobile species.	Hidden Swamp, Tuart Park, Secret Harbour Foreshore	Any open water body could be used by *Oxyura australis* (Blue-billed Duck). Migratory wetland bird species may opportunistically utilise water bodies and species which could use supportive habitats include *Ardea alba* (Cattle Egret), *Calidris ruficollis* (Red-necked Stint), *C. ferruginea* (Curlew Sandpiper), *Actitis hypoleucos* (Common Sandpiper), *Botaurus poiciloptilus* (Australasian Bittern), *Ixobrychus minutus* (Little Bittern).	
Coastal Heath and low shrublands on undulating dunes, dominated by species such as *Rhagodia baccata, Acacia species, Spyridium globulosum, Olearia axillaris* and *Acanthocarpus preissii*. This habitat would provide resources for many bushland birds and sand loving reptiles (such as burrowing species). These habitats often have good diversity of small reptiles such as skinks, snakes, legless lizards and dragons. Coastal birds may opportunistically use these areas for loafing and breeding.	Anstey Q Wetland, Rockingham Road Conservation Reserve, Secret Harbour Foreshore, Shoalwater Foreshore	Burrowing reptile species like *Lerista lineata* (Perth Lined Skink) and *Neelaps calonotus* (Black-striped Snake) occur on coastal sandy dunes and sand-plains vegetated with coastal heaths and shrublands. Scattered populations of *Morelia spilota imbricata* (Carpet Python) and *Synemon gratiosa* (Graceful Sunmoth) occur in large habitat areas in coastal zones. Coastal fringes may also be opportunistically utilised by migratory or coastal species like Fairy terns (*Sterna nereis nereis*).	
Tall shrublands on dunes and sandplains: dominated by *Acacia rostellifera* on sandunes and *Xanthorrhoea preissii* on sandplains. This habitat would provide resources for many bushland birds and sand loving reptiles (such as burrowing species). These habitats often have good diversity of small reptiles such as skinks, snakes, legless lizards and dragons. Vegetation cover provides additional resources to small mammals such as Quenda with larger remnant areas supporting Western Grey Kangaroo.	Alf Powell Reserve, Anstey Q Wetland, CUD Swamp, Hidden Swamp, Kinsdale Bend, Lewington Reserve, Marillana Conservation Area, Dixon Road Conservation Precinct, Secret Harbour Foreshore	Similar to coastal fringe areas these habitats are utilised by Carpet Python, Black-striped Snake and Perth Lined Skink. Denser vegetation structure can support Quenda (*Isoodon obesculus fusciventer*).	

Habitat Type	Sites	Conservation significant fauna likely to occur	Example Photo
Sedgelands in damplands The sedgelands provide supportive habitat for many bird species that forage in damplands. Bird species would readily utilise these sedgelands for nesting and refuge, particularly when associated to areas of inundation. Sedgelands can be important habitats for uncommon waterbird species, provide visual protection from predators and can have a high number of macroinvertebrate species. Small fauna species such as snakes and skinks are likely to utilise this habitat, particularly during hot and dry summer months. This habitat is generally uncommon in the metropolitan area.	Anstey Q Wetland, Bordeaux Ramble, Hidden Swamp, Kinsdale Bend, Marillana Conservation Reserve, Tamworth Hill Swamp, Trenant Park, Woodleigh Grove Reserve	Denser vegetation structure can support *Isoodon obesculus fusciventer* (Quenda). Some migratory terrestrial and wetland bird species may opportunistically utilise these areas for feeding and resting.	
Woodlands in damplands *Melaleuca rhaphiophylla* woodlands over sedgelands in damplands This habitat has periods of inundation and provides habitats seasonally to different fauna groups. Bush birds may use this habitat all year round, while wetland species may opportunistically utilise these areas while water is present. During this period the habitat provides feeding, nesting, loafing and resting resources. Large colonies of some species can be found in these areas while inundated such as Ibis and Spoonbills. During dry periods reptiles and mammals may utilise the area as feeding and rufugia resources due to a high diversity in micro-habitats with fallen logs and branches and thick patches of matted debris.	CUD Swamp, Sawley Close, Trenant Park, Tamworth Hill Swamp, Woodleigh Grove Reserve	Denser fringing vegetation can support *Isoodon obesculus fusciventer* (Quenda). Some migratory terrestrial and wetland bird species may opportunistically utilise these areas for feeding and resting.	
Forest/Woodland Includes Tuart woodlands and Marri-Jarrah-Banksia woodlands in the reserves in the east Provides nesting, roosting, foraging and refuge resources for many species, including fauna species of conservation significance, such as roosting and foraging resources for Black Cockatoos. Usually has a high diversity of bush birds. This habitat provides high diversity in micro-habitats with fallen logs and branches, thick patches of leaf litter, age class variation in many flora species, canopy connectivity and variation in the height and thickness of the vegetation	Anstey Q Wetland, Dixon Road Conservation Precinct, Karnup School Site, Karnup Townsite, Lewington Reserve, Sawley Close, Tamworth Hill Swamp, Trenant Park	Birds include all three species of Black Cockatoos, (Falco peregrinus) Peregrine Falcon, *Merops ornatus* (Rainbow bee-eater). Mammal species present include *Macropus irma* (Western Brush wallaby, only in the larger reserves that connect through to large areas of vegetation) and Quenda. Black-striped Snake and Carpet Python Graceful Sunmoth in area of high densities of Lomandra species. Some trees contain hollows which would support breeding for bird species (potentially including Black Cockatoos) and possums.	

Habitat Type	Sites	Conservation significant fauna likely to occur	Example Photo
Parkland cleared This habitat is often fauna-depleted however some species benefit from this habitat type including Galah, White Corella and White Ibis. Isolated parkland trees still provide a feeding and potential breeding resource to Black Cockatoos. Parkland areas can be enhanced for fauna by the addition of suitable plants that induces fauna use. Planting in clumps can also assist in this. Good foraging species include *Banksia, Hakea, Grevillea* and native *Eucalypt* species.		Black Cockatoos forage on individual stands of suitable foraging species (including *Eucalypt* species).	

Appendix D Natural Area Summary Assessment

Table D.1 **Ecological criteria assessment for the reserves, from template of quantitative assessment detailed in the Perth Biodiversity Project guidelines (Del Marco *et al.* 2004)**

Criteria		Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
1a. Regional Representation	i) recognised International, National, State or Regional conservation value but not already protected																					
	ii) of an ecological community with only 1500 ha or 30% or less (whichever is the greater) remaining in IBRA subregion		●						●	●					●			●				
	iii) large (greater than 20 ha), viable natural areas in good or better condition of an ecological community with more than 30% remaining within the IBRA subregion					●					●					●		●				
	iv) of an ecological community with only 1500 ha or 15% or less (whichever is the greater) protected for conservation in the Jarrah Forest IBRA subregion																					
	v) of an ecological community with only 400 ha or 10% or less (whichever is the greater) protected for conservation in the Bush Forever Study Area																					
1b. Local Representation	i) of an ecological community with 10% or less remaining of its pre-European extent within the Local Government Area																					
	ii) of an ecological community with 30% or less remaining of its pre-European extent within the Local Government Area								●	●												
	iii) large (greater than 10 ha), viable natural areas in good or better condition of an ecological community with more than 30% remaining within the Local Government Area		●			●				●	●					●		●				

Appendix D *cont.*

Criteria		Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
2. Diversity	i) natural area in good or better condition that contains both upland and wetland structural plant communities	●				●	●	●					●		●				●		●	
3. Rarity	i) of an ecological community with only 1500 ha or 10% or less (whichever is the greater) remaining in IBRA subregion																					
	ii) of an ecological community with only 400 ha or 10% or less (whichever is the greater) remaining in the Bush Forever Study Area																					
	iii) contains a Threatened Ecological Community	●		●		●	●	●					●		●				●			
	iv) contains Declared Rare Flora, Specially Protected Fauna or significant habitat for for these fauna									●												
	v) contains Priority or other significant flora or fauna or significant habitat for these fauna	●	●			●			●	●					●			●	●		●	
4. Maintaining Ecological Processes or Natural Systems - Connectivity	i) natural areas acting as stepping stones in a Regionally Significant Ecological Linkage		●						●	●					●			●	●		●	
	ii) natural areas acting as stepping stones in a locally significant ecological linkage	●	●				●		●	●	●	●	●	●	●	●	●	●	●	●	●	

Criteria		Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
5. Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation	i) Conservation or Resource Enhancement category wetland plus buffer	●		●	●		●	●					●		●			●	●		●	
	ii) EPP Lake plus buffer	●													●			●	●		●	
	iii) riparian vegetation plus buffer	●		●	●	●	●	●							●	●		●	●		●	
	iv) floodplain area plus buffer									●												
	v) estuarine fringing vegetation plus buffer																					
	vi) coastal vegetation on foredunes and secondary dunes						●	●			●	●	●	●	●	●	●					

Appendix D *cont.*

Table D.2 **Viability scoring assessment for the reserves, from template detailed in the Perth Biodiversity Project guidelines (Del Marco *et al.* 2004) Scoring detailed in Table H.3.**

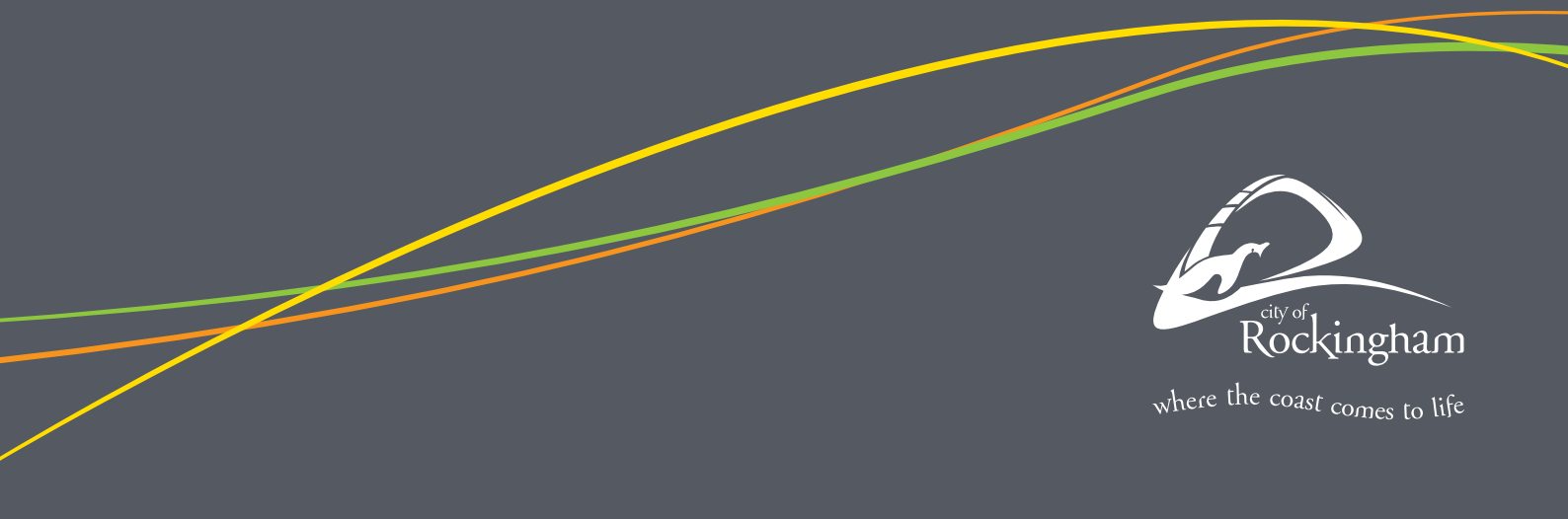
Viability Criteria	Alf Powell Reserve	Anstey Q Wetland	Baldivis Nature Reserve	Bordeaux Ramble	CUD Swamp	Dixon Road	Hidden Swamp	Kindsdale Bends	Karnup School Site	Karnup Townsite	Lewington Reserve	Mandurah Hill	Marillana	Rockingham Road	Sawley Close	Secret Harbour	Shoalwater F'shore	Tamworth Hill Swamp	Trennant Park Nature	Tuart Park	Woodleigh Grove Reserve
Size	3	3	3	2	2	5	2	1	2	4	4	1	2	3	3	5	5	5	3	2	3
Shape	2.5	3	2.5	3	2	3	3	3.5	3.5	3.5	3	3	3.5	3.5	3	2.5	1	3	3	2	3.5
Perimeter to area ratio	2	3	3	2	2	3	2	1	3	2	3	1	2	2	2	3	2	3	2	2	3
Vegetation Condition	1.56	5.81	4.78	8	1.88	3.72	6.78	2.91	6.37	7.92	2.82	2.76	8	4.62	4.51	4.54	2.56	2.19	4.96	3.24	5.7
Connectivity	0	0.5	0.5	0	0.5	4.5	0.5	0	5	5	0.5	0.5	4.5	0.5	5	4.5	4.5	5	5	0.25	5
Viability Total	9.06	15.31	13.78	15	8.38	19.22	14.28	8.41	19.87	22.42	13.32	8.26	20	13.62	17.51	19.54	15.06	18.19	17.96	9.49	20.2

Table D.3 **Viability scores (After: Del Marco *et al.* 2004)**

Viability Factor	Category	Score
Size	Greater than 20 ha	5
	Greater than 10 ha less than 20 ha	4
	Greater than 4 ha less than 10 ha 3	3
	Greater than 1 ha less than 4 ha	2
	Less than 1 ha	1
Shape	Circle, square or squat rectangle	3.5
	Oval, rectangle or symmetrical triangle	3
	Irregular shape with few indentations	2.5
	Irregular shape with many indentations	2
	Long thin shape with large proportion of area greater than 50m wide	1.5
	Long thin shape with large proportion of area less than 50 m wide	1
Perimeter to area ratio	Less than 0.01	4
	Greater than 0.01 less than 0.02	3
	Greater than 0.02 less than 0.04	2
	Greater than 0.04	1
Vegetation condition	Very Good - Excellent 8	
	Fair - Good 4	
	Poor 2	
	Very Poor 0	
Connectivity	Forms part of a Regional Ecological Linkage and is contiguous with another protected natural area greater than 4 ha	5
	Not part of a Regional Ecological Linkage and is contiguous with another protected natural area greater than 4 ha	4.5
	Forms part of a Regional Ecological Linkage and is within 500 m of more than 4 other protected natural areas having an area greater than 4 ha	4
	Not part of a Regional Ecological Linkage but is within 500 m of more than 4 other protected natural areas having an area greater than 4 ha	3.5
	Forms part of a Regional Ecological Linkage and is within 500 m of 3 or 4 other protected natural areas having an area greater than 4 ha	3
	Not part of a Regional Ecological Linkage but is within 500 m of 3 or 4 other protected natural areas having an area greater than 4 ha	2.5
	Forms part of a Regional Ecological Linkage and is within 500 m of 2 other protected natural areas having an area greater than 4 ha	2
	Not part of a Regional Ecological Linkage but is within 500 m of 2 other protected natural areas having an area greater than 4 ha	1.5
	Forms part of a Regional Ecological Linkage and is within 500 m of less than 2 other protected natural areas having an area greater than 4 ha	1
	Not part of a Regional Ecological Linkage but is within 500 m of less than 2 other protected natural areas having an area greater than 4 ha	0.5
	Forms part of a Regional Ecological Linkage and is not within 500 m of any other protected natural areas having an area greater than 4 ha	0.25

CITY OF ROCKINGHAM

Reserve Prioritisation Report



city of Rockingham

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