2020

CITY OF ROCKINGHAM

# Bushland Management Plan

city of Rockingham

where the coast comes to life

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# 1 Acknowledgment of Traditional Owners

The City of Rockingham respectfully acknowledges the traditional owners and custodians of the land on which Rockingham stands today, the Nyoongar people. The City pays its respects to their elders both past and present.

Nyoongar people successfully managed and nurtured the land and water for thousands of generations and an enduring spiritual and physical connection remains today. By showing respect for the land and water in the same way, the City can continue to work towards the sustainability of the environment for future generations.

The City of Rockingham is committed to working with the Nyoongar community on matters of land, water, culture, language and cultural heritage. The City's third Reconciliation Action Plan is in development and aims to build a community that demonstrates respect, builds positive relationships and creates opportunities for local Aboriginal and Torres Strait Islander people.

*The word Nyoongar is identified as a single language but can be pronounced and spelt several ways. This document uses Nyoongar to represent the different spellings.*

# 2 Introduction

## 2.1 Background

The City of Rockingham (the City) covers approximately 260 km$^2$ encompassing diverse wetland, bushland and coastal environments. In 2017, the City's Community Plan Strategy – Natural Area Conservation (the CPS) was adopted by Council. The CPS identified that four key management plans will be developed to address site specific actions relative to the City's foreshore, wetland, bushland and urban environments. This approach is based on the principle that similar ecosystems require similar considerations for management and therefore, resources can be allocated accordingly to maximise conservation outcomes (Soranno *et al.* 2010; MacNally *et al.* 2002).

This Bushland Management Plan (this 'Plan') has been prepared under the direction of the CPS, which is guided by the City's overarching Strategic Community Plan.

**Strategic Community Plan 2019-2029**

↓

**Community Plan Strategy: Natural Area Conservation**

↓

**Bushland Management Plan**

## 2.2 Vision

This plan addresses the following aspiration contained in the City's Strategic Community Plan 2019 -2029.

Aspiration 3: Plan for Future Generations

**Preservation and management of bushland and coastal reserves:** Encourage the sustainable management and use of the City's bushland and coastal reserves.

## 2.3 Purpose

The purpose of this Plan is to provide key direction for the ongoing use and management of the City's bushland reserves over the next five years (2019-2024). Particular focus will be given to enhancing the ecological and recreational values of all reserves.

## 2.4 Objectives

This Plan is driven by the following overarching objectives:

- Protect and enhance conservation values through the removal of threatening processes
- Encourage a range of sustainable recreational experiences through suitably located infrastructure and services, and
- Ensure equity and safety of all reserve users

## 2.5 Study Area

The eight City managed bushland reserves included in this plan are listed in Table 1 and displayed in Figure 1.

**TABLE 1 -** Bushland Reserves Included Within the Assessment

| | Reserves | Size (ha) |
|---|---|---|
| 1 | Alf Powell Reserve | 14.24 |
| 2 | Baldivis Nature Reserve | 14.03 |
| 3 | Dixon Road Conservation Precinct | 61.45 |
| 4 | Karnup School Site | 2.00 |
| 5 | Karnup Townsite | 12.86 |
| 6 | Mandurah Hill | 1.00 |
| 7 | Tuart Park | 4.63 |
| 8 | Baldivis Children's Forest | 20.39 |

## FIGURE 1 - Study Area

# 3 Methods

To inform the preparation of this Plan, 360 Environmental were commissioned by the City to undertake a detailed environmental assessment of the City's bushland reserves. The assessment conducted within each reserve included a desktop assessment, a detailed flora and vegetation survey, a weed assessment, a level two vertebrate fauna survey and an infrastructure assessment. The results of this assessment have enabled the City to identify the management actions required to maximise conservation outcomes across the study area.

## 3.1 Desktop Assessment

A desktop assessment was undertaken to identify flora and fauna species likely to occur within the study area.

### 3.1.1 Database Searches

The following databases were reviewed as part of the desktop assessment:

### 3.1.2 Assessment of Likelihood of Occurrence

In order to determine which conservation significant species have the potential to occur in the study area, the results of the database, literature searches and survey records were examined in the context of species known distributions and habitat preferences and whether suitable habitat was considered to be present on site. Species with habitat preferences that are not present within the study area were deemed unlikely to occur.

Of the threatened ecological communities (TECs) and priority ecological communities (PECs) recorded within the City's municipality, the likelihood of occurrence was determined for each community by comparing the known topography, hydrology, geology and flora species composition of each community to that present in the site.

**TABLE 2 -** Databases Searched

| Database Name | Search Target | Search Area |
|---|---|---|
| Threatened and Priority Ecological Communities Database (Department of Biodiversity Conservation and Attractions 2018) | Listed Threatened Ecological Communities and Priority Ecological Communities | City of Rockingham |
| Threatened and Priority Flora Database (Department of Biodiversity, Conservation and Attractions 2018) | Threatened and Priority Flora | City of Rockingham plus 20 km buffer |
| DBCA Threatened and Priority Flora Species List (Department of Biodiversity, Conservation and Attractions 2018) | Threatened and Priority Flora | City of Rockingham plus 20 km buffer |
| Western Australian Herbarium Flora (Department of Biodiversity, Conservation and Attractions 2018) | Threatened and Priority Flora | City of Rockingham plus 20 km buffer |
| Threatened and Priority Fauna Database Search (Department of Biodiversity, Conservation and Attractions 2018) | Threatened and Priority Flora | City of Rockingham |
| *NatureMap* (Department of Biodiversity, Conservation and Attractions 2018) | Threatened Priority Flora and Fauna | All reserves plus a 5 km radial search around each reserve boundary |
| Protected Matters Search Tool (Department of the Environment and Energy 2018) | Threatened Priority Flora and Fauna | All reserves plus a 5 km radial search around each reserve boundary |
| Regional Soil Type Mapping (Department of Primary Industries and Regional Development) | Soil Types | All reserves |
| Department of Biodiversity, Conservation and Attractions Geomorphic Wetlands Swan Coastal Plain dataset (Hill *et al.* 1996) | Geomorphic Wetlands | All reserves plus a 50 m radial search around each reserve boundary |
| Biogeographic Region Dataset for Western Australia (Department of Energy and Environment 2016) | Bioregion | All reserves |
| Department of Planning, Lands and Heritage (DPLH) Online Aboriginal Heritage Enquiry System | Indigenous Heritage Sites | All reserves plus a 5 km radial search around each reserve boundary |

## 3.2 Field Surveys

Extensive field surveys for flora and fauna were undertaken to inform this Plan. The timing of theses field surveys were selected to provide optimal conditions for the detection of all species of conservation significance that may have been present in the study area.

### 3.2.1 Flora and Vegetation Survey

A targeted and detailed flora and vegetation survey was undertaken in accordance with Environmental Protection Authority (EPA) Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016). The survey was undertaken over a five-day period from 3 October to 23 October 2018 by two qualified field botanists from 360 Environmental Consultancy.

The survey also included a visual assessment of vegetation which may have been affected by Phytophthora dieback, weed mapping, vegetation type mapping, vegetation condition mapping, opportunistic flora collections and observations and a targeted Priority flora search. The quadrat locations are presented within the Vegetation Type mapping figures for each reserve.

The following was recorded from each quadrat location:

- site code - a unique identifier allocated to each quadrat
- date and recorder – a record of the date of quadrat sample and a list of the personnel involved in sampling the quadrat
- GPS coordinates, measured from the north west corner of the quadrat
- landform and soil description
- additional site descriptors – information that might be useful in vegetation classification. Such as - slope, aspect, leaf litter cover, bare ground cover
- species list – a comprehensive vascular flora species list
- foliar cover – the estimated total percentage foliar cover for each species recorded
- plant height – the average height (in metres) of each species recorded
- vegetation description – a description of the vegetation according to the National Vegetation information System (NVIS), Level 5
- vegetation condition – assessed according to the vegetation condition scale, and
- photographs – a photograph from the northwest corner looking toward the southeast corner.

Outside of the quadrat locations, the reserves were traversed on foot to search for flora of conservation significance.

All plants collected during the field surveys were identified using appropriate reference material or through comparison with pressed specimens housed at the Western Australian Herbarium.

**Floristic Community Types**

To identify the likely Floristic Community Types within the reserve, statistical analysis was undertaken to allow for comparisons between the field quadrats and the Floristic Community Types defined by Gibson *et al* (1994). The analysis was based on the presence or absence of key plant species being within the quadrats.

### 3.2.2 Weeds

Locations and numbers of Weeds of National Significance (WoNS) and Declared Pest plants were recorded where encountered, and the locations of larger-sized weeds of lower priority (i.e. large, woody species) were also recorded. Where weeds were widespread, these were identified and mapped by weed suites using density mappings (weeds grouped by their growth form to allow for tailored control methods for each group). Weed suites identified included:

- Grasses
- Broadleaf perennial weeds
- Annual weeds
- Bulbous weeds, and
- Woody shrubs.

### 3.2.3 Fauna

**Level 2 Survey**

A level 2 fauna survey was undertaken by two licensed ecologists from 360 Environmental in accordance with the following guidance documents:

1. Technical Guidance – Terrestrial Fauna Surveys (Environmental Protection Authority, 2016)
2. Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (Environmental Protection Authority, 2016c)
3. Survey guidelines for Australia's threatened mammals (Department of Sustainability Environment Water Population and Communities, 2011), and
4. Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment Water Heritage and the Arts, 2010).

The field survey consisted primarily of systematic trapping, fauna habitat assessments, systematic bird searches, opportunistic observations, active foraging, baited motion sensitive camera trapping and acoustic surveys for bats.

*Systematic Trapping*

To provide information on the abundance and distribution of ground fauna present within the bushland reserves, seven trapping sites were established. The trapping sites utilised a combination of cage, Elliott, funnel and pit fall traps. All cage and Elliott traps were baited with universal bait (a mixture of rolled oats, peanut butter and sardines). Trapping sites were open for four nights at each trapping location.

Each systematic trapping site consisted of:

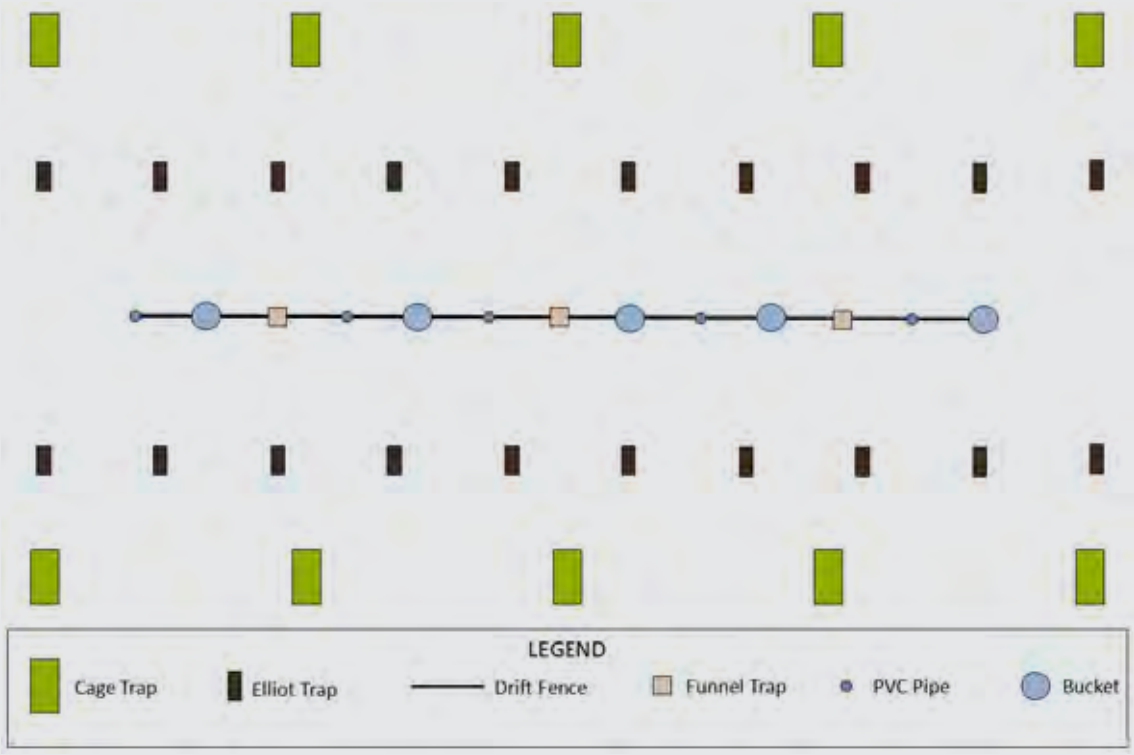
- 10 large cage traps
- 20 Elliott traps
- a 50 m drift fence
- 10 pit fall traps (comprising five 20 L buckets and five PVC pipes), and
- three pairs of funnel traps located either side of the drift fence.

The 50 m drift fence ran over the centre of each pitfall trap to direct animal movement and increase the likelihood of captures. The trapping design layout is displayed in the figure below.

*Fauna Habitat Assessments*

Fauna species and habitat data were collected from sample points that were considered to be representative of different fauna habitat types present. Specific habitat features were also used to determine the viability of the reserves providing habitat for conservation significant fauna species.

**FIGURE 2 - Diagram of trapping layout**



*Systematic Bird Searches*

Systematic bird searches were undertaken within each bushland reserve for 20 minutes in a 2 ha quadrat, in accordance with EPA guidance. Where possible, these surveys were undertaken during peak periods of activity, which was typically in the first three to four hours after sunrise.

*Opportunistic Observations and Active Foraging*

Opportunistic sightings of fauna were also recorded as part of the field survey. These included visual sightings of active fauna as well as indirect signs of species presence such as tracks, burrows and scats of mammals and reptiles.

Fauna occupancy searches were undertaken in microhabitats to determine the presence of different species across the study area, with a particular focus on locating the more elusive frogs and reptiles in all the reserves. This involved looking through leaf litter, looking beneath overturned rocks, looking under decorticating bark and searching for other evidence of animals.

*Acoustic Bat Surveys*

A SM2 unit, an ultrahigh frequency acoustic recorder was used to record the presence of bats. The SM2 was positioned within each bushland reserve for one night. The recordings were used to identify the bat species present.

*Baited Motion Sensitive Cameras*

Between two and four motion sensitive cameras were located within each bushland reserve for four nights except for Tuart Park, which did not have a large enough area to deploy cameras out of public view. The cameras were baited with universal bait and placed in representative habitat and tracks aimed at targeting Matters of National Environmental Significance species.

*Feral Species*

Evidence of pest fauna species inhabiting the reserve (e.g. bee hives and fox and rabbit warrens) were also recorded.

*Taxonomy*

All species identified in the survey were recorded using appropriate taxonomy and nomenclature.

**Black Cockatoo Habitat Assessment**

The three species of black cockatoo endemic to the south-west of Western Australia: Carnaby's, Baudin's and forest red-tailed black cockatoo have been recorded or are likely to occur in the City of Rockingham. All three of these species are Conservation Significant and listed under the EPBC Act. The purpose of this assessment was to qualify and quantify foraging, roosting and potential breeding habitat for the black cockatoo species across the study area. The survey included:

1. an assessment of vegetation communities and their potential to provide foraging habitat, and
2. an assessment of significant trees with the potential to provide roosting and/or breeding habitat.

The reserve was searched for locally occurring breeding and roosting tree species, namely *Eucalyptus marginata* (Jarrah), *Corymbia calophylla* (Marri) and *Eucalyptus gomphocephala* (Tuart), as outlined in the *EPBC Act referral guidelines for three threatened black cockatoo species* (SEWPaC, 2012). Where detected, the trees were assessed for trunk diameter and breast height (DBH). The Department of the Environment (DotE) considers that all habitat trees with a DBH greater than 500 mm have the potential to form hollows suitable for black cockatoo nesting (SEWPaC 2012). As such, trees with a DBH greater than 500 mm, or with hollows with diameters greater than 120 mm were identified and recorded using a GPS.

Any physical evidence of foraging or roosting were also recorded during the survey.

### 3.2.4 Infrastructure

During the field assessment, the location and condition of existing park infrastructure were documented to determine:

- reserve access points, including determining the type, condition, length and adequacy of fencing and the ability to restrict pedestrian and vehicular access
- the type, condition, length and adequacy of paths, and determining whether these should be formalised, consolidated or closed, or whether new paths should be installed
- condition and length of fences and paths
- type, condition, category and adequacy of reserve signage
- type, condition and adequacy of reserve structures (including furniture) to determine opportunities for upgrades or replacement and potential locations of new infrastructure
- adequacy and condition of bins, and
- current car parking facilities.

## 3.3 Methodology Limitations

Eight flora species could not be fully identified due to lack of identifying material. Of these, two represent weed species, partially identified as being *Freesia* sp., and *Cuscuta epithymum*. The remaining six species were not identified at all.

It was not possible to install a complete systematic trapping site with pitfall traps in Tuart Park due to a lack of representative bushland, therefore ground-dwelling fauna may not have been adequately surveyed in this reserve. Motion sensor cameras were also not used at Tuart Park on account of there being insufficient area to hide the cameras from the general public.

Due to the altered state of the upland vegetation at Baldivis Children's Forest, it is unlikely that significant flora species would be present within the Outridge Swamp wetland. The wetland vegetation, located on the eastern edge of the reserve, was very dense and considered to be in excellent condition. Due to the area being under water, access to allow a comprehensive targeted search was inhibited. The likelihood table shows many wetland species, including conservation significant species, have the potential to be present in the reserve due to soil types and hydrology, even though these species have been given a low likelihood of occurring, there is a chance they could be present.

Due to project time constraints, fauna trapping was only undertaken for four nights at each site.

# 4 Biophysical Environment

## 4.1 Land Use

The Rockingham area was originally a farming settlement and timber port. It was a relatively small coastal town until the second half of the twentieth century, when the commercial, industrial and residential growth of Perth extended to reach Rockingham. During the last few decades, the City has experienced rapid urban development and a significant growth in population. The reserves within the study area are primarily used for conservation and recreation by the local community, offering a range of active and passive recreation opportunities such as hiking, dog walking and nature observation.

## 4.2 Bioregion

The Interim Biogeographical Regionalisation for Australia (IBRA) Version 7 recognises 89 geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The 89 bioregions are further refined into 419 subregions which are more localised and homogenous geomorphological units in each bioregion (Department of the Environment and Energy [DEE] 2016b).

The entire study area lies within the Perth subregion of the Swan Coastal Plain bioregion, which is a low lying coastal plain mainly covered in woodlands (DEE 2015a). The Perth subregion is dominated by Banksia and/or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbarks in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The outwash plains, once dominated by *Casuarina obesa*, *Corymbia calophylla* woodlands and *Melaleuca* shrublands, are only found extensively in the south (Mitchell *et al.* 2002).

## 4.3 Climate

The study area has a warm Mediterranean climate, with hot, dry summers and cool, wet winters. The closest long-term Bureau of Meteorology (BoM) weather station with a complete dataset is the Garden Island HSF, located within the City.

Mean minimum and maximum temperatures range from 19.4°C to 28.3°C in February, the hottest month in summer, and 11.2°C to 17.8°C in July, the coolest month in winter (Bureau of Meteorology 2019). The long-term annual average rainfall is 604.8 mm (2001 to 2018).

## 4.4 Landform and Soils

The three land systems that occur in the study area are the Quindalup Dune System, the Spearwood Dune System and the Bassendean Dune System.

The Quindalup system occupies the largest area and is represented in Alf Powell Reserve, Dixon Road Conservation Precinct and Mandurah Hill Reserve. The Quindalup system is the youngest soil system on the Swan Coastal Plain, having formed the most recently from a combination of marine sands and Aeolian (windblown) soils. These coastal dunes are the most westerly on the Swan Coastal Plain and are underlain by the Safety Bay Sand formation which comprises calcareous soils derived from Tamala limestone (Semeniuk 1990).

The Spearwood system occupies the second largest area and is present in all the reserves located in Baldivis as well as Tuart Park. The Spearwood system occurs in between the Quindalup and Bassendean systems and is the highest above sea level. These dunes formed around 40,000 years ago and comprise sands rich in both iron and aluminium oxides.

Of all the reserves within the study area, only a portion of Karnup Townsite occurs on the Bassendean Dune System. This system is the oldest and most easterly on the Swan Coastal Plain, containing leached, infertile and slightly acidic sands (Davidson 1995, Bolland 1998).

## 4.5 Wetlands

There is one mapped conservation category wetland within the study area, Outridge Swamp which is located in the eastern section of Baldivis Children's Forest. Karnup Townsite intersects slightly with a multiple use wetland which is associated with the Serpentine River floodplain.

## 4.6 Vegetation

Regional vegetation complexes has been mapped by Heddle *et al* (1980) based on major geomorphic units on the Swan Coastal Plain. The extent of these complexes remaining within the City were mapped by Eco Logical Australia in 2017.

Five vegetation complexes occur within the study area, of which three still retain over 30% of their pre-European extent across the City and the Swan Coastal Plain. The remaining extent of these complexes is shown in Table 3.

Vegetation type and extent has also been mapped at a regional scale by Beard (1981) who categorised vegetation into broad associations. Beard's mapping at a scale of 1:1,000,000 formed the basis of several regional mapping systems, including the biogeographic region dataset for Western Australia (DEE 2016b). This dataset shows five broad vegetation types mapped across the reserves in the Study Area (Rockingham 3046, Rockingham 125, Pinjarra 968, Spearwood 1001 and Spearwood 998).

**TABLE 3 -** Extent of Remnant Vegetation Complexes

| | | Pre-European extent | | Current Extent (ha and %) | |
|---|---|---|---|---|---|
| **Vegetation Complex** | **Description** | **Swan Coastal Plain** | **City of Rockingham** | **Swan Coastal Plain (2015)** | **City of Rockingham (2016)** |
| Quindalup Complex | Coastal dune complex consisting of mainly of two alliances – the strand and fore-dune alliance. Local variations include the low closed forest of *Melaleuca lanceolate – Callitris preissii* and the closed scrub of *Acacia rostellifera* | 39,336 ha | 9,894 ha | 21,620 ha (55%) | 4,461 ha (45%) |
| Cottesloe Complex – Central and South | Mosaic of Woodland of *Eucalyptus gomphocephala* and open forest of *E. gomphocephala – E. marginata – Corymbia callophylla*; closed heath on limestone outcrops | 45,226 ha | 2,017 ha | 15,180 ha (34%) | 1,172 ha (58%) |
| Karrakatta Complex – Central and South | Predominantly open forest of *E. gomphocephala – E. marginata – C. callophylla* and Woodland of *E.marginata* – Banksia species. | 50,080 ha | 4,276 ha | 11,518 ha (14%) | 1,990 ha (47%) |
| Herdsman Complex | Sedgelands and fringing woodland of E. rudis – Melaleuca species | 8,309 ha | 532 ha | 2,821 ha (34%) | 417 ha (78%) |
| Serpentine River Complex | Closed scrub of *Melaleuca* sp. and fringing woodland of *E. rudis* and *M. rhaphiophylla* along streams | 19,855 ha | 3,658 ha | 2,028 ha | 1,199 ha (33%) |

### 4.6.1 Desktop Review of TEC Mapping

A search of the Department of Biodiversity, Conservation and Attractions database identified that one TEC occurs within the study area, the 'Banksia Woodlands of the Swan Coastal Plain' TEC was present in Baldivis Nature Reserve, Karnup Townsite and Karnup School Site.

*Banksia Woodlands of the Swan Coastal Plain*

The 'Banksia Woodlands of the Swan Coastal Plain' TEC is listed as endangered under the Commonwealth EPBC Act. The ecological community occurs in south-western Western Australia primarily on the Swan Coastal Plain Bioregion, which runs from Jurien Bay to Dunsborough and includes the City of Rockingham. The ecological community typically occurs on well-drained, low nutrient soils on sandplain landforms. Key defining features of the TEC are:

- low woodland to forest type structure with a low canopy
- the canopy must contain one or more of the following *Banksia* species: *Banksia attenuata* (candlestick banksia), *Banksia menziesii* (firewood banksia), *Banksia prionotes* (acorn banksia) and/or *Banksia ilicifolia* (holly-leaved banksia)
- other endemic trees of similar height may be present and codominate with the *Banksia* species
- Marri, Jarrah and Tuart trees may sometimes be present above the *Banksia* canopy
- the understorey typically contains shrub species with the ground layer comprising sedges, rushes and forbs, and
- the TEC is habitat to a variety of fauna species, including the endangered Carnaby's Black Cockatoo and the threatened Forest Red-Tailed Black Cockatoo.

**FIGURE 3 - Banksia Woodland**

Priority Ecological Communities

Priority Ecological Communities (PECs) are biological flora or fauna communities that are recognised to be of significance, but do not meet the criteria of a TEC. There are five categories of PECs, none of which are currently protected by legislation (see Appendix A). The latest listing of PECs recognises 32 PECs in the Swan bioregion (DBCA 2018). The desktop assessment determined that none of these PECs are mapped as occurring within the study area.

## FIGURE 4 - TECs and PECs within the City

### 4.6.2 Vegetation Types

The flora and vegetation survey identified 22 natural Vegetation Types within the study area. These are summarised in tables 1 – 8 in Appendix B. Maps of the vegetation associations are shown under the individual reserve snapshots (Sections 7-14).

### 4.6.3 Floristic Community Type Similarity Analysis

Indicative Floristic Community Types (FCTs) were assigned to the Vegetation Types recorded in the study area. Results from the statistical analyses and the site information, identified five FCTs as occurring across the bushland reserves. Four of these five FCTs are listed as PECs. The FCTs identified as occurring in the Survey Area were:

Communities FCT SCP 21a, FCT SCP 21c and FCT 24 are not listed as a TEC under the EPBC Act, but they are considered to be a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC, therefore have the potential to be listed and protected under the EPBC Act.

**TABLE 4 -** Floristic Community Types

| Indicative FCT | FCT Name | WA Conservation Status | Commonwealth Conservation Status | Reserves |
|---|---|---|---|---|
| 17 | *Melaleuca rhaphiophylla – Gahnia trifida* seasonal wetlands | Not listed | Not listed | Baldivis Children's Forest |
| 21a | *Central Banksia attenuata - Eucalyptus marginata* woodlands | Priority 3 | Endangered | Baldivis Nature Reserve, Karnup School Site, Karnup Townsite |
| 21c | Low lying *Banksia attenuate* woodlands or shrublands | Priority 3 | Endangered | Karnup Townsite |
| 24 | Northern Spearwood shrublands and woodlands | Priority 3 | Endangered | Alf Powell Reserve, Dixon Road Conservation Precinct, Tuart Park |
| 29b | *Acacia* shrublands on taller dunes | Priority 3 | Endangered | Mandurah Hill |

Communities FCT SCP 21a, FCT SCP 21c and FCT 24 are not listed as a TEC under the EPBC Act, but they are considered to be a component of the Endangered *Banksia Woodlands of the Swan Coastal Plain* EPBC listed TEC, therefore have the potential to be listed and protected under the EPBC Act

### 4.6.4 Vegetation Condition

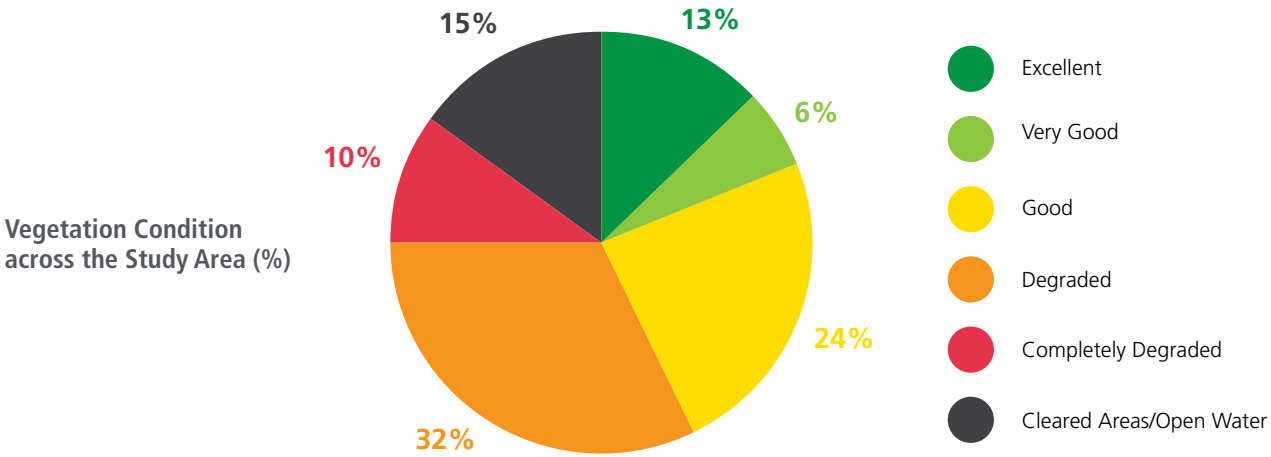
Vegetation condition across the reserves ranged from Completely Degraded to Excellent, as defined by the Keighery Condition Scale (Keighery 1994) (Table 5). Vegetation Condition was strongly tied to weed abundance and density. Vegetation condition maps are shown under the individual reserve snapshots (Sections 7-14). The maps provide an appropriate indication to the extent and severity of weed invasion.

# 4 Biophysical Environment (continued)

**TABLE 5 -** Vegetation condition across the study area

| Vegetation Condition | Alf Powell Reserve | Baldivis Children's Forest | Baldivis Nature Reserve | Dixon Road Conservation Precinct | Karnup School Site | Karnup Townsite | Mandurah Hill | Tuart Park | Total Area (ha) | Total Area (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Excellent | | 2.44 | 3.45 | | | 10.67 | | | 16.56 | 13% |
| Very Good | | 0.14 | 3.32 | 1.88 | 1.13 | 0.54 | 0.41 | | 7.42 | 6% |
| Good | 3.22 | 0.26 | | 26.05 | 0.13 | 0.83 | 0.24 | | 30.73 | 24% |
| Degraded | 0.46 | 14.31 | 0.73 | 23 | 0.38 | 0.4 | 0.12 | 1.8 | 41.21 | 32% |
| Completely Degraded | 3.23 | 0.53 | 1.17 | 7.59 | 0.09 | 0.23 | | 0.8 | 13.65 | 10% |
| Cleared Areas and Open Water | 3.4 | 2.72 | 5.11 | 5.49 | 0.27 | 0.29 | 0.23 | 2 | 19.51 | 15% |
| Total Area (ha) | 10.31 | 20.4 | 13.78 | 64.01 | 2 | 12.96 | 1 | 4.6 | 129.1 | 1 |

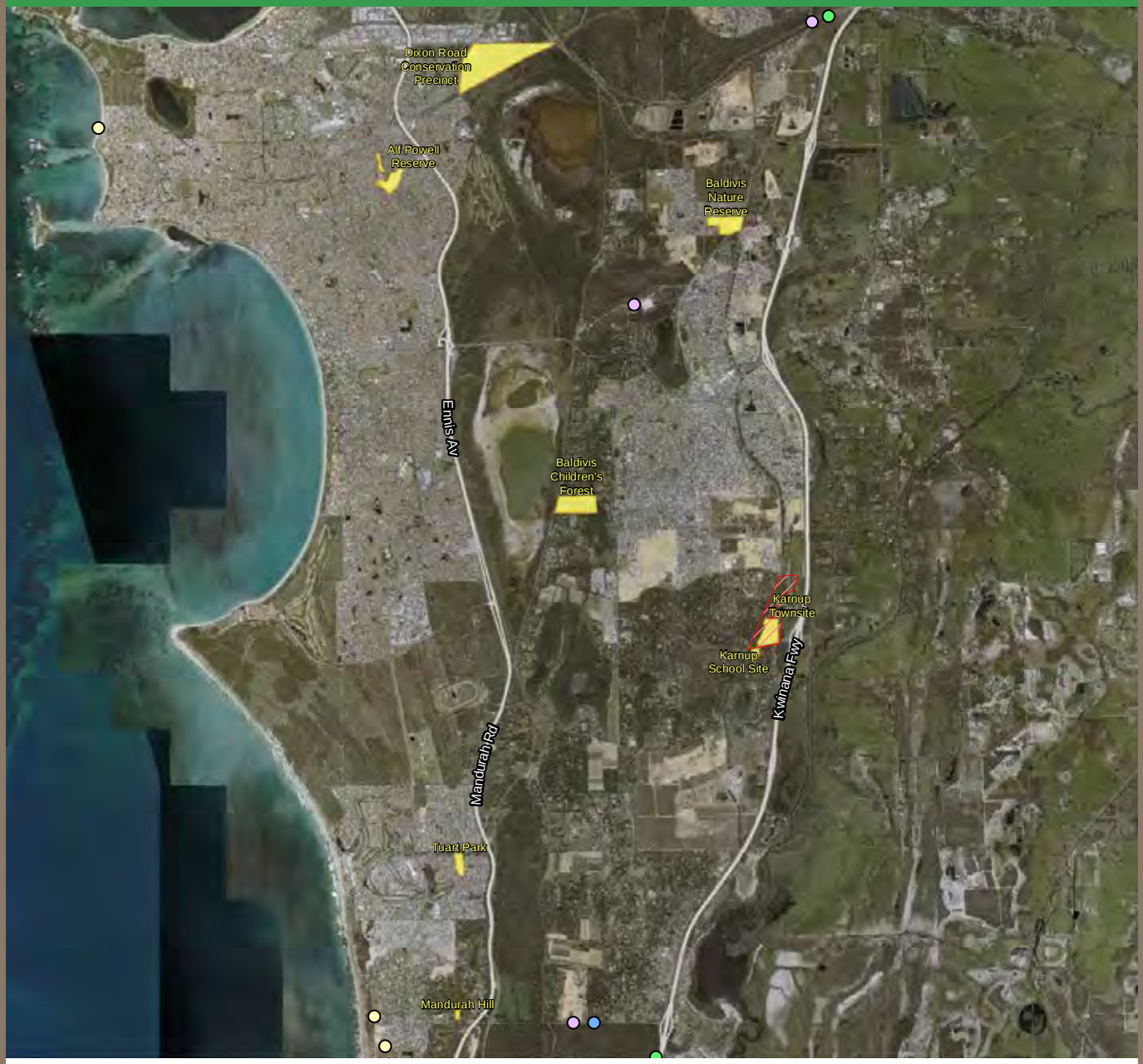
As shown below, 42% of vegetation within the study area is in either a Degraded or Completely Degraded condition and 43% is in a Good, Very Good or Excellent Condition.




### 4.6.5 Dieback

Historical mapping was reviewed for occurrences of the three dieback pathogens known to occur within the City (*Armillaria luteobubalina, Phytophthora multivora* and *Phytophthora cinnamomi).* The mapping indicates that disease confidence mapping of *Phytophthora cinnamomi* occurs directly within Karnup Townsite. *Armillaria luteobubalina* was found to be in close proximity to the vegetation at Mandurah Hill and *Phytophthora multivora* was found to be in close proximity to Mandurah Hill and Baldivis Nature Reserve. Despite the findings of the desktop study, no evidence of dieback was observed during the field survey. Historical records of dieback disease within the City are presented in Figure 5 (mapping compiled by Project Dieback (2018)). Descriptions of the three dieback pathogens are provided in Section 5 – Threatening Processes.

## FIGURE 5 - Historical records of dieback within the City




### Legend

Bushland Reserves

State Roads

**Dieback Points - Public Land**

- Armillaria luteobubalina (1982 - 2014 June 30)
- Phytophthora cinnamomi Public Land (1982 - 2018 June 30)
- Phytophthora multivora Public Land (1982 - 2018 June 30)
- Phytophthora nicotianae Public Land (1982 - 2018 June 30)

**Diesease Condidence Mapping P.cinnamomi to 2008 June 30**

Infested; confirmed or likely, Presence of P. cinnamomi most likely, degraded vegetation, strong pattern & chronology of deaths, vector present, positive sample and or previously interpreted infested

N

0 m 3000 m

# 4 Biophysical Environment (continued)

## 4.7 Flora

### 4.7.1 Flora Diversity

A total of 229 native flora species (78%) and 66 introduced weed species (22%) were recorded across the reserves. The species identified within the reserve represented 63 families with the *Fabaceae* (26 taxa), *Poaceae* (18 taxa), *Asteraceae* (15 taxa) and *Orchidaceae* (14 taxa) families having the most representation. The comprehensive list of plants recorded during the field surveys are presented in the technical Bushland Assessment Report prepared by 360 Environmental (D19/17700).

A summary of the number of species, including the proportion of weeds identified in the study area is presented in Table 6. Karnup Townsite had the highest species richness (91 species), while Mandurah Hill had the lowest species richness (31 species).

**TABLE 6 -** Flora Composition

| Reserve | Number of Species | Proportion of total species in the study area (%) | Number of Weed Species | Proportion of Weed Species in Reserve (%) |
|---|---|---|---|---|
| Alf Powell Reserve | 44 | 14.92% | 30 | 68% |
| Baldivis Children's Forest | 33 | 11.19% | 25 | 75.76% |
| Baldivis Nature Reserve | 65 | 22.03% | 25 | 38.46% |
| Dixon Road Conservation Precinct | 71 | 24.07% | 37 | 52.11% |
| Karnup School Site | 52 | 17.63% | 14 | 26.92% |
| Karnup Townsite | 91 | 30.85% | 14 | 15.39% |
| Mandurah Hill | 31 | 10.51 | 14 | 45.16% |
| Tuart Park | 33 | 11.19% | 15 | 45.45% |

### 4.7.2 Conservation Significant Flora

The desktop and literature searches identified that 52 species of conservation significance are known to occur within the City of Rockingham or within 20 km of one of the reserves in the study area. Of these, based on broad habitat requirements, seven priority flora species were considered to have a high likelihood of occurring within the study area (Table 7).

**TABLE 7 -** Conservation Significant Flora

| Conservation Rating | Species | Habitat |
|---|---|---|
| **Priority 2** | *Johnsonia pubescens subsp. cygnorum* | Grey, white or yellow sands in flats or seasonally wet sites |
| **Priority 3** | *Beyeria cineria* subsp. *cineria* | Grey/white or red sand. Coastal limestone and dunes |
| | *Lasiopetalum membranaceum* | Sandy substrate over limestone |
| | *Pimelea calcicola* | Coastal limestone ridges |
| **Priority 4** | *Dodonaea hackettiana* (Hackett's Hopbush) | Sand and outcropping limestone |
| | *Conostylis pauciflora* subsp. *pauciflora* | Grey sand over limestone on hillslopes and consolidated dunes |
| | *Jacksonia sericea* (Waldjumi) | Calcareous and sandy soils |

During the field assessment, two priority flora species were recorded in the study area. The survey identified two of the above priority species as occurring within the study area; *Johnsonia pubescens* subsp. *cygnorum* was found at Karnup Townsite and *Dodonaea hackettiana* (Hackett's Hopbush) was found at Baldivis Children's Forest and Dixon Road Conservation Precinct. It should however be noted that the hopbushes found at Baldivis Children's Forest are not naturally occurring as they were planted during a community revegetation event in 2009.

Two additional priority species, which were not identified as likely to occur by the desktop assessment, were also found during the field survey. These two species were *Austrostipa* sp. Cairn Hill (M.E. Trudgen 21176) (Priority 3), found at Alf Powell Reserve, and *Calothamnus graniticus* subsp. *leptophyllus* (Priority 4) found at Karnup Townsite. The locations of all priority species are shown in the individual reserve snapshots.

The occurrence of *Austrostipa* sp. Cairn Hill (M.E. Trudgen 21176) at Alf Powell Reserve represents a significant extension to the known range of a species which is typically found around the Moora region in the Wheatbelt. Although only one specimen was found during the survey, additional plants are likely to occur. No significant flora species were found within the reserve in the survey undertaken in 2014 as part of the Reserve Prioritisation Report. It is therefore quite possible that the specimen recorded at Alf Powell was planted in the years between 2014 and 2018.

*Calothamnus graniticus* subsp. *leptophyllus* (P4) did not appear in any database search results and does not typically occur in the vegetation types present at Karnup Townsite. It is possible that the species was planted in the reserve, as opposed to occurring there naturally.

The survey undertaken as part of the Reserve Prioritisation Report identified occurrences of *Pimelea calcicola* (P3) at Dixon Road Conservation Precinct. During the most recent survey the known area of the *Pimelea calcicola* was searched, however, no plants were found.

**FIGURE 6 - *Dodonaea hackettiana***

**FIGURE 7 - *Austrostipa sp.* Cairn Hill**

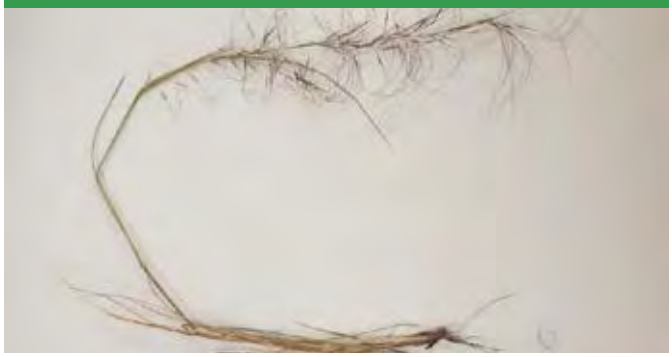
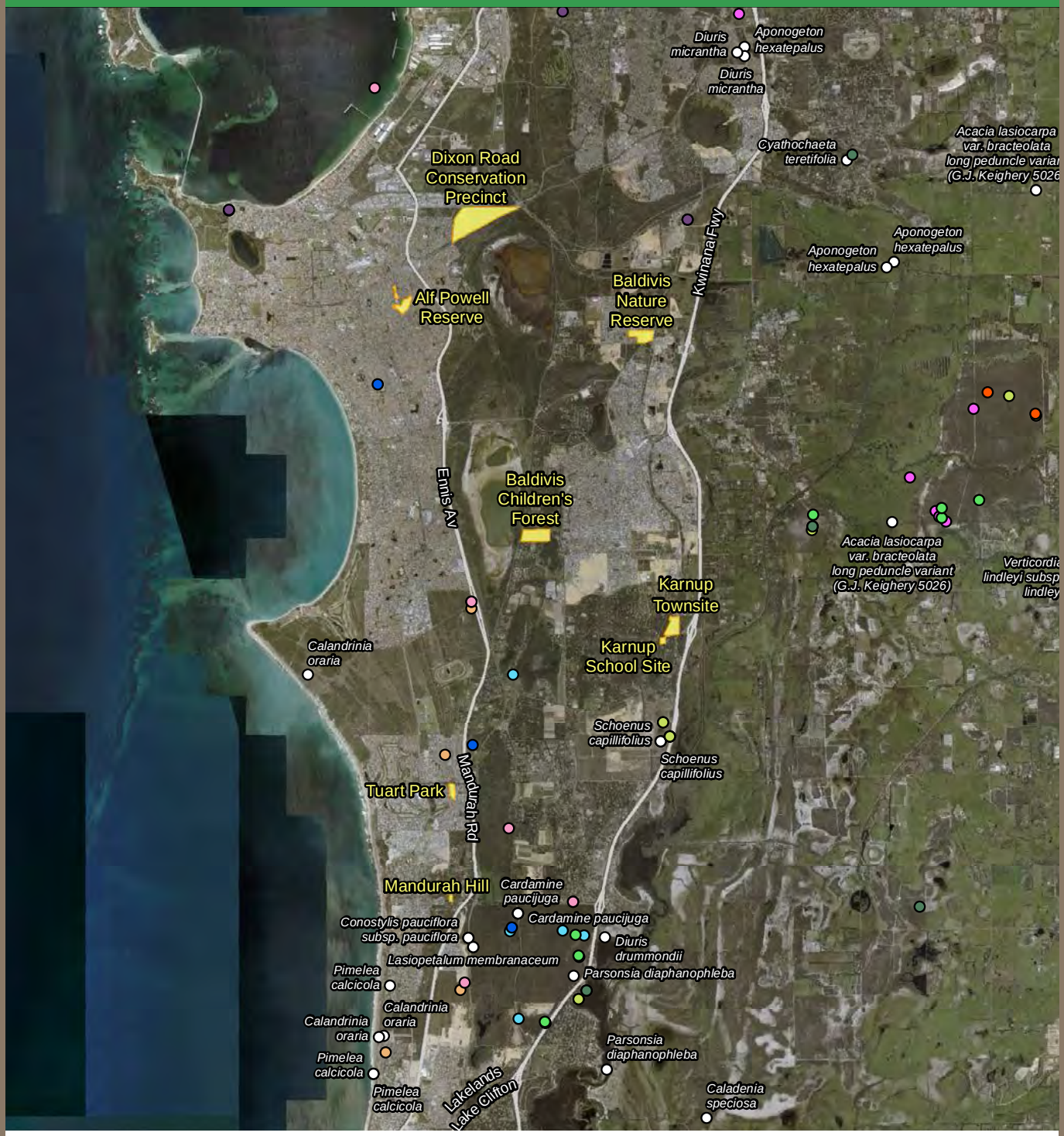


**FIGURE 8 - *Calothamnus graniticus***

## FIGURE 9 - Conservation Significant Flora




**Legend**

- Bushland Reserves
- State Roads

DEFINE PRIORITY VALUES



N 0 m 3000 m

### 4.7.3 Weeds

Weeds were common and widespread across the study area and consisted of 22% of all flora species recorded. The proportion and distribution of weed species ranged from 15.39% at Karnup Townsite to 75.76% at Baldivis Children's Forest.

The location and distribution of all weeds are shown in figures within each individual reserve snapshot. A weed species list summarising presence within each reserve is presented in Appendix C. The weed species have been sorted by weed suites, which groups the weeds based on their growth form to allow for control methods being tailored to treat each individual suite. The five weed suites are:

1. Annual weeds
2. Broadleaf perennial weeds
3. Bulbous weeds
4. Grass weeds,, and
5. Woody shrubs.

The majority of the weeds were either grasses or **Euphorbia terracina* (Geraldton Carnation Weed), a very common coastal weed.

Fifteen larger and more prominent weeds within the study area include:

- *Fumaria capreolata* (Whiteflower Fumitory)
- *Leptospermum laevigatum* (Coast Teatree)
- *Pelargonium capitatum* (Rose Pelargonium)
- *Pinus* sp.
- *Schinus terebinthifolia*
- *Fumaria muralis* (Wall Fumitory)
- *Lupinus cosentinii*
- *Lupinus luteus* (Yellow Lupin)
- *Acacia iteaphylla*
- *Polygala myrtifolia* (Myrtleleaf Milkwort)
- *Solanum nigrum* (Black Berry Nightshade)
- *Asparagus asparagoides* (WoNS Declared) (Bridal Creeper)
- *Chamaecytisus palmensis* (Tagasaste)
- *Watsonia meriana var.bulbillifera* (Bugle Lily)
- *Ficus carica* (Common Fig)

The GPS locations of these larger and more prominent weed species within each reserve of the study area are shown in the weed mapping figures (available within the individual reserve snapshots) with recommended treatment for the species listed in Appendix C.

Significant Weeds

Bridal Creeper (*Asparagus asparagoides*) was found in Dixon Road Conservation Precinct. This weed has been assessed as a Weed of National Significance (WoNS) by the Australian Department of the Environment and Energy and is also a declared pest under the *Biosecurity and Agriculture Management Act* (Department of Primary Industries and Regional Development).

Bridal Creeper is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread and its associated economic and environmental impacts. Bridal Creeper's climbing stems and foliage smother native plants, restricting photosynthesis. It also forms a thick mat of underground tubers that impeded the root growth of other plants and often prevents seedling establishment. The flowers are white, with flowering recorded between August and September producing more than 1,000 berries per square metre. The seeds are effectively distributed after being consumed by the birds, rabbits and foxes that eat the berries. Bridal Creeper is known to grow across a number of soil types including sandy loam, clay and granite soils. The specimens present at Dixon Road Conservation Precinct are growing in the deep Quindalup Sands that are usually associated with foredune environments.

The control category for Bridal Creeper is C3 management (Department of Primary industries and Regional Development) which includes requirements such as:

- prohibiting the introduction and/or supply of this pest into an area
- infestations must be managed, and
- persons undertaking work in an infested area must be aware of control measures.

**FIGURE 10 - Bridal Creeper**

## 4.8 Fauna

### 4.8.1 Fauna Habitats

A total of 10 broad habitat types were recorded in the field survey in addition to the cleared parkland areas. The description of these habitat types are shown in Table 8 and their representation across the reserve is displayed in the vegetation association maps within the individual reserve snapshots.

**TABLE 8 -** Fauna Habitats

| Fauna Habitat Type | Description | Reserves |
|---|---|---|
| *Xanthorrhoea* Shrubland | *Xanthorrhoea* shrubland with a dense understorey of annual weed species and grasses.<br>Flat landform with white sandy soil.<br>Moderate amounts of leaf litter, no logs, hollows or rocks. | Alf Powell Reserve |
| *Acacia / Xanthorrhoea* Shrubland | *Acacia* and *Xanthorrhoea* shrubland with a dense understorey of annual weed species and grasses. Flat landform with white sandy soil.<br>Moderate amounts of leaf litter, no logs, hollows or rocks. | Alf Powell Reserve, Dixon Road Conservation Precinct |
| Tuart / *Banksia* Woodland | Tuart woodland with a midstorey of *Banksia* spp. and a dense understorey of annual weed species and grasses.<br>Yellow sandy soil. Moderate amounts of leaf litter, logs and hollows. | Baldivis Children's Forest |
| Sedgeland | Overstorey of *Melaleuca* and some Flooded Gum over dense wetland sedges.<br>Some areas of open water.<br>Moist, peaty soil. Moderate amounts of logs and leaf litter, no hollows. | Baldivis Children's Forest |
| Eucalypt / *Banksia* Woodland | Marri and Jarrah woodland with a midstorey of *Banksia* spp. and understorey of annual weed species and grasses.<br>Flat landform.<br>Yellow sandy soil.<br>Moderate amounts of leaf litter, logs and hollows | Baldivis Nature Reserve |
| *Agonis / Banksia* Woodland | Woodland of *Agonis* and *Banksia* sp. with occasional Marri.<br>Flat landform.<br>Yellow sandy soil.<br>Moderate amounts of leaf litter, logs, rare hollows. | Karnup School Site |
| Marri / *Banksia* Woodland | Marri woodland with a midstorey of *Banksia* spp. and understorey of small shrubs.<br>Flat landform.<br>Yellow sandy soil.<br>Moderate amounts of leaf litter, logs and hollows. | Karnup Townsite |
| *Banksia / Kunzea* Shrubland | Dense *Kunzea* shrubland with overstorey of *Banksia* sp.<br>White sandy soil.<br>No logs, hollows or rocks.<br>Low to moderate levels of leaf litter. | Karnup Townsite |
| *Acacia* Shrubland | Dense low *Acacia* shrubland / heathland.<br>Steep landform with shallow sandy soil over limestone.<br>Moderate amounts of leaf litter and woody debris. No logs or hollows. | Mandurah Hill |
| Tuart Woodland over Shrubland | Tuart woodland with a patchy understorey of *Banksia* sp.<br>Flat landform.<br>Moderate amounts of leaf litter and logs, rare hollows. | Tuart Park |

### 4.8.2 Fauna Assemblage

A total of 80 species from 42 families and 71 genera were recorded during the Level 2 Fauna Assessment undertaken in October 2018. This consisted of two amphibian species, 46 bird species, 14 mammal species and 18 reptile species.

A full list of the species recorded within each reserve and across the entire studt area is available from Appendix D.

### 4.8.3 Conservation Significant Fauna

Fauna records compiled from the database and literature searches identified that a total seven amphibian, 199 bird, 26 mammal and 69 reptile species have the potential to occur within the Study Area. However, the Department of Biodiversity, Conservation and Attractions database search was not entirely accurate as it included fauna species that have:

- specific habitat requirements that are not present within the study area
- limited or patchy distribution
- become locally extinct, and
- been erroneously identified in previous surveys.

Following the exclusion of fauna species that met the above criteria, a total of 21 conservation significant species were identified as potentially occurring within the study area. These 21 species comprise 12 bird, six mammal and three reptile species.

**TABLE 9 -** Results of Conservation Significant Fauna Database Search

| Likelihood of occurrence | Number of species | Reserves |
|---|---|---|
| Recorded | 5 | Forest red-tailed black cockatoo, Baudin's black cockatoo, Carnaby's black cockatoo, quenda and Perth lined slider |
| High likelihood | 1 | Wambenger brush-tailed phascogale |
| Medium likelihood | 15 | Pacific swift, Australasian bittern, peregrine falcon, sharp-tailed sandpiper, red-necked stint, wood sandpiper, common sandpiper, common greenshank, glossy ibis, western quoll, western brush wallaby, water-rat, western ringtail possum, black striped snake, jewelled south-west ctenotus |

***Conservation Significant Fauna Identified in the Study Area***

Forest Red-tailed Black Cockatoo
*(Calyptorhynchus banksii naso) – Vulnerable*

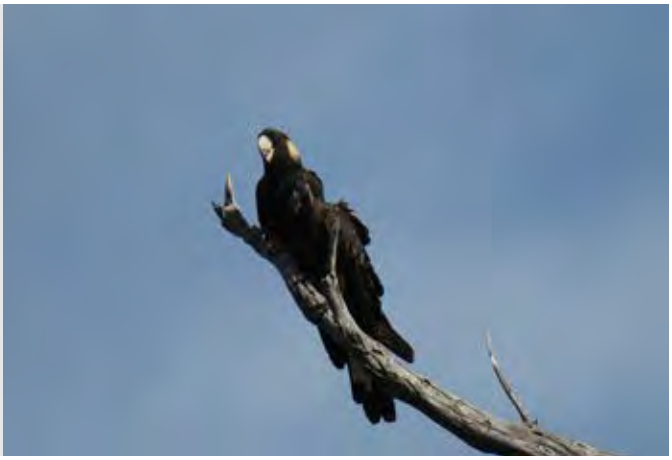
Forest red-tailed black cockatoos depend primarily on marri and jarrah trees for both foraging and nesting. The seeds of both eucalypts are the preferred food source. Hollows within live or dead eucalypts are utilised for nesting purposes. Breeding varies between years and occurs during the fruiting season for jarrahs and marris. These black cockatoos breed in woodland, forest or artificial nest boxes, but may also breed in former woodland or forest that has been reduced to isolated trees.

Baudin's black cockatoo
*(Calyptorhynchus baudinii) – Endangered*

Baudin's black cockatoos occur primarily in Eucalypt forests, foraging at all strata levels within the forests with a tendency to favour areas containing marri. Breeding generally occurs in the jarrah, marri and karri forests of the southwest of Western Australia in areas averaging more than 750 mm of rainfall annually.

Carnaby's black cockatoo
*(Calyptorhynchus latirostris) – Endangered*

Carnaby's black cockatoos feed on the seeds, nuts and flowers, of a variety of native and introduced plant species and insect larvae. Food plants generally occur within proteaceous genera such as *Banksia, Dryandra, Hakea* and *Grevillea,* but these birds are also known to forage on *Eucalypt* species in woodland areas. Carnaby's black cockatoos have also adapted to feeding on exotic species such as pines and cape lilac and weeds such as wild radish and wild geranium. Carnaby's black cockatoos usually breed between July and December in the hollows of live or dead eucalypts; primarily in Salmon Gum and Wandoo, but also within jarrah, marri and other eucalypt species.



# 4 Biophysical Environment (continued)

***Conservation Significant Fauna Identified in the Study Area***

Quenda
*(Isoodon obesulus fusciventer) – Priority 4*

The quenda, which is also known as the southern brown bandicoot, once occurred throughout southwest Western Australia. It now occurs from Guilderton southwards on the Swan Coastal Plain, including the Perth metropolitan area, in jarrah and karri forests and adjacent coastal vegetation complexes. This species inhabits scrubby, often swampy, vegetation with dense cover up to about 1 m high. It feeds in adjacent forest and woodland that is burnt on a regular basis. On the Swan Coastal Plain it is often associated with wetlands with dense vegetation where they feed on fruit, seeds, insects and fungi.

Perth Lined Slider
*(Lerista lineata) – Priority 3*

This species is restricted to a 90 km sandy coastal strip between Mandurah and Lancelin. It occurs in dunes and sand-plains with heaths as well as Eucalypt-Banksia Woodland. It is one of 71 reptile species occurring in the Perth region which make this area as diverse as any similar sized coastal region in Australia. The Perth slider is a burrowing species which is usually found in loose soil or sand beneath stones, logs, or termite mounds, where they feed on ants, termites and other small insects.

**Locally Significant Species**

Common Brushtail Possum (Koomal)
*(Trichosurus vulpecula hypoleucus)*

Brushtail possums are known to occupy a variety of habitats including forests and woodlands. As a nocturnal animal, it spends the day in a hollow in a tree trunk, fallen log, rock cavity or a termite mound. In areas affected by foxes, such as Karnup Townsite, Brushtail possum habitat is restricted to tree hollows. Across Australia their former range has been considerably reduced by a combination of habitat clearing and fox predation. Like most possums, these are herbivores, with *Eucalyptus* leaves comprising the bulk of the diet.

*Bungarra*
*(Gould's Goanna) (Varanus gouldii)*

Bungarras are large, carnivorous lizards, capable of growing up to 1.6 m in length. Their diet is comprised of smaller reptiles, insects, small mammals and carrion. Bungarras are found in most habitat types across the Swan Coastal Plain, with a preference for open woodlands over sandy soils. They typically burrow beneath rocks, logs, and dense leaf litter or rubbish piles. Bungarras have earned their nickname 'race horse goanna' due to their tendency to run for cover at great speed after being startled. Dixon Road Conservation Precinct offers an ideal habitat for these lizards and was the only reserve within the study area where they were recorded.

### 4.8.4 Black Cockatoo Habitat Assessment

As identified above, the three species of Black Cockatoo endemic to the south-west; Carnaby's, Baudin's and Forest red-tailed black cockatoo, are listed as likely or possibly occurring in the study. This indicates they utilise the habitat available for activities such as breeding, foraging and roosting.

The black cockatoo assessment recorded 901 potential breeding trees within the Survey Area (D19/17700), of which 134 contained hollows with openings estimated to be greater than 120 mm in diameter. A total of 101.7 ha of potential black cockatoo foraging habitat was mapped within the Survey Area. The black cockatoo habitat was identified across all the reserves aside from Mandurah Hill. The detailed mapping is presented in the individual reserve snapshots.

### 4.8.5 Introduced Fauna

The following introduced fauna species were observed during the field surveys:

- Domestic cat *(Felis catus)*
- Domestic dog *(Canis familiaris)*
- Eastern long-billed corella *(Cacatua tenuirostris)*
- Laughing turtle dove *(Spilopelia senegalensis)*
- Laughing kookaburra *(Dacelo novaeguineae)*
- Rainbow lorikeet *(Trichoglossus moluccanus)*
- Red fox *(Vulpes vulpes)*
- Black rat *(Rattus rattus)*
- Rabbit *(Oryctolagus cuniculus)*
- Fallow deer *(Dama dama)*, and
- House mouse *(Mus musculus)*.

Locations of these observations are located in the individual reserve snapshots.

## 4.9 Conservation areas

Approximately 3,894 ha of natural areas in the City are managed by DBCA and 1,229 ha are managed by the City, predominantly for conservation purposes. All bushland reserves included within this assessment are managed exclusively by the City.

### 4.9.1 Bush Forever

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

Dixon Road Conservation Precinct, Karnup School Site and Karnup Townsite all form part of Bush Forever sites. Dixon Road Conservation Precinct is within Bush Forever Site No. 356 and both Karnup reserves are within Bush Forever Site No. 376.

### 4.9.2 Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are prescribed under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* and have been identified to protect native vegetation values of areas surrounding significant, threatened or scheduled flora, vegetation communities or ecosystems. All reserves, aside from Alf Powell Reserve and Baldivis Nature Reserve, are located within ESAs.

### 4.9.3 Ecological Linkages

Ecological linkages play an important role in maintaining the diversity and vigour of ecological systems (WALGA 2017). They also enable native fauna to move through the landscape by providing continuous or near-continuous habitat. Linkages may occur as continuous stretches of habitat, or as a close network of reserves and remnant vegetation separated by short distances. Where the distance between habitats is great, the ability of flora and fauna to disperse is limited.

Many natural areas in the Perth metropolitan region, particularly on the Swan Coastal Plain, are small and fragmented due to increasing pressures from urbanisation and industrial development. Natural areas that connect or are adjacent to regionally significant areas provide valuable linkages that help to reduce the effects of threats on ecological systems (WALGA 2017). This increases the long-term viability of both regionally and locally significant natural areas.

Ecological linkages across the City's municipality were defined as part of a Natural Areas Technical Assessment undertaken by Eco Logical Australia in 2017. Ecological linkages were initially constructed as linear pathways joining reserves and larger patches of remnant vegetation. Paths were then expanded into 500 m wide corridors. Corridors this wide were considered suitable given size of the City.

The Natural Areas Technical Assessment identified that six of the reserves in the study area are connected by ecological linkages. The reserves that are not within ecological linkages are Alf Powell Reserve and Tuart Park.

## 4.10 Heritage

*Indigenous Heritage*

The City of Rockingham is situated within Nyoongar Country, an area that holds special significance to its traditional owners with many sacred sites occurring within the region (City of Rockingham 2015).

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 Aboriginal Affairs branch of the Department of Planning, Lands and Heritage manages the online Aboriginal Heritage Enquiry System, which identifies any registered Nyoongar heritage sites within the vicinity of the search area.

A summary of Indigenous heritage sites in close proximity to the reserves in the study area is presented in the Table 10.

In addition to the registered sites, there are also 37 sites in the City listed as 'Other heritage places'. These sites can be of high heritage value and the eight sites located in proximity to the bushland reserves in this Plan are also presented in table 10 (Site 18501, onwards).

The City has also recently launched new signage for a Nyoongar Trail at Karnup School Site. The Nyoongar Trail has been moved from its original location within Karnup Townsite and has been re-established within the adjacent reserve to provide information about the six Nyoongar seasons and the connection the Nyoongar people have with Rockingham. The new signage includes significant use of Nyoongar language, which has been included to increase recognition of the language within the community.

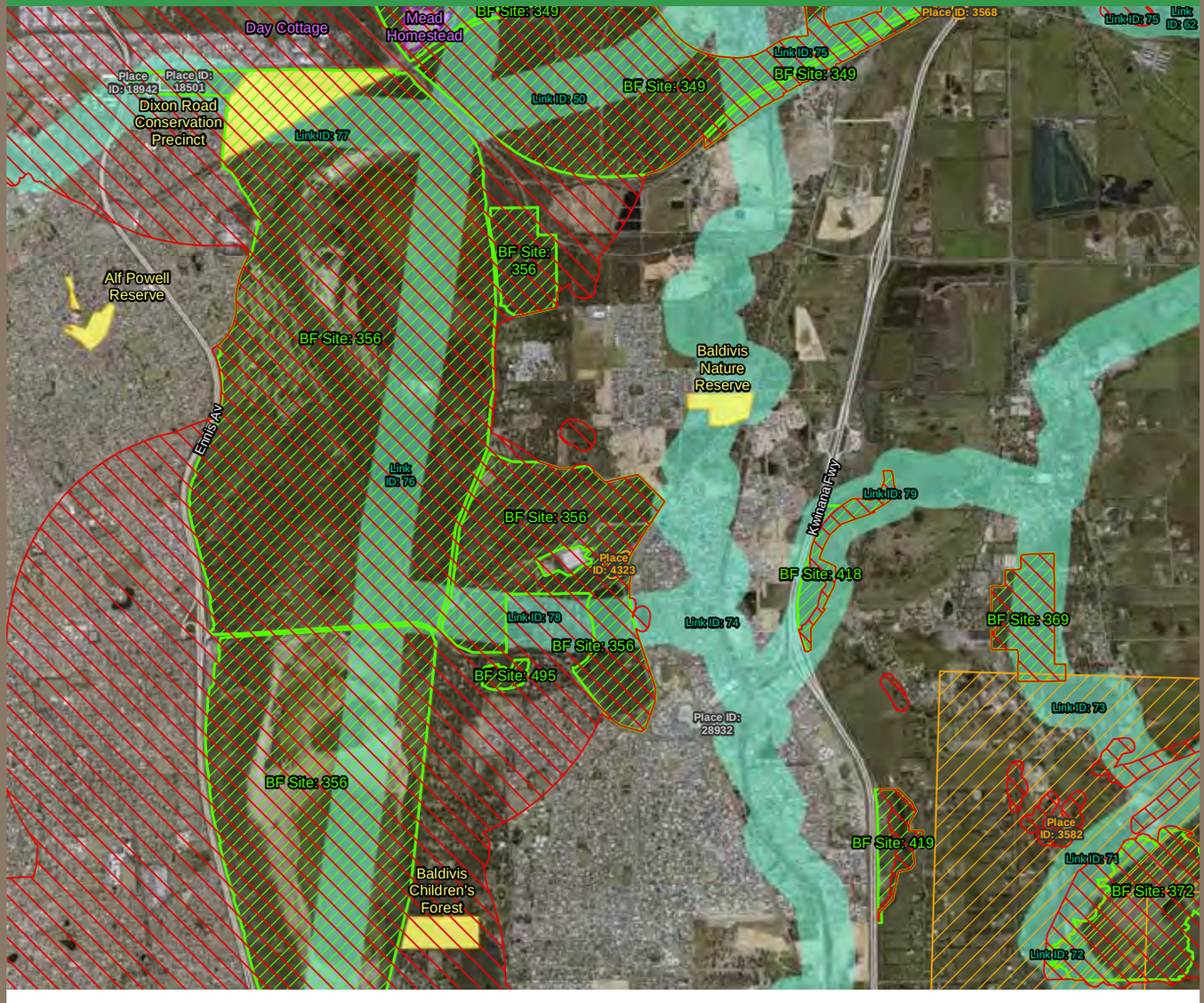
*European Heritage*

The Heritage Council and the State Heritage Office manage an online database called Inherit. Inherit contains comprehensive information about cultural heritage places listed in heritage inventories at all tiers of Government as well as non-government lists and surveys. A search of the Inherit database identified that the study area does not contain any known local, state or federal European heritage sites.

**TABLE 10 -** Local Indigenous Heritage Sites

| Site ID | Name | Type | Location |
|---|---|---|---|
| 3582 | Serpentine River | Ceremonial and Mythological | Karnup Townsite and Karnup School Site are within this heritage site |
| 22888 | Mooribirdup Ceremonial Grounds | Ceremonial, Camp, Named Place and Plant Resource | Within 5 km of Alf Powell Reserve |
| 352 | Lake Richmond | Fish Trap and Man Made Structure | Within 5 km of Alf Powell Reserve |
| 31265 | Sister Kate's Children's Home (Summer Camp) | Historical, Camp, Mission and Water Source | Within 5 km of Alf Powell Reserve |
| 3471 | Rotary Park, Rockingham | Mythological | Within 5 km of Alf Powell Reserve |
| 3534 | Sloan's Reserve Artefacts | Artefacts, Scatter, Arch Deposit and Other | Within 5 km of Dixon Road Conservation Precinct |
| 3710 | Thomas Oval | Camp | Within 5 km of Dixon Road Conservation Precinct |
| 4323 | Gas Pipeline | Artefacts and Scatter | Within 5 km of Baldivis Nature Reserve and Baldivis Children's Forest |
| 17307 | Paganini Swamp (Barong) | Mythological, Camp, Hunting Place and Water Source | Within 5 km of Tuart Park and Mandurah Hill |
| 18501 | Scarred and Modified Trees | Artefacts, Ceremonial, Engraving, Man-Made Structure, Modified Tree, Mythological | Within 500 m of Dixon Road Conservation Precinct |
| 18502 | Ring of Stones | Ceremonial, Grinding Patches/ Grooves, Man-Made Structure | Within 500 m of Dixon Road Conservation Precinct |
| 18942 | Dixon Rd Foothole Tree | Modified Tree | Within 1 km of Dixon Road Conservation Precinct |
| 3334 | Rockingham | Man-Made Structure | Within 1 km of Dixon Road Conservation Precinct |
| 4347 | Sixty Eight Road, Baldivis | Artefacts / Scatter | Within 1 km of Karnup Town Site |
| 4324 | Gas Pipeline 83 | Artefacts / Scatter | Within 1 km of Karnup Town Site and School Site |
| 3469 | Golden Bay Camp and Swamp | Ceremonial, Historical, Camp, Hunting Place, Meeting Place, Plant Resource, Water Source | Within 1 km of Mandurah Hill |
| 37720 | Karnup Station Scarred Tree | Modified Tree | Within 1 km of Mandurah Hill |

## FIGURE 18 - Indigenous Heritage




### Legend

- Bushland Reserves
- State Roads
- Environmentally Sensitive Areas
- Bush Forever Sites
- Perth Regional Ecological Linkage
- State Heritage Office Registered Sites

**Aboriginal Heritage Sites**

- Registered Sites
- Lodged Sites

N

0 m 1500 m

# 5 Infrastructure Assessment

Well maintained and appropriately located infrastructure plays an important role in ensuring recreational uses do not adversely impact upon conservation values. All current and proposed infrastructure is mapped in the individual reserve snapshots (sections 7-14).

## 5.1 Fencing

Fencing of sensitive areas is important to prevent undesirable impacts from uncontrolled access, such as trampling of vegetation and the potential spreading of weeds. 'Good condition' fencing is installed around the majority of the reserve boundaries within the study area, however, there are exceptions where there is inadequate fencing which needs repairing. Fencing repairs are proposed for Alf Powell Reserve, Baldivis Nature Reserve and Mandurah Hill. The type, condition and extent of fencing at each reserve is summarised in Table 11 below and shown in the individual reserve snapshots.

**TABLE 11 -** Summary of Existing Fencing

| | | Condition | |
|---|---|---|---|
| **Reserve** | **Fence Type** | **Good (m)** | **Poor (m)** |
| **Alf Powell Reserve** | Bollards | 890 | 0 |
| | Three-strand rural fencing | 1,740 | 0 |
| | Private property fencing | 510 | 0 |
| | School fencing | 183 | 2 |
| | Security fencing | 90 | 0 |
| **Baldivis Children's Forest** | Three-strand rural fencing | 280 | 0 |
| | Private property fencing | 1,690 | 0 |
| | Revegetation fencing | 890 | 0 |
| **Baldivis Nature Reserve** | Three-strand rural fencing | 1,050 | 0 |
| | Fence droppers | 240 | 0 |
| | Sporting oval fence | 340 | 350 |
| | School fencing | 180 | 0 |
| **Dixon Road Conservation Precinct** | Three-strand rural fencing | 1,730 | 0 |
| | Chain linked fence | 1,970 | 0 |
| | Private property fencing | 500 | 0 |
| **Karnup School Site** | Three-strand rural fencing | 130 | 0 |
| | Bollards | 100 | 0 |
| | Private property fencing | 290 | 0 |
| **Karnup Townsite** | Three-strand rural fencing | 960 | 0 |
| **Mandurah Hill** | Three-strand rural fencing | 500 | 40 |
| | Private property fencing | 130 | 30 |
| | Utility fencing | 58 | 2 |
| **Tuart Park** | Bollards | 740 | 0 |
| | Three-strand rural fencing | 40 | 0 |
| | Hedge | 40 | 0 |
| | Private property fencing | 65 | 0 |

## 5.2 Paths and Tracks

Paths are important to ensure appropriate access to the reserves for recreation without negatively impacting on the surrounding vegetation.

The creation of 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.

All of the reserves contain formalised paths ranging from well-maintained concrete paths, to crushed limestone and bare earth tracks. The majority of the paths in the study area are in good condition, however, there are a number of informal tracks within the bushland reserves that need to be either formalised or closed.

The type, condition, extent of paths and whether or not they are fenced are summarised for each reserve in Table 12 and the mapping is shown in the individual reserve snapshots.

**TABLE 12 -** Summary of Existing Paths

| Reserve | Path Type | Fenced | Condition | |
|---|---|---|---|---|
| | | | Good (m) | Poor (m) |
| Alf Powell Reserve | Paved concrete | ✓ | 1,020 | 0 |
| | Compacted earth | ✗ | 440 | 0 |
| | Sand | ✗ | 0 | 150 (informal track to be formalised) |
| | Dirt trail | ✗ | 0 | 310 (informal track to be closed) |
| Baldivis Children's Forest | Sand fire break | ✓ | 1,490 | 0 |
| | Dirt trail | ✗ | 1,160 | 0 |
| | Crushed limestone | ✗ | 1,100 | 0 |
| | Dirt trail | ✗ | 0 | 70 (Blue wetland trail is underwater and will be closed for safety reasons) |
| Baldivis Nature Reserve | Crushed limestone | ✗ | 2,050 | 0 |
| | Paved concrete | ✗ | 130 | 0 |
| | Dirt trail | ✗ | 0 | 50 (informal track to be formalised) |
| | Dirt trail | ✗ | 0 | 150 (informal track to be closed) |
| Dixon Road Conservation Precinct | Crushed limestone | ✗ | 5,630 | 0 |
| | Dirt trail | ✗ | 0 | 620 (informal trail to be closed) |
| Karnup School Site | Sand fire break | ✓ | 140 | 0 |
| | Crushed limestone | ✗ | 190 | 0 |
| Karnup Townsite | Crushed limestone | ✗ | 670 | 0 |
| | Dirt trail | ✗ | 280 | 0 |
| Mandurah Hill | Bitumen | ✓ | 200 | 0 |
| | Sand fire break | ✗ | 1,170 | 0 |
| Tuart Park | Paved concrete | ✗ | 1,170 | 0 |
| | Dirt trail | ✗ | 0 | 40 (informal track to be closed) |

# 5 Infrastructure Assessment (continued)

## 5.3 Signage

Signs across the study area include reserve name signs, regulatory signs, directional signs and interpretive information signs. These signs vary in condition, and poor condition signage should be progressively replaced or removed.

There are opportunities across the study area to install new educational signage to discourage unauthorised access and rubbish disposal.

Content for new interpretive signage will be prepared in consultation with the City's Aboriginal Advisory Group to reflect Indigenous heritage values and the local environmental attributes of each reserve, as identified in this Plan.

As Dixon Road Conservation Precinct forms part of the Rockingham Lakes Regional Park, new signage will be designed to align with the Department of Biodiversity, Conservation and Attractions' regional parks sign system.

New signage has been proposed for all reserves except for Mandurah Hill and Tuart Park.

The type and condition of existing signs is summarised in Table 13 below.

**TABLE 13 -** Summary of Existing Signage

| Reserve | Sign Type | Number | Number Poor Condition |
|---|---|---|---|
| Alf Powell Reserve | Reserve name | 1 | 0 |
| | Regulatory | 2 | 0 |
| | Interpretive | 1 | 1 |
| Baldivis Children's Forest | Reserve name | 1 | 0 |
| | Regulatory | 2 | 0 |
| | Interpretive | 8 | 1 |
| | Directional | 10 | 0 |
| | Undetermined | 3 | 3 |
| Baldivis Nature Reserve | Reserve name | 2 | 0 |
| | Regulatory | 1 | 0 |
| | Interpretive | 9 | 3 |
| | Directional | 2 | 1 |
| Dixon Road Conservation Precinct | Reserve name | 2 | 1 |
| | Regulatory | 4 | 0 |
| | Interpretive | 3 | 0 |
| | Directional | 8 | 1 |
| Karnup School Site | Regulatory | 2 | 0 |
| | Undetermined | 1 | 1 |
| Karnup Townsite | Reserve name | 2 | 0 |
| | Regulatory | 1 | 1 |
| | Interpretive | 9 | 8 |
| | Directional | 2 | 1 |
| Mandurah Hill | Reserve name | 1 | 0 |
| | Regulatory | 1 | 0 |
| Tuart Park | Regulatory | 2 | 0 |
| | Interpretive | 1 | 0 |
| Total | | 81 | 22 |

## 5.4 Other Park Infrastructure and Facilities

The type and condition of other park infrastructure is summarised in the tables below:

### Alf Powell Reserve

**Stormwater drains**
Number: 5 Number in Poor Condition: 3

**Recreational structures**
Number: 3 Number in Poor Condition: 0

**Car parking facilities**
None

**Park benches**
Number: 1 Number in Poor Condition: 0

**Rubbish bins**
Number: 4 Number in Poor Condition: 1

The poor condition stormwater drains were either overgrown with weeds or congested with leaf litter. The poor condition rubbish bin was missing with only the support pole remaining.

### Baldivis Children's Forest

**Amphitheatres**
Number: 1 Number in Poor Condition: 0

**Barbecues**
Number: 1 Number in Poor Condition: 0

**Park benches**
Number: 5 Number in Poor Condition: 0

**Fire extinguishers**
Number: 2 Number in Poor Condition: 0

**Park shelters**
Number: 2 Number in Poor Condition: 0

**Public toilets**
Number: 1 Number in Poor Condition: 0

**Rubbish bins**
Number: 1 Number in Poor Condition: 0

**Car parking facilities**
Along Mandurah Road and within the reserve via the driveway which is locked

### Baldivis Nature Reserve

**Barbecues**
Number: 1 Number in Poor Condition: 3

**Park benches**
Number: 2 Number in Poor Condition: 1

**Community Buildings**
Number: 1 Number in Poor Condition: 0

**Playgrounds**
Number: 1 Number in Poor Condition: 0

**Park shelters**
Number: 1 Number in Poor Condition: 0

**Tables**
Number: 2 Number in Poor Condition: 0

**Rubbish bins**
Number: 4 Number in Poor Condition: 0

**Car parking facilities**
Official car park with delineated bays accessible from Fifty Road

One of the park benches is starting to deteriorate and is in need of maintenance.

# 5 Infrastructure Assessment (continued)

## Dixon Road Conservation Precinct

### Park benches
Number: 5 Number in Poor Condition: 0

### Buildings
Number: 1 Number in Poor Condition: 0

### Tables
Number: 2 Number in Poor Condition: 0

### Rubbish bins
Number: 5 Number in Poor Condition: 0

### Car parking facilities
Reserve has a western carpark and an eastern carpark.

## Karnup School Site

### Barbecues
Number: 1 Number in Poor Condition: 0

### Park shelters
Number: 2 Number in Poor Condition: 0

### Water tanks
Number: 1 Number in Poor Condition: 0

### Rubbish bins
Number: 1 Number in Poor Condition: 0

### Car parking facilities
Carpark accessible through the driveway on Karnup Road

## Karnup Townsite

### Park benches
Number: 2 Number in Poor Condition: 0

### Dieback Stations
Number: 2 Number in Poor Condition: 2

### Car parking facilities
Reserve has a western carpark and an eastern carpark.

Poor condition dieback stations were identified where the stations were accompanied with insufficient information to inform the public how these stations are to be used.

## Mandurah Hill

### Park benches
Number: 3 Number in Poor Condition: 1

### Antennas
Number: 1 Number in Poor Condition: 0

### Sun Dials
Number: 1 Number in Poor Condition: 0

### Car parking facilities
There are two carparks. One is publicly available from Crystaluna Drive. The second was adjacent to the tower and is only accessible via a gated driveway

## Tuart Park

### Barbecues
Number: 2 Number in Poor Condition: 0

### Park benches
Number: 7 Number in Poor Condition: 0

### Water fountains
Number: 1 Number in Poor Condition: 0

### Park shelters
Number: 2 Number in Poor Condition: 0

### Stormwater drains
Number: 4 Number in Poor Condition: 1

### Tables
Number: 2 Number in Poor Condition: 0

### Public toilets
Number: 1 Number in Poor Condition: 0

### Rubbish bins
Number: 5 Number in Poor Condition: 0

### Car parking facilities
None, residential parking only

The poor condition stormwater drain is full of water, indicating that the surrounding drainage infrastructure is not adequately conveying stormwater flow.

# 6 Threatening Processes

A key objective of this Plan is to protect and enhance conservation values through the removal of threatening processes. The processes that threaten biodiversity conservation can vary according to the unique biophysical characteristics of the region. As such, the actions identified in this section of the Plan have been specifically targeted to bushland environments and will be progressively implemented by the Parks Services Team to address the following threatening processes:

weed invasion

feral animals

inappropriate access

vandalism and rubbish dumping

climate change

diseases and pathogens

## 6.1 Weed Invasion

Potential Impact

Invasive species, such as weeds, present the biggest threat to biodiversity after direct habitat loss (DotE 2014).

Weeds may impact on the biodiversity values by:

- outcompeting 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, and
- altering fire regimes.

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

- edge effects from roads/cleared areas
- dumping of rubbish
- escape of garden plants and grasses
- human and animal transport (particularly through unauthorised tracks), and
- asexual reproduction following mechanical slashing.

Management Objectives

Management actions will seek to remove/reduce existing weed infestations, minimise the spread of weeds and limit the introduction of new weeds as much as practicable. Particular focus will be given to removing all occurrences of Bridal Creeper *(Asparagus asparagoides)* and the other prominent weeds from the reserves.

Management techniques will be undertaken during optimal control periods and using appropriate methods for each weed suite.

Effective management will ensure that weed control does not negatively impact flora and fauna. This can be achieved by revegetating weed infested sites with suitable native plants.

## 6.2 Feral Animals

Potential Impact

Feral animals are introduced animals that can have detrimental effects on the conservation value of ecosystems through:

- predation on native fauna
- competing with native species for food and shelter
- habitat destruction, and
- introducing and spreading diseases.

Since European settlement of Australia, the introduction of feral fauna species has been a major contributing factor in the decline of many native fauna species. This is particularly true in the South West of Western Australia with the introduction of the red fox, cat and rabbit (Invasive Plants and Animals Committee, 2017, Ben Reddiex, David M. Forsyth and Department of the Environment and Heritage, 2004).

Although foxes and cats were not recorded in all of the reserves, it is still highly likely they are present. These two species will have a major impact on species such as quenda, brushtail possum and various other mammal, reptile and amphibian species through predation.

Rabbits are also a problem species as they degrade vegetation, outcompete other fauna species and increase the occurrence of feral predators such as red fox and cat by providing them with a food source.

Management Objectives

Management of red fox, feral cat and rabbit populations is the priority for feral animal control, particularly within the areas of high conservation value. The control of the other feral fauna species will be undertaken as a lesser priority. This will include management of the fallow deer within Karnup Townsite and the populations of black rat, house mouse and feral bee across all reserves.

Objectives include reducing the occurrence and spread of feral animals as well as enhancing the habitat value for native species. Feral animal control will utilise methods that are known to be acceptable for use in proximity to urban environments. This will be achieved through the implementation of the management actions listed in the Implementation Table in Section 14.

## 6.3 Inappropriate Access

Potential Impact

Inappropriate access, such as the use of undefined tracks, can result in habitat degradation or loss through trampling of native vegetation. Trampling of vegetation can also lead to changes in flora composition through introduction of non-native species.

Management Objective

The objective is to provide safe, convenient and controlled access within the reserves. Management actions will seek to restrict unauthorised access to conservation areas and rehabilitate informal tracks. Actions are listed in the Implementation Table in Section 14.

## 6.4 Vandalism and Rubbish Dumping

Potential Impact

Vandalism and dumping of rubbish can reduce the visual amenity and the overall recreational value of the bushland reserves. It can also facilitate the spread of weeds and negatively impact upon native fauna.

Management Objective

The management objective is to enhance the recreational and amenity value of the reserve by restricting unauthorised access, promoting a 'take your rubbish with you' message for smaller reserves and providing an adequate number of rubbish bins where appropriate for the reserves and ongoing maintenance accessibility.

## 6.5 Climate Change

Potential Impact

There is consensus amongst climate scientists that increasing levels of greenhouse gases produced by human activities are contributing to global warming. Changes observed over the 20th century include increases in global average air and ocean temperature, widespread melting of snow and ice and rising global sea levels. The extra heat in the climate system also has impacts on atmospheric and ocean circulation, which influences rainfall and wind patterns (Department of the Environment 2015).

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) *Global Assessment Report 2019* anticipates that 5% of all flora and fauna species worldwide will be at risk of extinction from the projected 2°C increase in temperature, the proportion of species at risk rises to 16% should mean global temperatures warm by 4.3 °C.

To put this in a local context, records show that the decade of 2001-2010 was the world's warmest decade and in Australia, each decade has been warmer than the last since the 1950s (DoTE 2015). Scientists predict that as the unique biodiversity in south-western Australia are particularly sensitive to changes in temperature and rainfall, the capacity of these natural systems to adapt to climate change is relatively limited. The decline in annual rainfall is resulting in tree deaths and affecting water dependent ecosystems throughout the region. Tree deaths may occur within the study area as the temperature increases and the bushland dries. Areas containing wetlands, including Baldivis Children's Forest, may see a more drastic change.

Management Objectives

The City's management approach acknowledges the consensus that healthy ecosystems are likely to be more resilient in the face of climate change (DoEE 2017).
The actions outlined in this Plan will seek to provide species with an opportunity to adapt to changing climatic conditions by:

- managing threatening processes
- promoting species diversity through revegetation, and
- continuing to monitor the bushland ecosystems in order to detect changes and take informed action as required.

The City monitors and manages the effect of climate change on wetland ecosystems through the actions outlined in the Wetland Management Plan and the long-term Frog Population Monitoring Program.

# 6 Threatening Processes (continued)

## 6.6 Fire

Potential Impact

The vegetation within the study area contains a large amount of fuel for bushfires which creates a fire prone environment and as such, there is a long history of fires occurring within the City.

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. Potential negative environmental impacts of fires include:

- damage to native vegetation and fauna habitats
- increased weed germination post fire
- native fauna mortality
- destruction of fauna habitats resulting in an increased risk of predation by feral animals, and
- destruction or damage to reserve infrastructure.

Management Actions

The key management objective is to maintain existing firebreaks to reduce the likelihood of bushfires occurring and limit the ability of a potential fires to spread. Additional mitigation actions may be required and will be guided by the City's Bushfire Risk Management Plan.

## 6.7 Dieback

Potential Impact

Dieback is a fungi-borne pathogen which causes the roots of susceptible plants to rot. Descriptions of the threat posed by the three dieback pathogens known to occur within the City are provided below:

*Phytophthora cinnamomi*

*Phytophthora cinnamomi* is one of the biggest threats to biodiversity in Australia. It occurs widely across southern Australia and is most commonly found in areas which receive above 600 mm annual rainfall. Phytophthora dieback is causing significant damage in the South-West Australia Ecoregion of Western Australia, because:

- over 40% of native plant species and over 50% of rare or endangered flora species in the region are susceptible
- the climate and soils of the South-West Australia Ecoregion suit the pathogen's survival and spread, and
- the pathogen was spread widely before it was identified as the cause of permanent damage to our ecosystems.

*Armillaria luteobubalina*

A soil-borne fungus that causes root rot of a wide variety of plants including many species of native flora. The 'Honey fungus' is native to Australia and can cause major damage to natural ecosystems. *Armillaria* lives and feeds on the wood of infected plants and spreads on infected roots as branching threads which can also be found under the bark of trees on the lower portion of the trunk. *Armillaria* reduces the function of the roots and affects the internal structure of the tree, often resulting in a slow decline in health and eventually death (Dieback Working Group, 2008).

*Phytophthora multivora*

This fungus is common in urban areas of Perth, particularly along the inland dune systems. Entry and establishment in bushland reserves is more likely in areas where nursery stock and soil are introduced and the use of machinery and vehicles is common.

The symptoms produced on plants vary depending upon the host, the environment and climatic conditions. *P. multivora* is commonly associated with individual spot deaths and areas of tree decline. It can cause rapid death of plants or a slow perennial decline in health of the crown. It has been observed causing large aggressive lesions on *Banksias*. On other species such as tuarts (*Eucalyptus gomphocephala*) the fungus is considered to be a pathogen of the fine roots only.

Management Actions

As no evidence of dieback was observed within the study area, management actions will seek to establish an ongoing monitoring program so that any occurrences of dieback will be identified at an early stage.

Alf Powell

# Alf Powell Reserve

*Willmott Drive, Cooloongup*

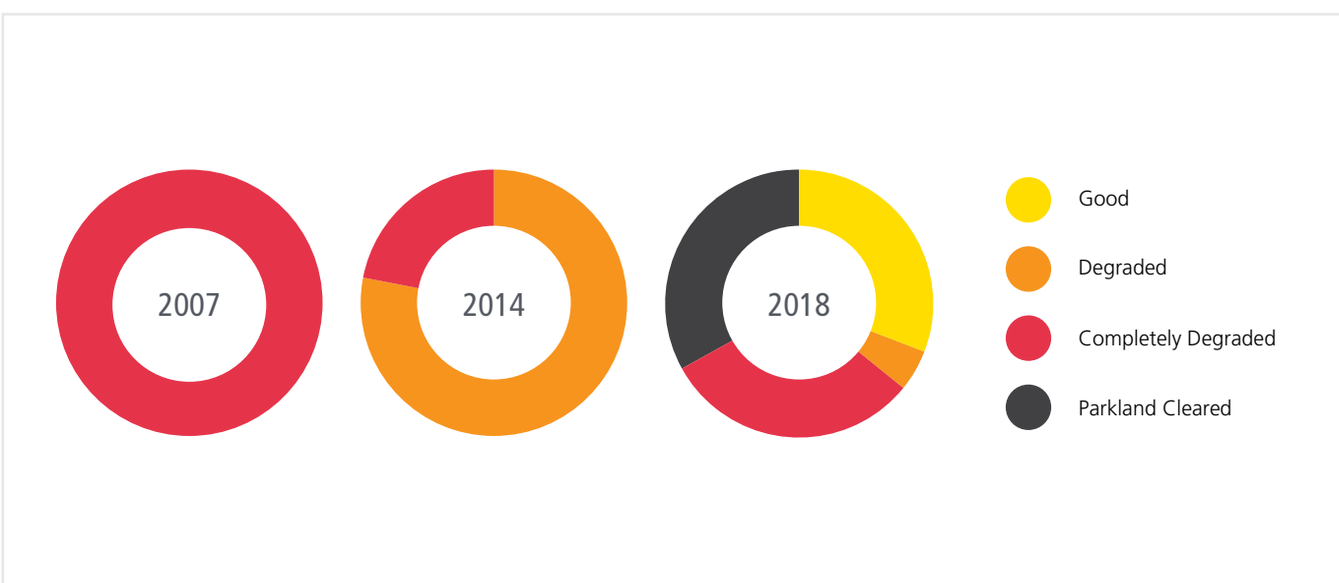
Alf Powell Reserve (10.31 ha) contains 4.09 ha of bushland, consisting of *Xanthorrhoea preissii* and *Acacia* sp. shrubland. Vegetation condition within the survey area ranged from 'Good' to 'Completely Degraded', with the major disturbance being the historical clearing to make way for grassed parkland and infrastructure. The degraded vegetation still retains large numbers of native shrub species, meaning that it has the potential to regenerate with proper management.

The cleared parkland consists of lawns with a playground, a skate park and planted peppermint and Eucalyptus trees. Two pedestrian gates were found to be vandalised with one gate being removed completely and found nearby. The absence of these barriers has allowed motorcycles and/or bicycles entry into the bushland areas resulting in two informal BMX tracks. It is proposed that the central sand track be formalised with limestone once pedestrian gates have been reinstalled. This formalisation will discourage the development of makeshift BMX tracks.

## Conservation Significant Species and Communities

- One Priority 3 flora species (*Austrostipa* sp. Cairn Hill (M.E. Trudgen 21176)) as listed by DBCA was recorded within the Alf Powell Survey Area. This find was far beyond the known range of the species, thus suggesting that it may have been planted.
- The Floristic Community Type in the survey area is considered equivalent to FCT SCP24 – *Northern Spearwood shrublands and woodlands*. This FCT is listed as a Priority 3 community by DBCA and has been listed as a subcommunity of the TEC, *Banksia Woodlands of the Swan Coastal Plain*.
- Three fauna species listed as Marine under the EPBC Act were recorded:
  - Black-faced Cuckoo-shrike *(Coracina novaehollandiae)*
  - Tree Martin *(Petrochelidon nigricans)*, and
  - Silver Gull *(Larus novaehollandiae)*.
- Contains potential black cockatoo foraging, roosting and breeding habitat.

## Vegetation Condition (%)



## Fauna Habitat

Nineteen native fauna species; comprising 11 birds, two mammals and six reptiles were recorded during the field survey. The full list of fauna species is available in Appendix D.

| TABLE 14 - Fauna Habitat | |
|---|---|
| *Xanthorrhoea* Shrubland | Habitat for reptiles and birds. |
| *Acacia / Xanthorrhoea* Shrubland | Habitat for reptiles and birds. |
| Isolated Trees | Potential black cockatoo roosting and breeding habitat.<br>Habitat for other birds. |

## Dieback

No evidence of dieback was observed.

## Proposed Management Actions

| TABLE 15 - Summary of Management Actions for Alf Powell | | |
|---|---|---|
| **Major Threats/Issues** | **Management Actions** | **Priority** |
| Weed Invasion | Ongoing control of weeds, particularly the dense grassy weeds (see Figures 23-26). | **High** |
| Dieback | Additional dieback assessments to be undertaken as part of future Bushland Management Plan reviews. | **Low** |
| Degradation of vegetation | Revegetation, weed control, repair gates, close informal tracks, formalise the central limestone track (see Figure 30). | **High** |
| Feral animals | Ongoing control of fox and cat populations, monitor populations of native species.<br>Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition. | **Low** |
| Vandalism and rubbish dumping | Remove damaged rubbish bin where only the pole remains (see Figure 30). | **Medium** |

## FIGURE 19 - Vegetation Type


Refer to Appendix B for Vegetation Type Descriptions

## FIGURE 20 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Good (3.22 ha)
- Degraded (0.46 ha)
- Completely Degraded (3.23 ha)
- Cleared (3.04 ha)

N

0 m 100 m

## FIGURE 21 - Potential TEC


**Legend**

- Bushland Reserves
- Local Road
- Banksia dominated woodlands of the Swan Coastal Plain IBRA region (Priority 3{DBCA})
- Sub-community of Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered {EBPC Act})

Note: PEC/TEC Mapping is based on statistical analysis results only, before approved conversation advice has been applied

N

0 m 100 m

## FIGURE 22 - Annual Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 23 - Bulbous Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 24 - Grassy Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 25 - Broadleaf Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 26 - Fauna Habitats

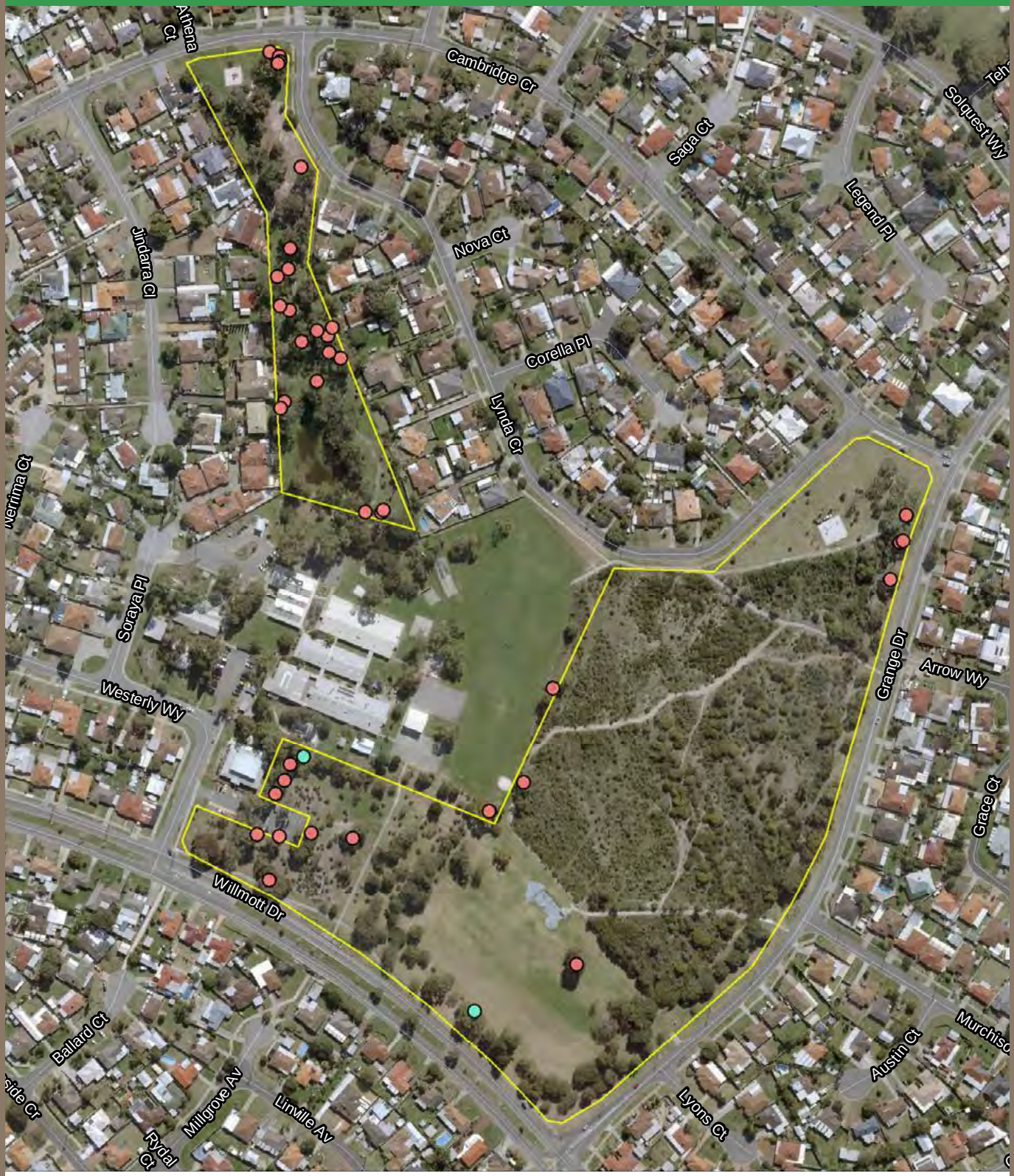

**Legend**

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

**Fauna Habitats**

- Acacia/Xanthorrhoea Shrubland
- Isolated Trees
- Xanthorrhoea Shrubland
- Cleared

## FIGURE 27 - Black Cockatoo Breeding Trees




**Legend**

- Bushland Reserves
- Local Road

**Black Cockatoo Potential Breeding Trees**

Introduced/Other Eucalypt

- 500 - 1000 mm

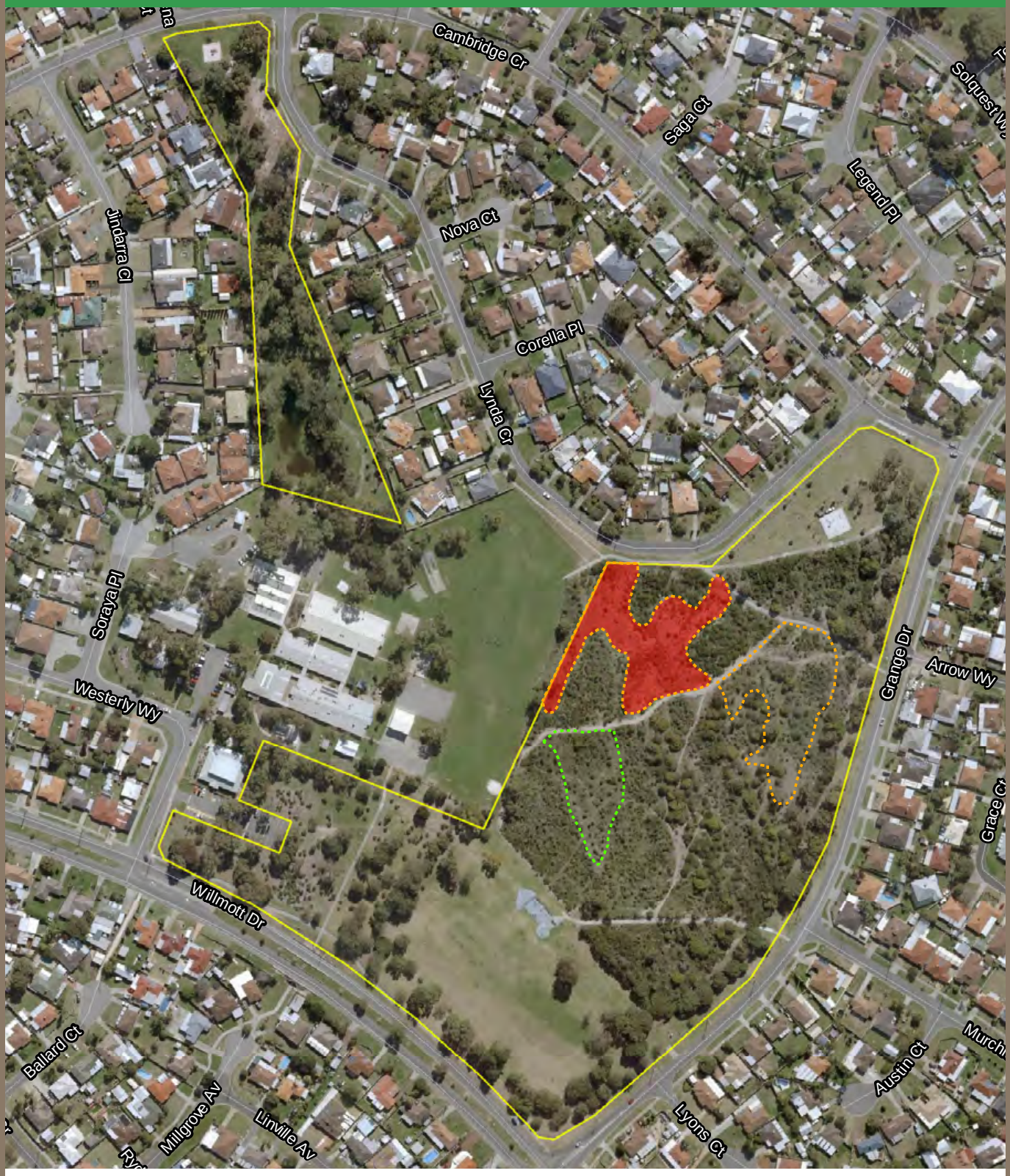
Tuart (*Eucalyptus gomphocephala*)

- 500 - 1000 mm

N

0 m 100 m

## FIGURE 28 - Recommended Revegetation Areas




**Legend**

- Bushland Reserves
- Local Road

**Recommended Revegetation Areas**

- Medium Density (1 per 2 $m^2$)
- Low Density (1 per 4 $m^2$)
- Priority Area

N

0 m 100 m

## FIGURE 29 - Infrastructure


### Legend

- Bins: Good Condition
- Bins: Missing (Recommend Replacing)
- Access Points: Good Condition
- Access Points: Average Condition
- Access Points: Poor Condition
- Signages: Good Condition
- Signages: Poor Condition
- Reserve Structures: Good Condition
- Reserve Structures: Average Condition
- Reserve Structures: Poor Condition
- Other

**Paths**

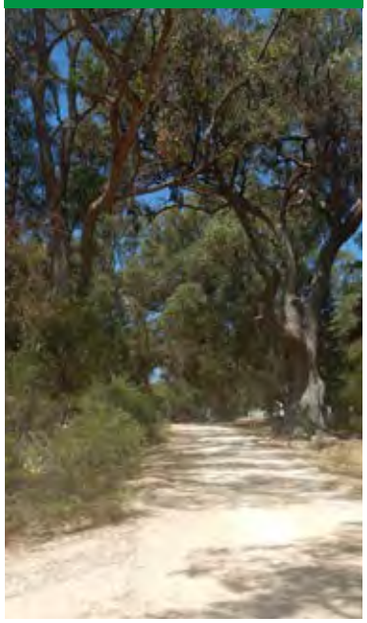
- Compacted Earth
- Dirt Trail (Recommend Closing)
- Paved
- Sand (Recommend Formalising)

**Fences**

- Bollard
- Property
- School
- Security
- Three-strand Rural
- Fence Repair Recommended

N

0 m 100 m



# Baldivis Children's Forest

*Mandurah Road, Baldivis*

The Baldivis Children's Forest is a 20.4 ha bushland reserve which serves an environmental education centre for the local community. The Baldivis Children's Forest has walk trails, information signs, an outdoor classroom, toilets, electric barbecue, picnic areas, an amphitheatre and a presentation of local artwork.

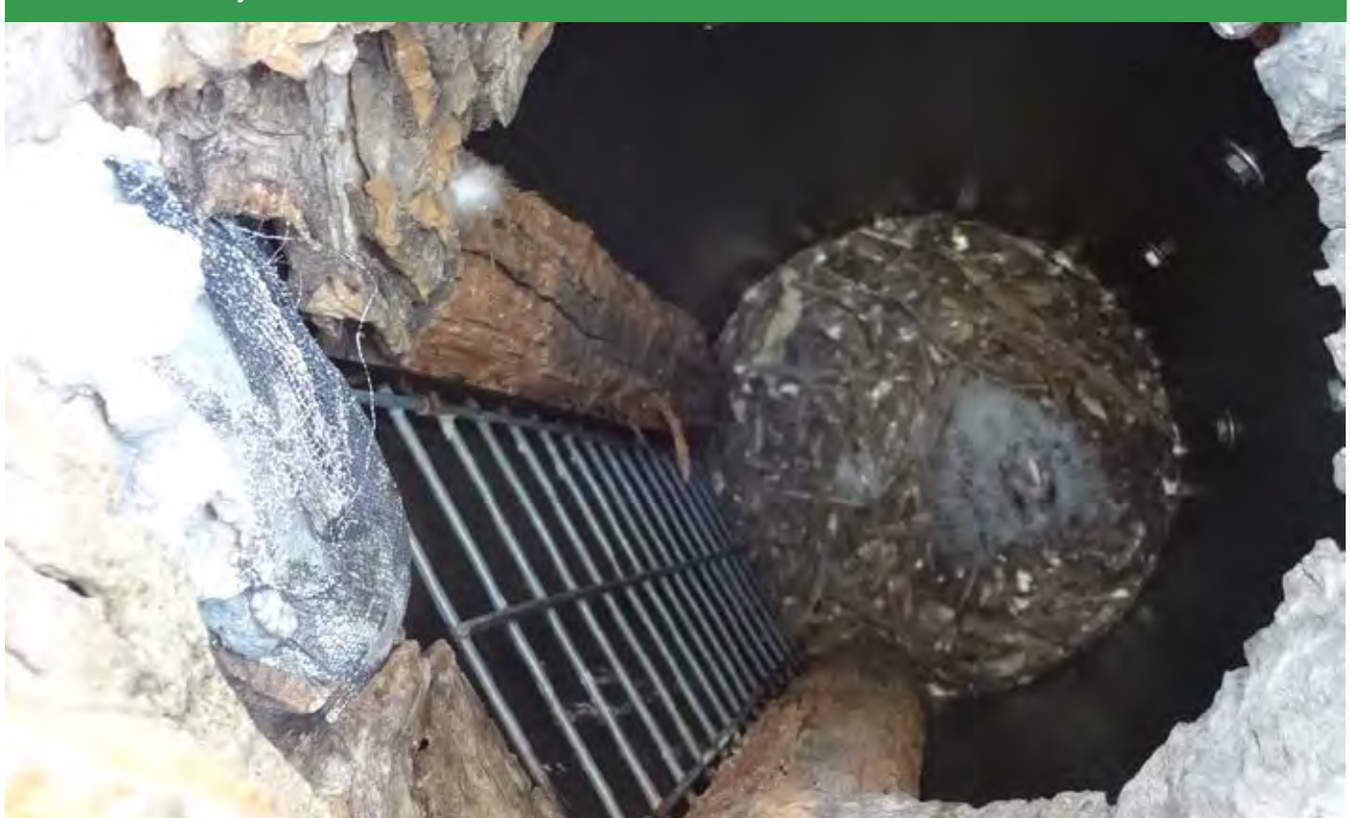
The vegetation within the site consists of tuart forests with a middle-storey of banksias. A portion of Outridge Swamp is located in the east of the reserve. The vegetation within this wetland is representative of a low forest of Melaleucas over native sedges. Vegetation condition within the Survey Area ranged from Excellent to Completely Degraded. The majority of the Survey Area was in 'Degraded' condition (70.3 %) due to the creation of numerous walking trails and the associated fencing. The reserve has been subject to extensive planting activities and in some cases the species are not endemic to the site. For this reason, it was difficult to determine naturally occurring vegetation apart from revegetation areas due to planting that has been undertaken. Weeds were also extensive throughout the reserve.

The 'blue wetland trail' was underwater for the duration of the field survey. To ensure visitor safety, it is recommended that signage be installed to advise of the potential for inundation.

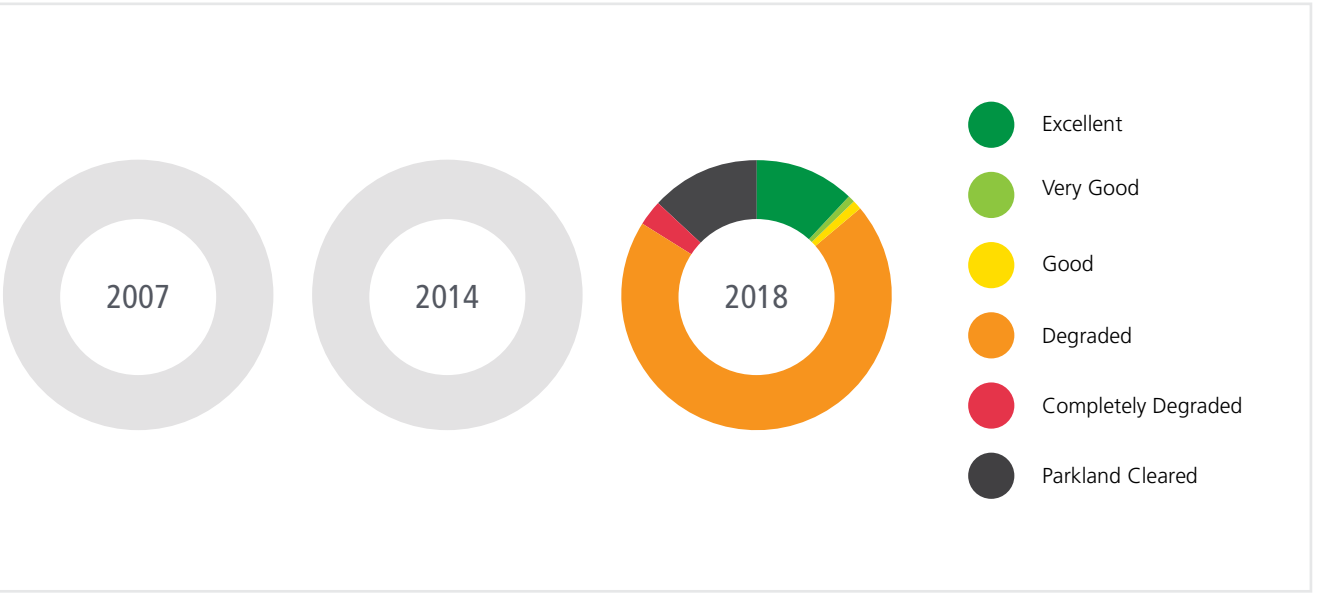
## Conservation Significant Species and Communities

- One Priority 4 flora species *(Dodonaea hackettiana)* was recorded. The presence of this species in the reserve is as a result of planting and it does not represent a natural occurrence.
- All three of the threatened black cockatoo species were recorded. Carnaby's black cockatoo have been observed utilising the nesting boxes onsite.
- A small population of Quenda was identified within the eastern sedgeland.
- Five fauna species listed as 'Marine' under the EPBC Act were recorded:
  - Black-faced cuckoo-shrike *(Coracina novaehollandiae)*;
  - Fan-tailed cuckoo *(Cacomantis flabelliformis)*;
  - Rainbow bee-eater *(Merops ornatus)*;
  - Straw-necked ibis *(Threskiornis spinicollis)*, and
  - Silvereye *(Zosterops lateralis)*.

**FIGURE 30 - Carnaby's Black Cockatoo chick**



## Vegetation Condition (%)




## Fauna Habitat

Thirty-five native fauna species comprising: two amphibians, 24 birds, four mammals and seven reptiles were recorded during the field survey. The full list of fauna species is available in Appendix D.

**TABLE 16 - Fauna Habitat**

| | |
|---|---|
| Tuart / *Banksia* Woodland | Black cockatoo foraging, roosting and breeding habitat |
| Sedgeland | Habitat for quenda, birds and macroinvertabrates |

## Dieback

No evidence of dieback was observed.

## Proposed Management Actions

**TABLE 17 - Summary of Management Actions for Baldivis Children's Forest**

| Major Threats/Issues | Management Actions | Priority |
|---|---|---|
| Weed Invasion | Ongoing control of weeds – particularly the dense grassy weeds, revegetation (see Figures 34-37). | High |
| Dieback | Additional dieback assessments to be undertaken as part of future Bushland Management Plan reviews. | Low |
| Feral animals | Ongoing control of fox and cat populations. Monitor populations of native species. Install additional black cockatoo nesting boxes. Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition. | High |
| Public safety | Install 'beware of snake' signs, electric fence signs and inundation hazard signage. | High |

## FIGURE 31 - Vegetation Type


**Legend**

- Bushland Reserves
- Local Road
- Quadrat Locations

**Vegetation Types**

- EgBaNe
- EgLg
- Er
- MrGt
- Cleared

Refer to Appendix B for Vegetation Type Descriptions

## FIGURE 32 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Excellent (2.44 ha)
- Very Good (0.14 ha)
- Good (0.26 ha)
- Degraded (14.31 ha)
- Completely Degraded (0.53 ha)
- Cleared (2.72 ha)



N 0 m 80 m

## FIGURE 33 - Annual Weeds

**Legend**

Bushland Reserves

**Annual Weeds Density (%)**

5-25

**Weed Point Mapping**

**Fumaria capreolata*

**Fumaria muralis*

## FIGURE 34 - Bulbous Weeds

**Legend**

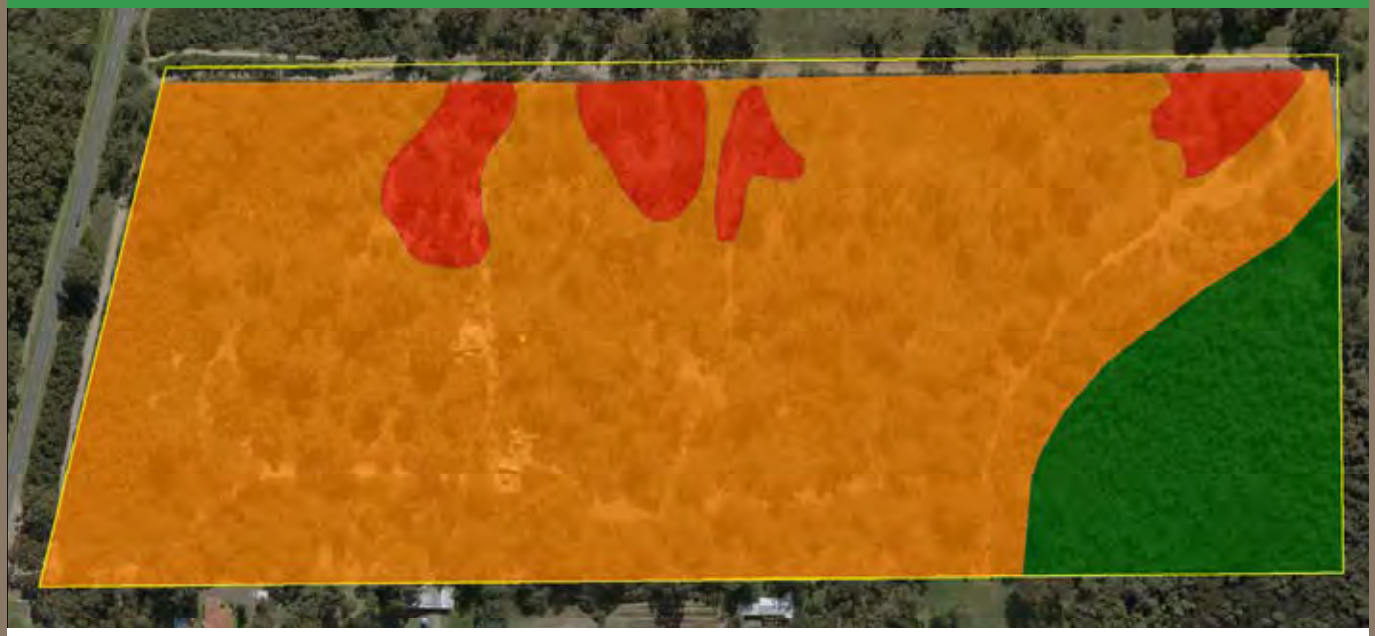
Bushland Reserves

**Bulbous Weeds Density (%)**

5-25

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 35 - Grassy Weeds



**Legend**

Bushland Reserves

**Grass Weeds Density (%)**

0-5
65-85
85-100

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 36 - Broadleaf Weeds

**Legend**

Bushland Reserves

**Broadleaf Perennial Weeds Density (%)**

5-25
25-45
65-85

**Weed Point Mapping**

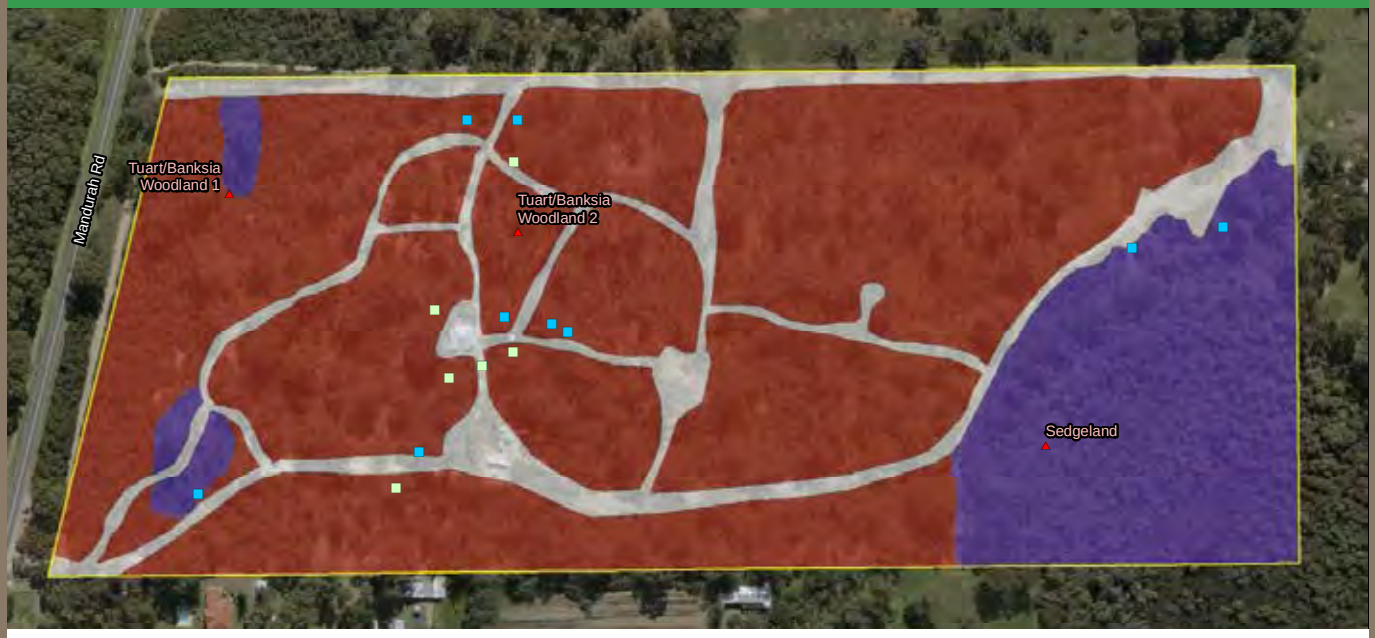
**Lupinus cosentinii*
**Lupinus luteus*

Refer to Appendix C for Weed Species Locations and Treatments



N 0 m 80 m

## FIGURE 37 - Fauna Habitats




**Legend**

- Bushland Reserves
- Local Road
- Bat nesting box
- Small bird nesting box
- Habitat Assessment Locations

**Fauna Habitats**

- Sedgeland
- Tuart/Banksia Woodland
- Cleared

## FIGURE 38 - Fauna of Interest


**Legend**

- Bushland Reserves
- Local Road

**Conservation Significant Fauna**

- Quenda
- Baudin's Black Cockatoo, Sighting
- Carnaby's Black Cockatoo, Sighting
- Forest Red-tailed Black Cockatoo, Sighting
- Forest Red-tailed Black Cockatoo, Foraging

**Introduced Fauna**

- Black Rat
- Laughing Kookaburra
- Rainbow Lorikeet
- Red Fox

## FIGURE 39 - Black Cockatoo Breeding Trees


**Legend**

- Bushland Reserves
- Local Road

**Black Cockatoo Potential Breeding Trees**

Flooded gum (*Eucalyptus rudis*)
- 500 - 1000 mm

Marri (*Corymbia calophylla*)
- 500 - 1000 mm

Tuart (*Eucalyptus gomphocephala*)
- 500 - 1000 mm
- 1000 - 2000 mm

Stag
- 500 - 1000 mm
- 1000 - 2000 mm

**Black Cockatoo Breeding Trees**

- Potentially contains hollows
- Contains hollows with estimated diameter > 120 mm
- Contains artificial hollows

## FIGURE 40 - Infrastructure

**Legend**

- Bins: Good Condition
- Access Points: Poor Condition
- Car Parkings: Good Condition
- Signages: Good Condition
- Signages: Average Condition
- Signages: Poor Condition
- Reserve Structures: Good Condition
- Reserve Structures: Average Condition
- Reserve Structures: Poor Condition

**Paths**

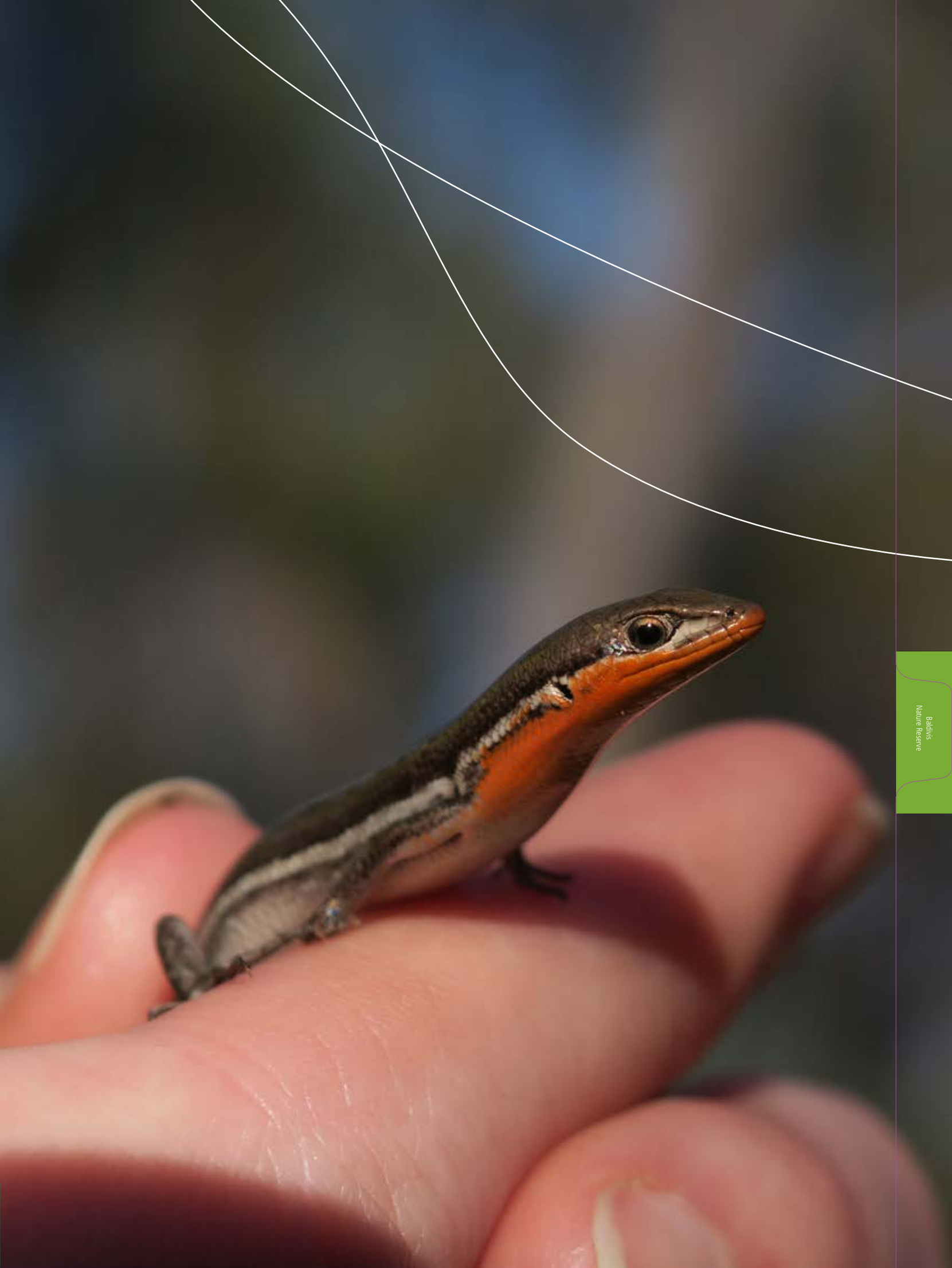
- Community Dirt Trail
- Dirt Trail (Recommend Closing)
- Fire Break
- Limestone

**Fences**

- Property
- Revegetation
- Three-strand Rural



N 0 m 80 m



SECTION 9

# Baldivis Nature Reserve

*Fifty Road, Baldivis*

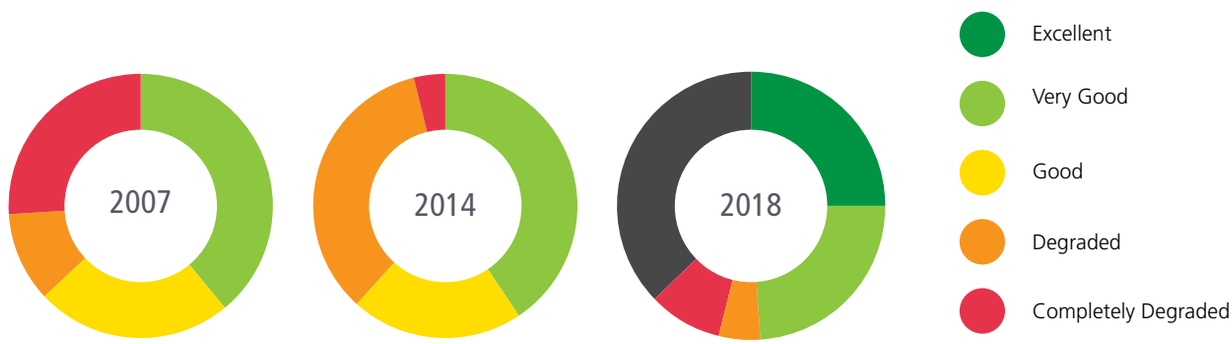
Baldivis Nature Reserve (13.78) contains predominantly 'Very Good' to 'Excellent' condition bushland, which consists of jarrah – marri – banksia – sheoak woodland. Jarrah is the more dominant species on the eastern side of the reserve with marri being more dominant on the higher, western side of the reserve. This woodland serves as habitat to a healthy population of the common brushtail possum *(Trichosurus vulpecula hypoleucus)*.

On the eastern side of the reserve, there are recreational facilities including barbecues, 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.

## Conservation Significant Species and Communities

- The Floristic Community Type in the survey area is considered equivalent to FCT SCP21a – *Central Banksia attenuata - Eucalyptus marginata woodlands*. This FCT is listed as a Priority 3 community by DBCA and has been listed as a subcommunity of the TEC, *Banksia Woodlands of the Swan Coastal Plain*.
- Carnaby's and forest red-tailed black cockatoos were recorded in the reserve.
- Four fauna species listed as 'Marine' under the EPBC Act were recorded:
  - Whistling Kite *(Haliastur sphenurus)*
  - Sacred Kingfisher *(Todiramphus sanctus)*
  - Black-faced Cuckoo-shrike *(Coracina novaehollandiae)*, and
  - Magpie-lark *(Grallina cyanoleuca)*.

## Vegetation Condition (%)




Note: the 'Very good' condition ratings for 2007 and 2014 actually reflect vegetation in a Very Good-Excellent condition. This is because the previous assessments used a different rating scale (Kaesehagen). The previous assessments also did not include the Parkland Cleared area of the reserve.

## Fauna Habitat

Twenty-nine native fauna species comprising; one amphibian, 20 birds, three mammals and five reptiles were recorded during the field survey. The full list of fauna species is available in Appendix D.

**TABLE 18 - Fauna Habitat**

| | |
|---|---|
| *Eucalypt / Banksia* Woodland | Black cockatoo foraging, roosting and breeding habitat. Brushtail possum habitat. |
| Isolated Trees | Potential black cockatoo roosting and breeding habitat. Habitat for other birds. |

## Dieback

No evidence of dieback was observed. There were a few dead *Banksias* in the north of the reserve, however these deaths do not appear to be due to dieback as they are localised occurrences and no other species are showing signs of the disease.

## Proposed Management Actions

**TABLE 19 - Summary of Management Actions for Baldivis Nature Reserve**

| Major Threats/Issues | Management Actions | Priority |
|---|---|---|
| Weed Invasion | Ongoing control of weeds – particularly around the edges of paths and tracks (see Figures 45-49). | High |
| Dieback | Additional dieback assessments to be undertaken as part of future Bushland Management Plan reviews. | Low |
| Degradation of vegetation | Install new gates and repair existing gates to restrict bicycle access (see Figure 53). | Medium |
| Feral animals | Ongoing control of fox population.<br>Monitor populations of native species, particularly the brushtail possums.<br>Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition.<br>Install black cockatoo nesting boxes. Install nesting boxes for brushtail possums | High |
| Vandalism and rubbish dumping | Ongoing litter collection, install signage to discourage illegal littering. | Medium |
| Public safety | Install 'beware of snake' signs. | High |

## FIGURE 41 - Vegetation Type


**Legend**

- Bushland Reserves
- Local Road
- Quadrat Locations

**Vegetation Types**

- AgCcNE
- BaBm
- Cc
- CcBa
- NE
- Cleared

## FIGURE 42 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Excellent (3.45 ha)
- Very Good (3.32 ha)
- Degraded (0.73 ha)
- Completely Degraded (1.17 ha)
- Cleared (5.11 ha)

Refer to Appendix B for Vegetation Type Descriptions



N 0 m 60 m

## FIGURE 43 - Potential TEC


**Legend**

- Bushland Reserves
- Local Road
- Banksia dominated woodlands of the Swan Coastal Plain IBRA region (Priority 3{DBCA})
- Sub-community of Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered {EBPC Act})

Note: PEC/TEC Mapping is based on statistical analysis results only, before approved conversation advice has been applied

## FIGURE 44 - Annual Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Annual Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Solanum nigrum*

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 45 - Bulbous Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Bulbous Weeds Density (%)**

- 5-25
- 25-45
- 45-65
- 85-100

## FIGURE 46 - Grassy Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Grass Weeds Density (%)**

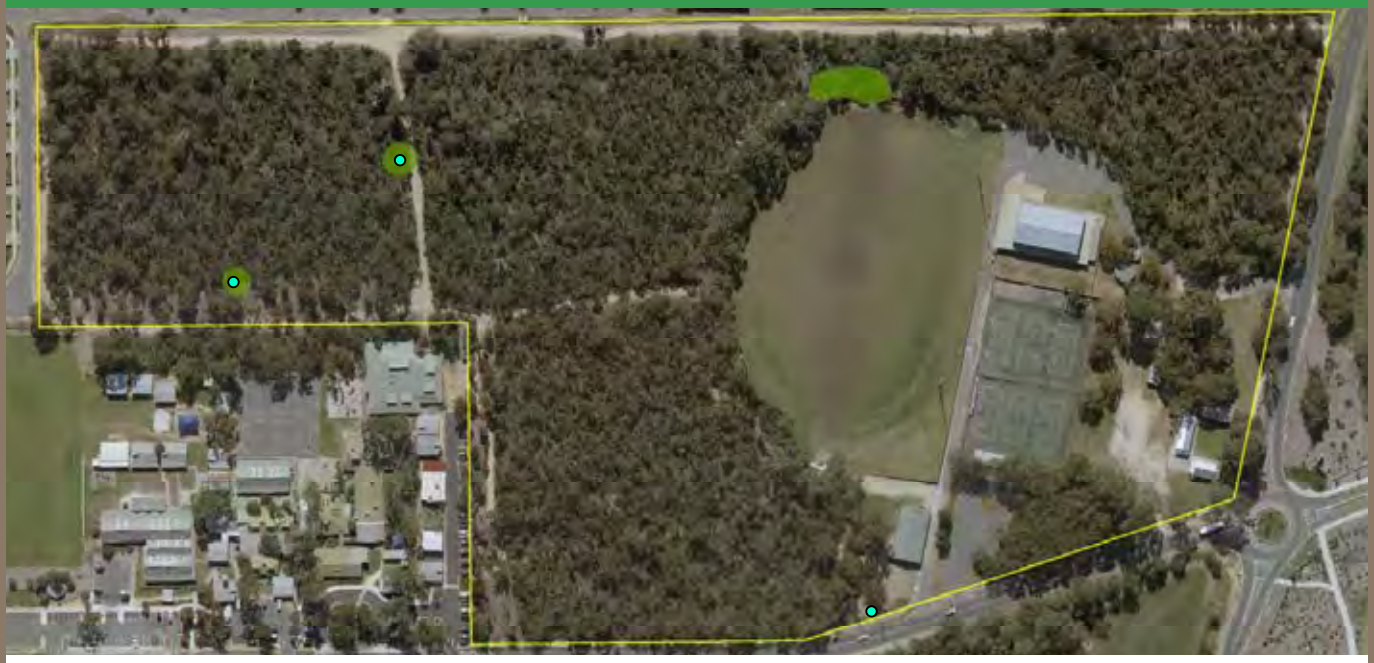
- 0-5
- 5-25
- 25-45
- 45-65

Refer to Appendix C for Weed Species Locations and Treatments



N 0 m 60 m

## FIGURE 47 - Broadleaf Weeds



**Legend**

Bushland Reserves

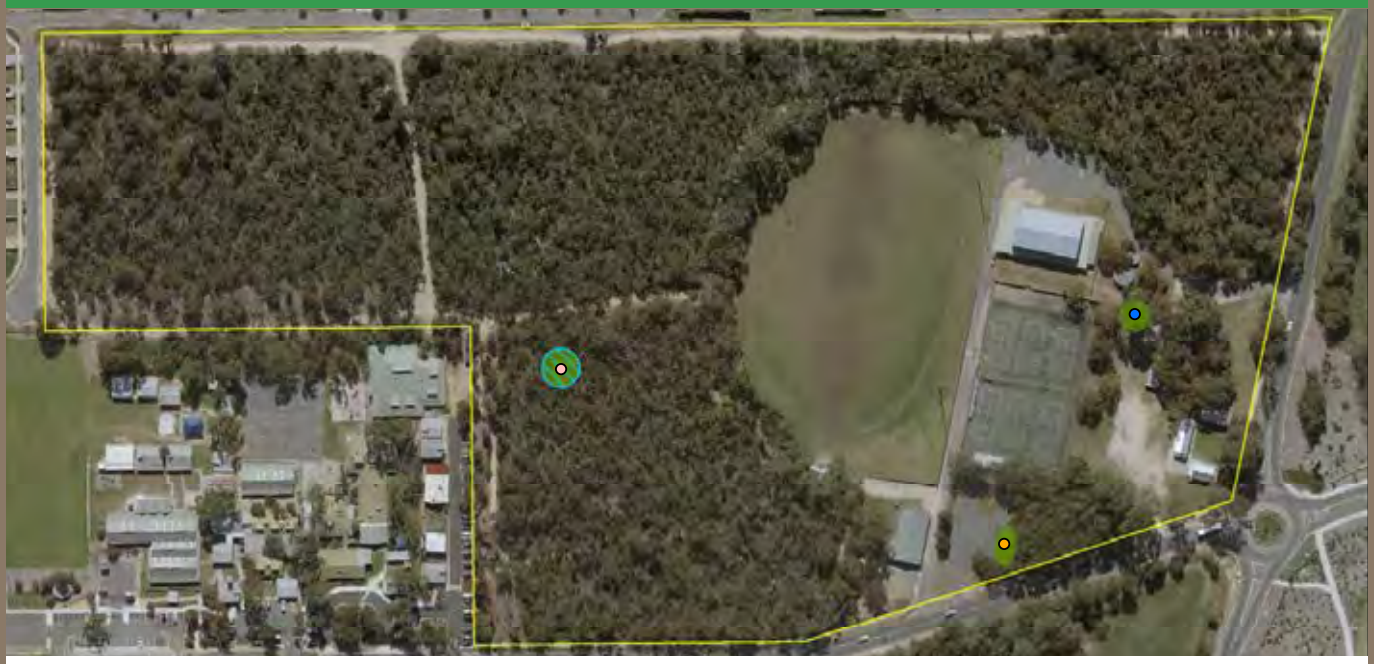
**Broadleaf Perennial Weeds Density (%)**

5-25

**Weed Point Mapping**

**Pelargonium capitatum*

## FIGURE 48 - Woody Weeds



**Legend**

Bushland Reserves

Priority Weed Management Areas

**Woody Weeds Density (%)**

5-25

**Weed Point Mapping**

**Acacia iteaphylla*

**Pinus* sp.

**Polygala myrtifolia*

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 49 - Fauna Habitats

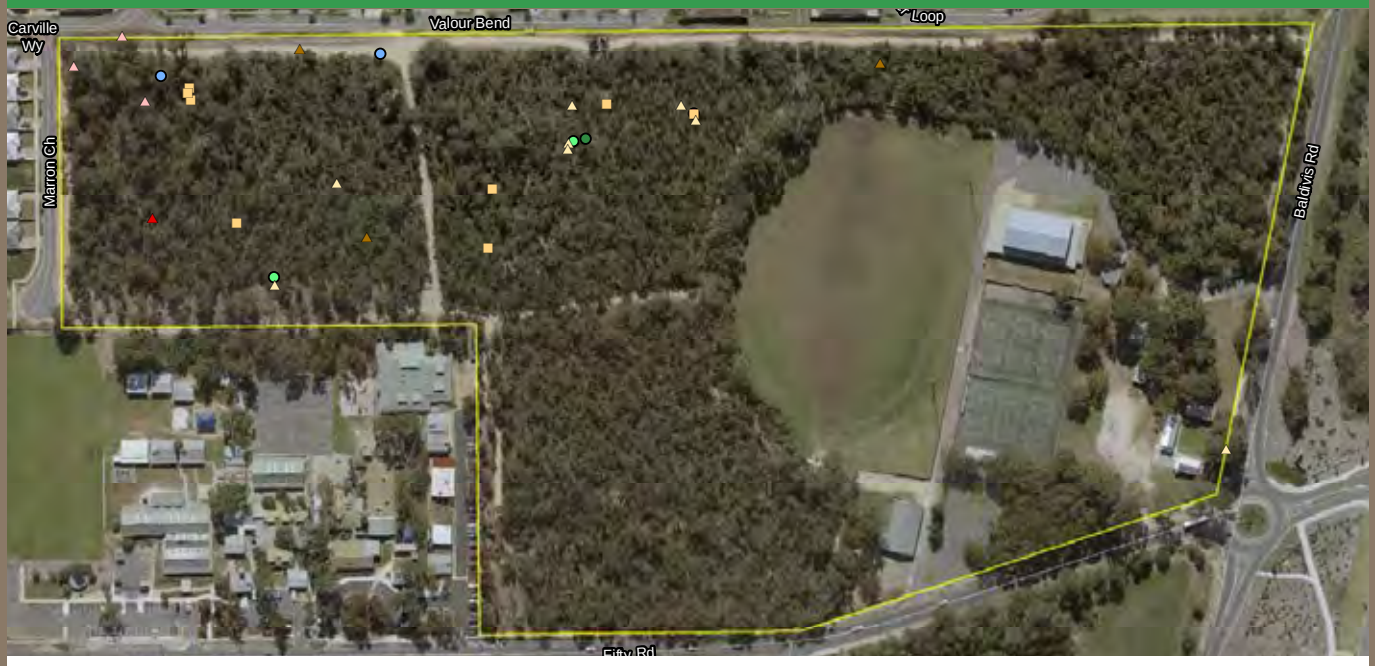

**Legend**

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

**Fauna Habitats**

- Eucalypt/Banksia
- Isolated Eucalyptus
- Trees Cleared

## FIGURE 50 - Fauna of Interest




**Legend**

- Bushland Reserves
- Local Road

**Conservation Significant Fauna**

- Carnaby's Black Cockatoo, Sighting
- Carnaby's Black Cockatoo, Foraging
- Forest Red-tailed Black Cockatoo, Sighting
- Forest Red-tailed Black Cockatoo, Foraging

**Locally Significance Fauna**

- Common Brushtail Possum

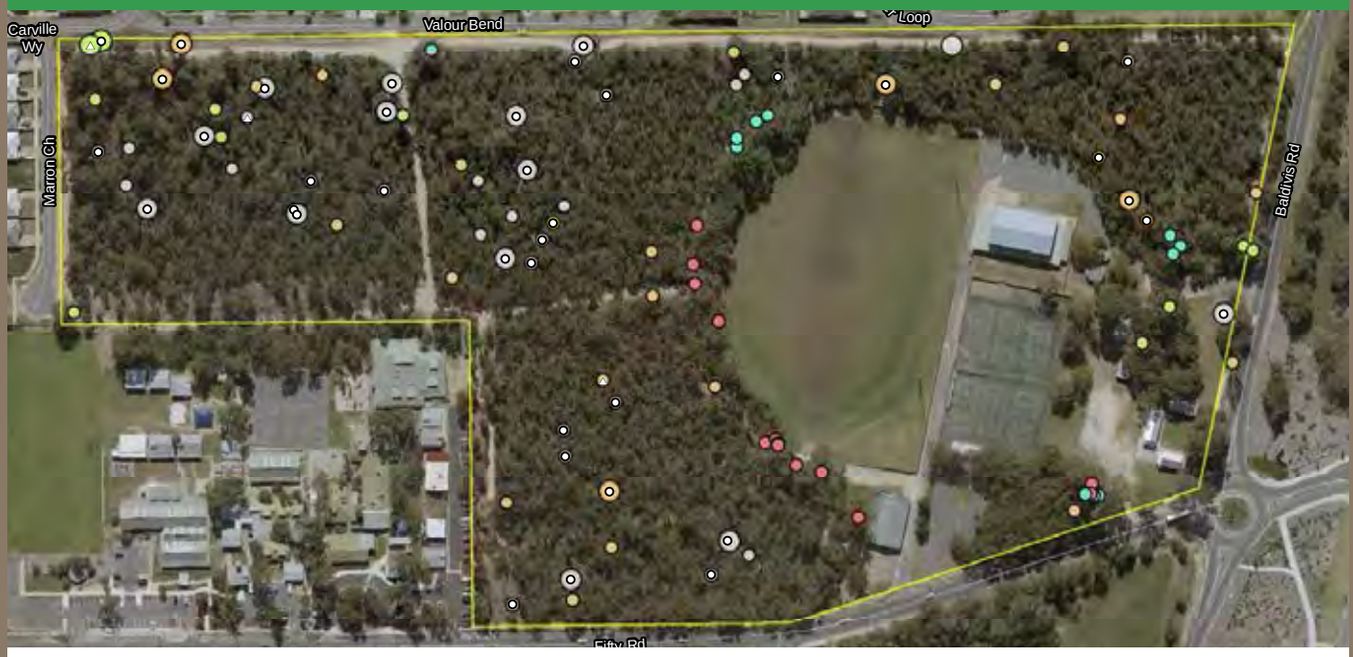
**Introduced Fauna**

- Cat
- Laughing Kookaburra
- Laughing Turtle-Dove
- Rainbow Lorikeet

N

0 m 60 m

## FIGURE 51 - Black Cockatoo Breeding Trees




**Legend**

- Bushland Reserves
- Local Road

**Black Cockatoo Potential Breeding Trees**

Introduced/Other Eucalypt
- 500 - 1000 mm

Jarrah (*Eucalyptus marginata*)
- 500 - 1000 mm
- 1000 - 2000 mm

Marri (*Corymbia calophylla*)
- 500 - 1000 mm
- 1000 - 2000 mm

Tuart (*Eucalyptus gomphocephala*)
- 500 - 1000 mm

Stag
- 500 - 1000 mm
- 1000 - 2000 mm

**Black Cockatoo Breeding Trees**
- Potentially contains hollows
- Contains hollows with estimated diameter > 120 mm

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018


## FIGURE 52 - Infrastructure


**Legend**

- Bins: Good Condition
- Access Points: Good Condition
- Access Points: Average Condition
- Access Points: Poor Condition
- Car Parkings: Good Condition
- Car Parkings: Average Condition
- Signages: Good Condition
- Signages: Average Condition
- Signages: Poor Condition
- Reserve Structures: Good Condition
- Reserve Structures: Average Condition
- Reserve Structures: Poor Condition
- Other

**Paths**
- Dirt Trail (Recommend Formalising)
- Dirt Trail (Recommend Closing)
- Limestone
- Paved

**Fences**
- Fence Dropper
- School
- Sports Fence (Good Condition)
- Sports Fence (Poor Condition)
- Three-strand Rural
- Fence Repair Recommended

N

0 m 60 m

# Dixon Road Conservation Precinct

*Dixon Road, Hillman*

Dixon Road Conservation Precinct is a large area of remnant bushland (64.01 ha) with connections to Lake Cooloongup and Walyungup to the south and Leda Conservation Reserve to the east. It is part of Bush Forever Site No. 356 and is also an environmental offset site under the EPBC Act, where substantial weed removal and revegetation has been undertaken to offset the clearing of vegetation required by the Mundijong Road extension. The reserve contains Tuart woodlands, *Banksia* woodlands and *Acacia rostellifera* shrublands, with limestone trails throughout for cycling and walking. The vegetation within the reserve ranges from 'Completely Degraded' to 'Very Good' condition. There is a dilapidated European heritage site (abattoir) on the western side which has been identified for repair by the City. The sandy woodlands is also habitat to a small population of Bungarra *(Varanus gouldii)*.

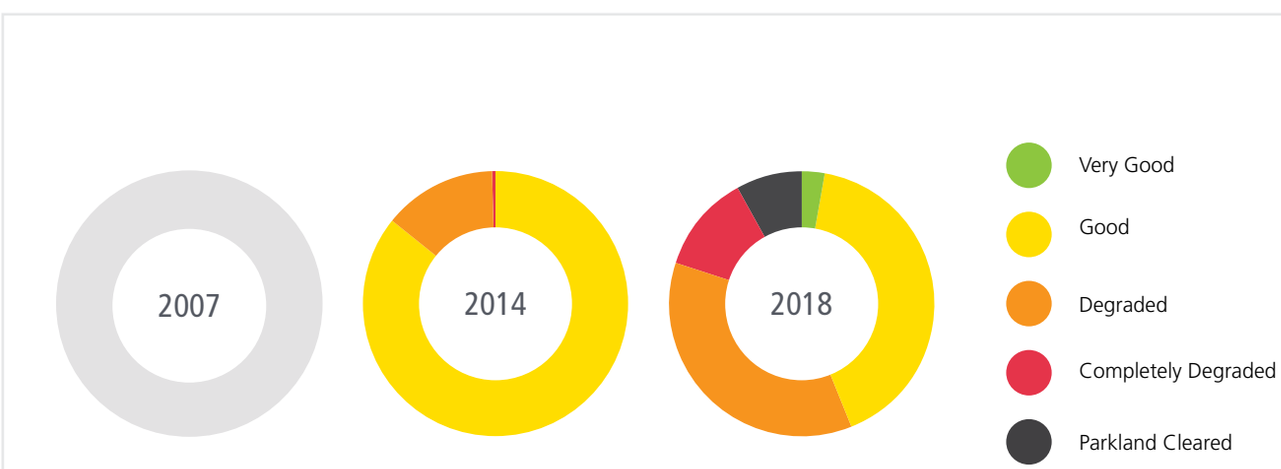
The Dixon Road Conservation Precinct is of high indigenous heritage value as it contains a number of scar trees. Scarred trees (pictured below) are reminders of the resource harvesting techniques practised by Aboriginal people for thousands of years. Portions of bark and wood were removed by Aboriginal people for a variety of uses including the making of coolamons (baby carriers), vessels for food collection and preparation, and collecting water. The remaining scar also served a purpose as signage to mark trails, resources and sacred sites.

The number of scarred trees is dwindling and the remaining ones need to be protected (Creative Spirits, 2019).

## Conservation Significant Species and Communities

- One Priority 4 flora species *(Dodonaea hackettiana)* was recorded.
- The Floristic Community Type in the survey area is considered equivalent to FCT SCP24 – *Northern Spearwood shrublands and woodlands*. This FCT is listed as a Priority 3 community by DBCA and has been listed as a subcommunity of the TEC, *Banksia Woodlands of the Swan Coastal Plain*.
- Contains a healthy population of Quenda.
- Seven fauna species listed as Marine under the EPBC Act were recorded:
  - Whistling Kite *(Haliastur sphenurus)*
  - Black-faced Cuckoo-shrike *(Coracina novaehollandiae)*
  - Fan-tailed Cuckoo *(Cacomantis flabelliformis)*
  - Shining Bronze Cuckoo *(Chrysococcyx lucidus)*
  - Tree Martin *(Petrochelidon nigricans)*
  - Rainbow Bee-eater *(Merops ornatus)*, and
  - Silvereye *(Zosterops lateralis)*.
- Contains potential Black Cockatoo foraging, roosting and breeding habitat.

## Vegetation Condition (%)




Note: the 2014 assessment did not take into account the Parkland Cleared area of the reserve.

## Fauna Habitat

Thirty-five native fauna species comprising; two amphibian, 24 bird, two mammal and seven reptiles were recorded during the field survey. The full list of fauna species is available in Appendix D.

| TABLE 20 - Dixon Road Conservation Precinct Fauna Habitat | |
|---|---|
| *Acacia / Xanthorrhoea* Shrubland | Habitat for the Quenda as well as bushland reptiles and birds. |
| Revegetation | Revegetated flora has been recently planted and currently offers minimal habitat value. |
| Isolated Trees | Potential black cockatoo roosting and breeding habitat. Habitat for other birds. |

## Dieback

No evidence of dieback was observed.

## Proposed Management Actions

| TABLE 21 - Summary of Management Actions for Dixon Road Conservation Precinct | | |
|---|---|---|
| **Major Threats/Issues** | **Management Actions** | **Priority** |
| Weed Invasion | Ongoing control of weeds – particularly the dense grassy weeds and the bridal creeper, revegetation (see Figures 57-60). | **High** |
| Dieback | Additional dieback assessments to be undertaken as part of future Bushland Management Plan reviews. | **Low** |
| Degradation of vegetation | Close or upgrade informal tracks. Upgrade pedestrian only gates. | **Medium** |
| Feral animals | Ongoing control of fox and rabbit populations, monitor populations of native species – particularly quenda, install additional signage encouraging park visitors to keep dogs on leashes.<br>Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition. | **High** |
| Public safety | Notify police of homeless camps. | **High** |

## FIGURE 53 - Vegetation Type


**Legend**

- Bushland Reserves
- Local Road
- Quadrat Locations

**Vegetation Types**

- Ar
- BiXp
- Eg
- EgAr
- Rehab
- Cleared

## FIGURE 54 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Very Good (1.88 ha)
- Good (26.05 ha)
- Degraded (23.00 ha)
- Completely Degraded (7.59 ha)
- Cleared (5.49 ha)

Refer to Appendix B for Vegetation Type Descriptions



N 0 m 200 m

## FIGURE 55 - Potential TEC


**Legend**

- Bushland Reserves
- Local Road
- Banksia dominated woodlands of the Swan Coastal Plain IBRA region (Priority 3{DBCA})
- Sub-community of Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered {EBPC Act})

Note: PEC/TEC Mapping is based on statistical analysis results only, before approved conversation advice has been applied

## FIGURE 56 - Annual Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Annual Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Fumaria capreolata*
- **Solanum nigrum*

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 57 - Bulbous Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Bulbous Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Asparagus asparagoides* (WoNS Declared)

## FIGURE 58 - Grassy Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Grass Weeds Density (%)**

- 5-25
- 25-45
- 65-85
- 85-100

Refer to Appendix C for Weed Species Locations and Treatments



N 0 m 200 m

## FIGURE 59 - Broadleaf Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Broadleaf Perennial Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Pelargonium capitatum*
- **Schinus terebinthifolia*

## FIGURE 60 - Fauna Habitats


**Legend**

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

**Fauna Habitats**

- Acacia/Xanthorrhoea Shrubland
- Isolated Trees
- Revegetation
- Cleared

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 61 - Fauna of Interest


**Legend**

- Bushland Reserves
- Local Road

**Conservation Significant Fauna**

- Quenda

**Introduced Fauna**

- Eastern Long-billed Corella
- Laughing Kookaburra
- Laughing Turtle-Dove
- Rabbit
- Rainbow Lorikeet
- Red Fox

## FIGURE 62 - Black Cockatoo Breeding Trees


**Legend**

- Bushland Reserves
- Local Road

**Black Cockatoo Potential Breeding Trees**

Tuart (*Eucalyptus gomphocephala*)

- 500 - 1000 mm
- 1000 - 2000 mm

Stag

- 500 - 1000 mm

**Black Cockatoo Breeding Trees**

- Potentially contains hollows
- Contains hollows with estimated diameter > 120 mm
- Contains artificial hollows



N 0 m 200 m

## FIGURE 63 - Recommended Revegetation

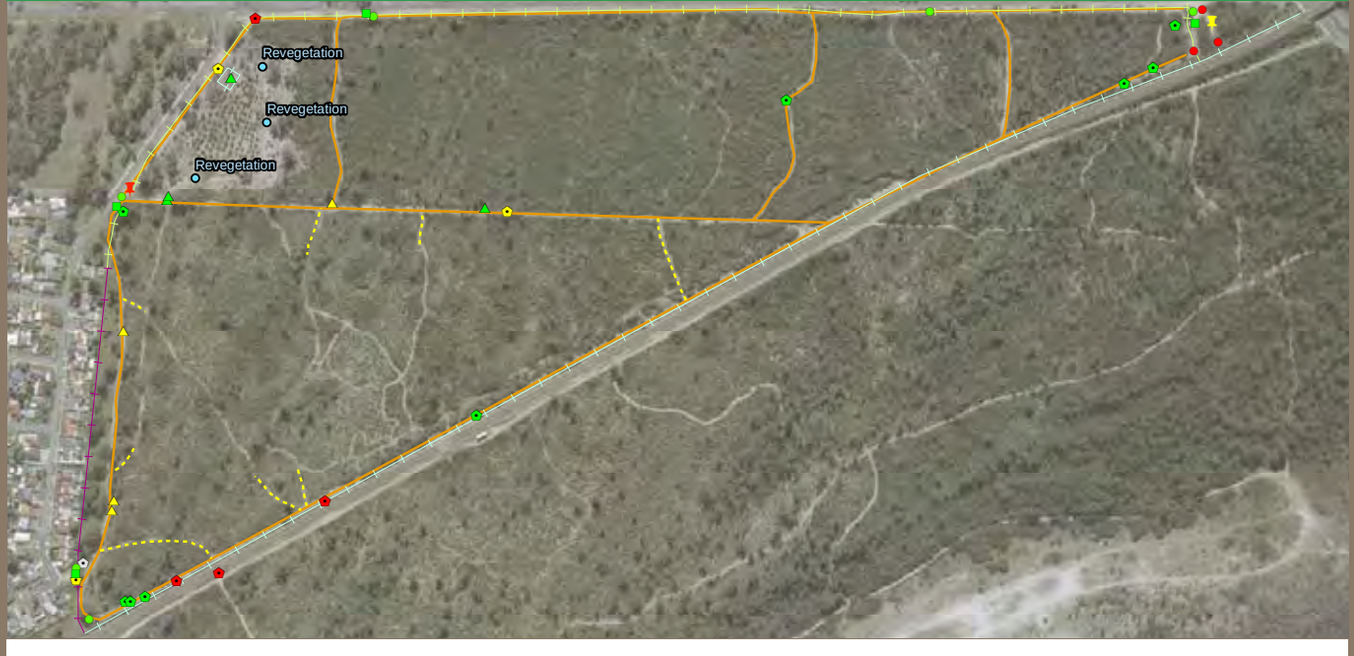

**Legend**

- Bushland Reserves
- Local Road

**Recommended Revegetation Areas**

- High Density (1 per $m^2$)
- Priority Area

## FIGURE 64 - Infrastructure




**Legend**

- Bins: Good Condition
- Access Points: Good Condition
- Access Points: Poor Condition
- Car Parkings: Average Condition
- Car Parkings: Poor Condition
- Signages: Good Condition
- Signages: Average Condition
- Signages: Poor Condition
- Signages: Missing (Recommend Replacing)
- Reserve Structures: Good Condition
- Reserve Structures: Average Condition
- Other

**Paths**

- Dirt Trail (Recommend Closing)
- Limestone

**Fences**

- Chain Linked
- Property
- Three-strand Rural

N

0 m 200 m

SECTION 11

# Karnup School Site

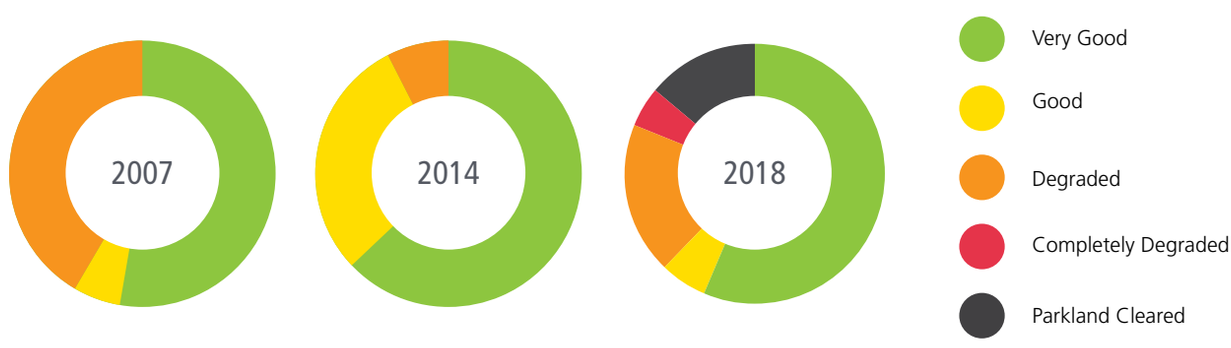
*Baldivis Road, Baldivis*

Karnup School Site is a small (2 ha) reserve located on Baldivis Road just south of the intersection with Karnup Road. The reserve is predominantly native bushland (Peppermint – Marri – *Banksia* woodland) in 'Very Good' condition 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. A sign to educate visitors about the site's history 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 No. 376.

## Conservation Significant Species and Communities

- The Floristic Community Type in the survey area is considered equivalent to FCT SCP21a – *Central Banksia attenuata - Eucalyptus marginata woodlands*. This FCT is listed as a Priority 3 community by DBCA and has been listed as a subcommunity of the TEC, *Banksia Woodlands of the Swan Coastal Plain*.
- Carnaby's and forest red-tailed black cockatoos were recorded in the reserve.

## Vegetation Condition (%)




Note: the 'Very good' condition ratings for 2007 and 2014 actually reflect vegetation in a Very Good-Excellent condition. This is because the previous assessments used a different rating scale (Kaesehagen). The previous assessments also did not include the Parkland Cleared area of the reserve.

## Fauna Habitat

Twenty-one native fauna species comprising: one amphibian, nine birds, four mammals and seven reptiles were recorded during the field survey. The full list of fauna species is available in Appendix D.

**TABLE 22 - Karnup School Site Fauna Habitats**

| | |
|---|---|
| *Agonis / Banksia* Woodland | High value fauna habitat with good connectivity to adjacent natural areas. |
| Isolated trees | Potential black cockatoo roosting and breeding habitat.<br>Habitat for other birds. |

## Dieback

No evidence of dieback was observed, however, a recent fire has affected the majority of the reserve which makes it difficult to interpret the vegetation for signs of dieback. Follow up surveys will be conducted once the vegetation sufficiently regenerates.

## Proposed Management Actions

**TABLE 23 - Summary of Management Actions for Karnup School Site**

| Major Threats/Issues | Management Actions | Priority |
|---|---|---|
| Weed Invasion | Ongoing control of weeds – particularly the weeds that have a propensity to spread quickly * *Chamaecytisus palmensis* and * *Pelargonium capitatum* (see Figures 68-71). | High |
| Dieback | Site survey for dieback presence. | High |
| Degradation of vegetation | Establish new revegetation sites as per Figure 76.<br>Manage areas of existing revegetation. | Medium |
| Feral animals | Ongoing feral animal control.<br>Monitor populations of native species – particularly the four species of bats which are present in the reserve.<br>Include another fauna survey in future Management.<br>Plan reviews to note potential changes in fauna species composition.<br>Install bat nesting boxes.<br>Install black cockatoo nesting boxes. | Low |

## FIGURE 65 - Vegetation Type


Refer to Appendix B for Vegetation Type Descriptions

## FIGURE 66 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Very Good (1.13 ha)
- Good (0.13 ha)
- Degraded (0.38 ha)
- Completely Degraded (0.09 ha)
- Cleared (0.27 ha)

N

0 m 20 m

## FIGURE 67 - Potential TEC


**Legend**

- Bushland Reserves
- Local Road
- Banksia dominated woodlands of the Swan Coastal Plain IBRA region (Priority 3{DBCA})
- Sub-community of Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered {EBPC Act})

Note: PEC/TEC Mapping is based on statistical analysis results only, before approved conversation advice has been applied



N 0 m 20 m

## FIGURE 68 - Annual Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 69 - Grassy Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 70 - Broadleaf Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 71 - Woody Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 72 - Fauna Habitats


**Legend**

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

**Fauna Habitats**

- Agonis/Banksia Woodland
- Isolated Trees
- Cleared

N

0 m 20 m

## FIGURE 73 - Fauna of Interest


**Legend**

- Bushland Reserves
- Local Road

**Conservation Significant Fauna**

- Carnaby's Black Cockatoo, Foraging
- Forest Red-tailed Black Cockatoo, Foraging

**Introduced Fauna**

- Black Rat

N

0 m 20 m

## FIGURE 74 - Black Cockatoo Breeding Trees


**Legend**

- Bushland Reserves
- Local Road

**Black Cockatoo Potential Breeding Trees**

Introduced/Other Eucalypt
- 500 - 1000 mm

Marri (*Corymbia calophylla*)
- 500 - 1000 mm
- 1000 - 2000 mm

Stag
- 500 - 1000 mm
- Contains hollows with estimated diameter > 120 mm

N

0 m 20 m

## FIGURE 75 - Infrastructure


### Legend

- Bins: Good Condition
- Access Points: Good Condition
- Car Parkings: Average Condition
- Signages: Good Condition
- Signages: Missing (Recommend Replacing)
- Reserve Structures: Good Condition
- Other

**Paths**

- Fire Break
- Limestone

**Fences**

- Bollard
- Property
- Three-strand Rural



N 0 m 20 m

## FIGURE 76 - Recommended Revegetation


**Legend**

- Bushland Reserves
- Local Road

**Recommended Revegetation Areas**

- Low Density (1 per 4 $m^2$)

N

0 m 20 m

# Karnup Townsite

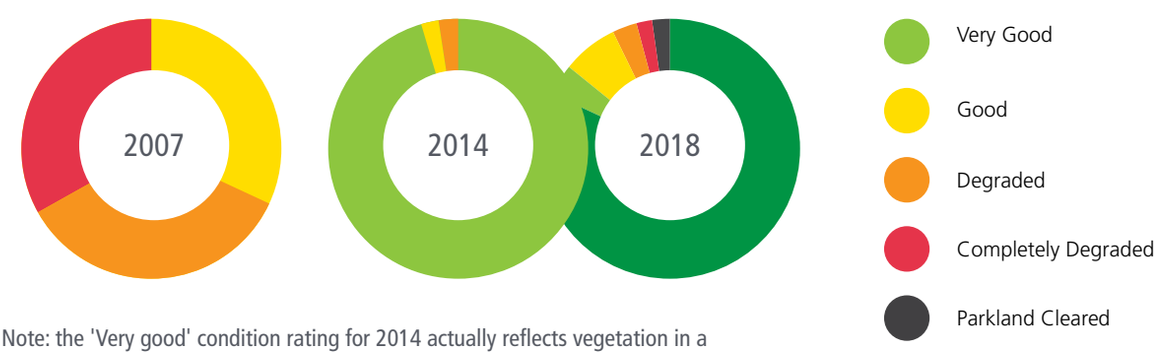
*Sixty Eight Road, Baldivis*

Karnup Townsite (12.96 ha) is a bushland reserve in 'Excellent' condition with significant conservation value provided by good quality fauna habitat and high floral species diversity. A firebreak that passes through the centre of the reserve is used as a walking trail, with connections to an interpretive trail that is located directly adjacent to the reserve, within the Baldivis Tramway. Management for the two adjacent reserves should be consolidated as they occur over the same patch of bushland. 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 woodland serves as habitat to a large population of the Common Brushtail Possum *(Trichosurus vulpecula hypoleucus)*. The reserve forms part of Bush Forever Site No. 376.

## Conservation Significant Species and Communities

- One Priority 2 (*Johnsonia pubescens* subsp. *cygnorum*) and one Priority 4 flora species (*Calothamnus graniticus* subsp. *leptophyllus*) were recorded.
- The Floristic Community Types in the survey area is considered equivalent to FCT SCP21a – Central Banksia attenuata - Eucalyptus marginata woodlands and FCT - 21c – *Low lying Banksia attenuata woodlands or shrublands*. Both FCTs are listed as a Priority 3 community by DBCA and has been listed as a subcommunity of the TEC, Banksia Woodlands of the Swan Coastal Plain.
- All three of the threatened Black Cockatoo species were recorded.
- Three fauna species listed as 'Marine' under the EPBC Act were recorded:
  - Black-faced cuckoo-shrike *(Coracina novaehollandiae)*
  - Rainbow bee-eater *(Merops ornatus)*, and
  - Magpie-lark *(Grallina cyanoleuca)*.

## Vegetation Condition (%)




Note: the 'Very good' condition rating for 2014 actually reflects vegetation in a Very Good-Excellent condition. This is because the previous assessment used a different rating scale (Kaesehagen). The previous assessments also did not include the Parkland Cleared area of the reserve.

## Fauna Habitat

Twenty-five native fauna species comprising: one amphibian, 17 bird, four mammal and three reptile species were recorded during the field survey. The full list of fauna species is available in Appendix D.

| TABLE 24 - Karnup Townsite Fauna Habitats | |
|---|---|
| *Marri / Banksia* Woodland | Excellent fauna habitat for a range of species, including large habitat trees.<br>Good connectivity to adjacent natural areas.<br>Very high value. |
| *Banksia / Kunzea* Shrubland | Habitat for bushland reptiles and birds. |

## Dieback

Disease confidence mapping undertaken by Project Dieback Natural Resource Management (2018) mapped Karnup Townsite as 'High Confidence' for the presence of dieback. Despite this, results of the field survey undertaken as part of the Environmental Assessment Report, were inconclusive due to the majority of the plants in the vegetation type along the eastern edge not being susceptible to dieback. *Banksia* occurred sporadically and the overstorey consisted of *Melaleuca* species which are not known to be susceptible. There were a few dead shrubs of *Kunzea glabrescens*, however, surrounding specimens remained healthy, indicating that the shrubs may have died of other causes. Further detailed testing for dieback will be undertaken in due course.

## Proposed Management Actions

| TABLE 25 - Summary of Management Actions for Karnup Townsite | | |
|---|---|---|
| **Major Threats/Issues** | **Management Actions** | **Priority** |
| Weed Invasion | Ongoing control of weeds – particularly within the north east corner of the reserve where weed density is highest. Patches of *Watsonia meriana* var. *bulbillifera* are also a priority (See Figures 80-84). | **Medium** |
| Dieback | Site testing for dieback presence.<br>Install new dieback stations and signage. | **High** |
| Degradation of vegetation | Revegetation as per Figure 89, use resistant species if dieback is detected within the reserve. | **Low** |
| Feral animals | Ongoing control of fox population.<br>Monitor populations of native species – particularly the brushtail possums.<br>Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition.<br>Install black cockatoo nesting boxes.<br>Install nesting boxes for brushtail possums. | **High** |

## FIGURE 77 - Vegetation Type


Refer to Appendix B for Vegetation Type Descriptions

## FIGURE 78 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Excellent (10.67 ha)
- Very Good (0.54 ha)
- Good (0.83 ha)
- Degraded (0.4 ha)
- Completely Degraded (0.23 ha)
- Cleared (0.29 ha)

N

0 m 60 m

## FIGURE 79 - Potential TEC


**Legend**

- Bushland Reserves
- Local Road
- Banksia dominated woodlands of the Swan Coastal Plain IBRA region (Priority 3{DBCA})
- Sub-community of Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered {EBPC Act})

Note: PEC/TEC Mapping is based on statistical analysis results only, before approved conversation advice has been applied

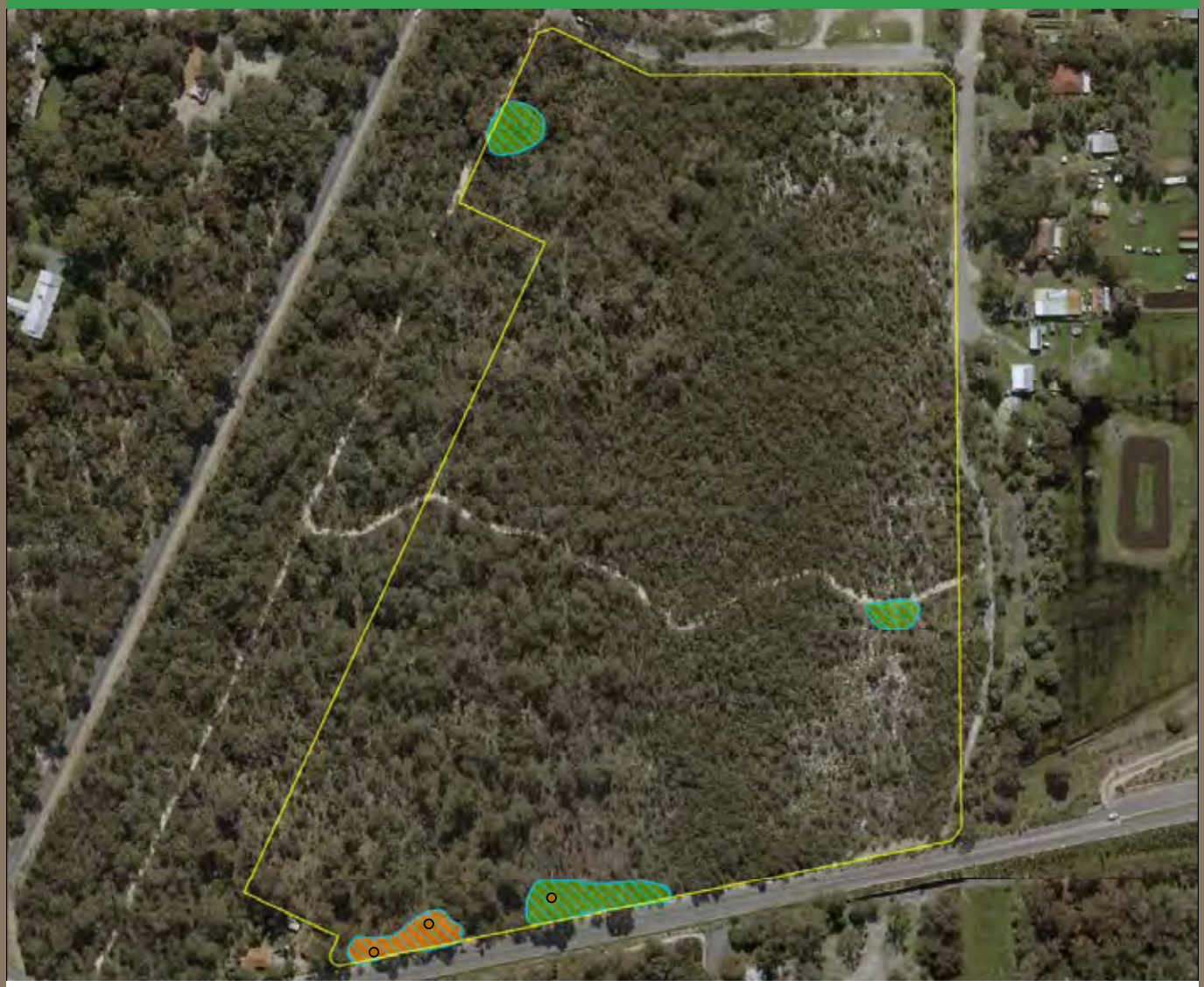


N 0 m 60 m

## FIGURE 80 - Annual Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 81 - Bulbous Weeds

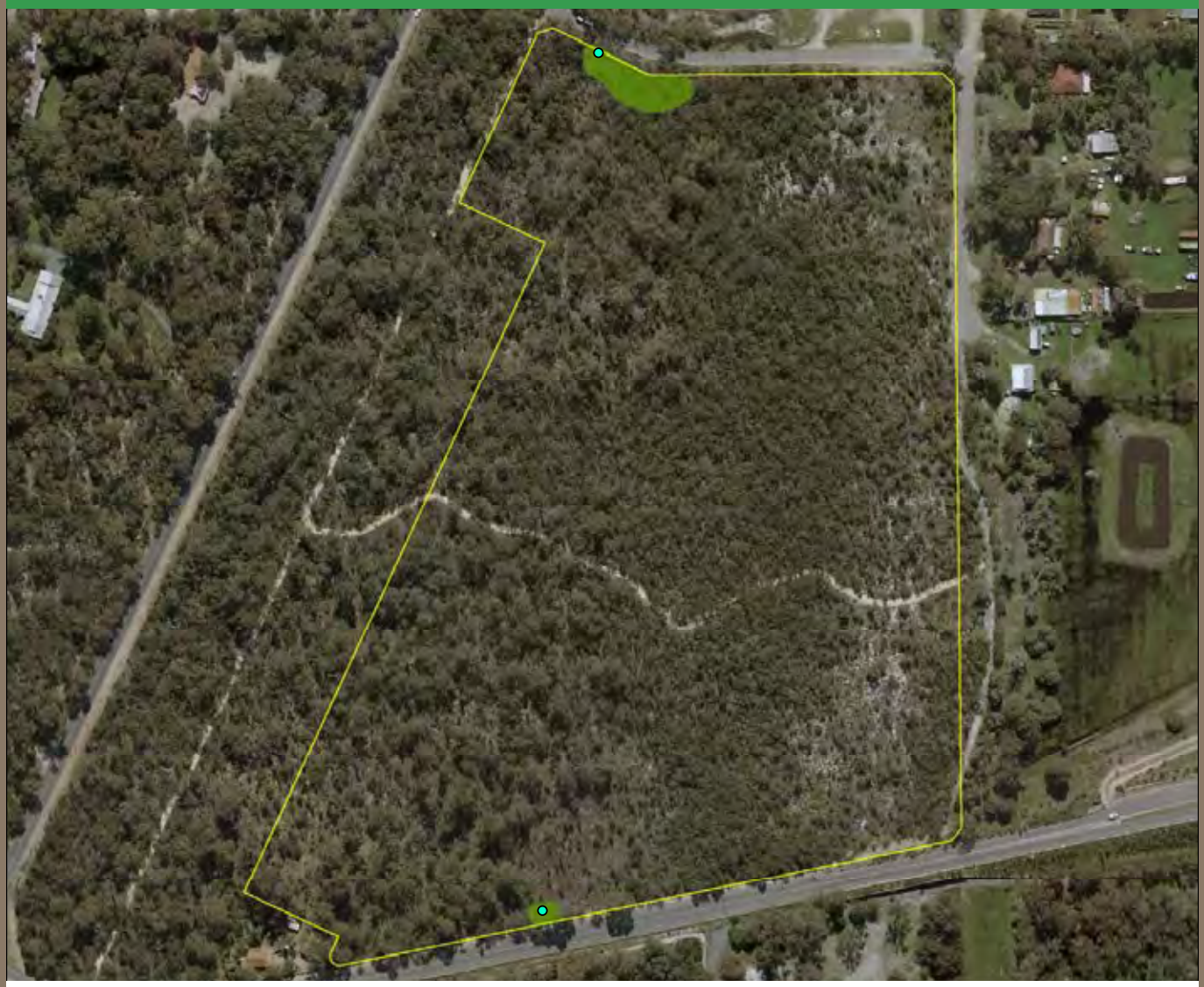



Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 82 - Grassy Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 83 - Broadleaf Weeds




Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 84 - Woody Weeds


Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 85 - Fauna Habitats


**Legend**

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

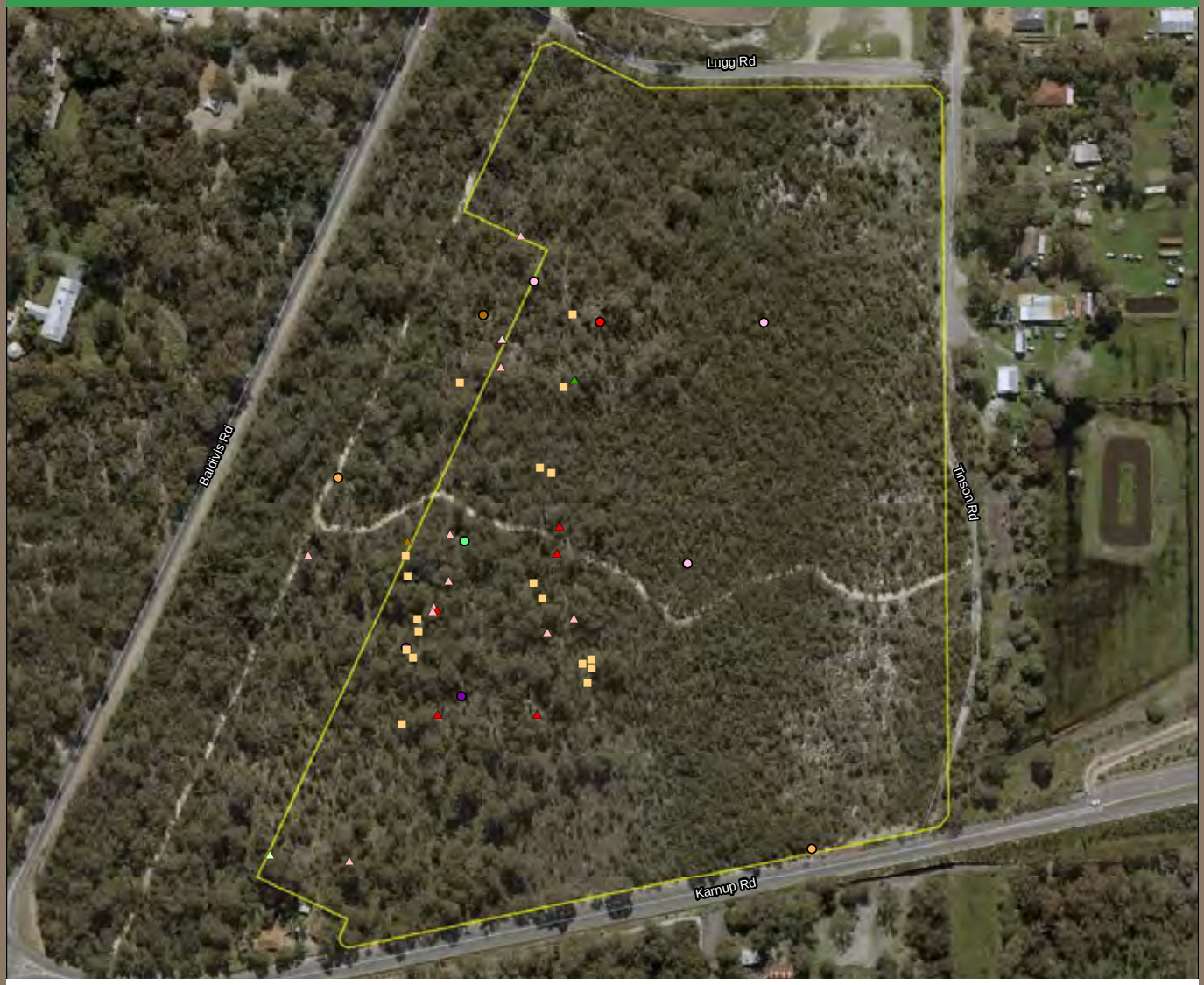
**Fauna Habitats**

- Banksia/Kunzea Shrubland
- Marri/Banksia Woodland
- Cleared



N 0 m 60 m

## FIGURE 86 - Fauna of Interest




**Legend**

- Bushland Reserves
- Local Road

**Conservation Significant Fauna**

- Baudin's Black Cockatoo, Sighting
- Baudin's Black Cockatoo, Foraging
- Carnaby's Black Cockatoo, Sighting
- Forest Red-tailed Black Cockatoo, Sighting
- Forest Red-tailed Black Cockatoo, Foraging
- White-tailed Black Cockatoo Sp., Sighting

**Locally Significance Fauna**

- Common Brushtail Possum

**Introduced Fauna**

- Black Rat
- Dog
- Fallow Deer
- Laughing Kookaburra
- Rabbit
- Red Fox

N

0 m 60 m

## FIGURE 87 - Black Cockatoo Habitat Trees


**Legend**

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

**Black Cockatoo Potential Breeding Trees**

Marri (*Corymbia calophylla*)

- 500 - 1000 mm
- 1000 - 2000 mm

Stag

- 500 - 1000 mm
- 1000 - 2000 mm

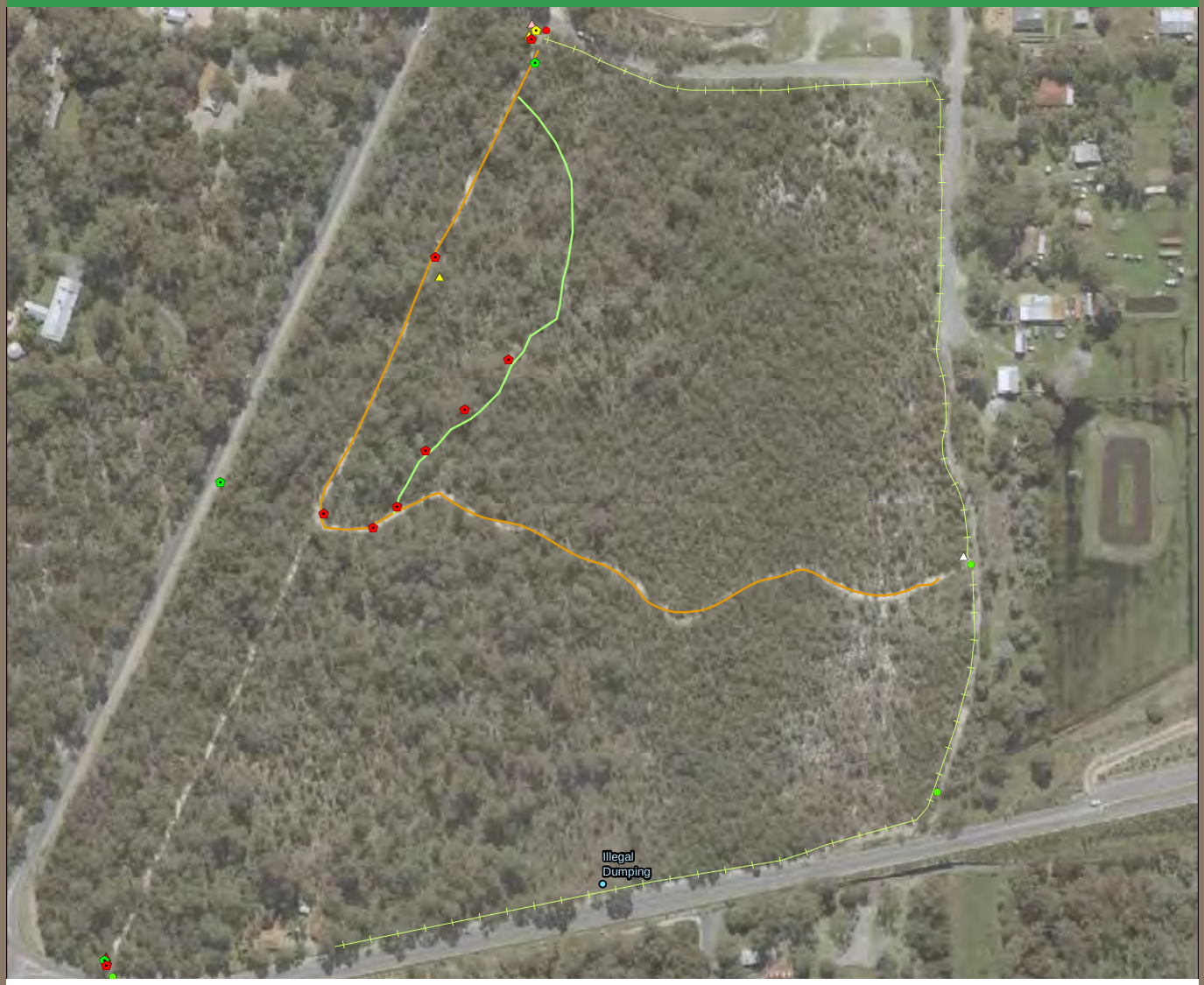
**Black Cockatoo Breeding Trees**

- Potentially contains hollows
- Contains hollows with estimated diameter > 120 mm

N

0 m 60 m

## FIGURE 88 - Infrastructure




### Legend

- Access Points: Good Condition
- Access Points: Poor Condition
- Signages: Good Condition
- Signages: Average Condition
- Signages: Poor Condition
- Reserve Structures: Average Condition
- Reserve Structures: Poor Condition
- Reserve Structures: Poor Condition (Recommend Replacing)
- Reserve Structures: Missing (Recommend Replacing)
- Other

**Paths**

- Dirt Trail
- Limestone

**Fences**

- Three-strand Rural

N

0 m 60 m

## FIGURE 89 - Recommended Revegetation


**Legend**

- Bushland Reserves
- Local Road

**Recommended Revegetation Areas**

- High Density (1 per 1 $m^2$)
- Priority Area

N

0 m 60 m

# Mandurah Hill

*Crystaluna Drive, Golden Bay*

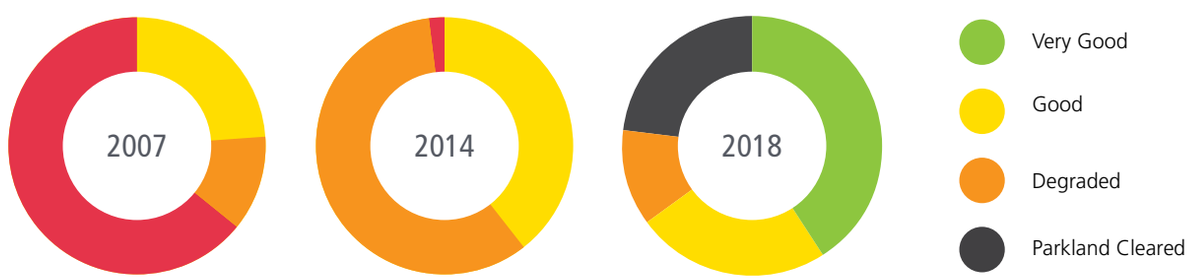
Mandurah Hill is a small reserve (1 ha) that is situated on a high dune. The site contains an antenna and its associated outbuildings. There is a gated road up to the antenna site and access is restricted with a high security fence. From the carpark there is a steep walking trail that winds up the hill to lookout with views of 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' – 'Very Good' condition; however, erosion on the steep, sandy slopes is an issue in some areas.

## Conservation Significant Species and Communities

- A number of Perth Lined Sliders (Priority 3) were identified in the reserve, and
- One fauna species listed as 'Marine' under the EPBC Act was recorded:
  - Silvereye *(Zosterops lateralis)*.

## Vegetation Condition (%)




Note: the previous assessments did not include the Parkland Cleared area of the reserve.

## Fauna Habitat

Nineteen native fauna species, comprising; nine bird, two mammal, and eight reptile species were recorded during the field survey. The full list of fauna species is available in Appendix D.

| TABLE 26 - Mandurah Hill Fauna Habitat | |
|---|---|
| *Acacia* Shrubland | Habitat for birds and reptiles. |

## Dieback

Disease confidence mapping undertaken by Project Dieback Natural Resource Management (2018) mapped Karnup Townsite as 'High Confidence' for the presence of dieback. Despite this, results of the field survey undertaken as part of the Environmental Assessment Report, were inconclusive due to the majority of the plants in the vegetation type along the eastern edge not being susceptible to dieback. *Banksia* occurred sporadically and the overstorey consisted of *Melaleuca* species which are not known to be susceptible. There were a few dead shrubs of *Kunzea glabrescens*, however, surrounding specimens remained healthy, indicating that the shrubs may have died of other causes. Further detailed testing for dieback will be undertaken in due course.

## Proposed Management Actions

**TABLE 27 - Summary of Management Actions at Mandurah Hill**

| Major Threats/Issues | Management Actions | Priority |
|---|---|---|
| Weed Invasion | Ongoing control of weeds as per Figures 92-94 – particularly near the entry road and the path. | High |
| Dieback | Additional dieback assessments to be undertaken as part of future Bushland Management Plan reviews. | Low |
| Degradation of vegetation | Revegetation aimed at minimising erosion of the sand dune; repair fencing (Figures 97-98). | Medium |
| Feral animals | Ongoing feral animal control. Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition. | Low |

## FIGURE 90 - Vegetation Type


**Legend**

- Bushland Reserves
- Local Road
- Quadrat Locations

**Vegetation Types**

- ArAl
- Cleared

## FIGURE 91 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Very Good (0.41 ha)
- Good (0.24 ha)
- Degraded (0.12 ha)
- Cleared (0.23 ha)

Refer to Appendix B for Vegetation Type Descriptions



N 0 m 20 m

## FIGURE 92 - Annual Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Annual Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Fumaria capreolata*
- **Fumaria muralis*

## FIGURE 93 - Grassy Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Grass Weeds Density (%)**

- 0-5
- 5-25
- 25-45
- 45-65

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 94 - Broadleaf Weeds

### Legend

- Bushland Reserves
- Priority Weed Management Areas

**Broadleaf Perennial Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Pelargonium capitatum*

## FIGURE 95 - Fauna Habitats


### Legend

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

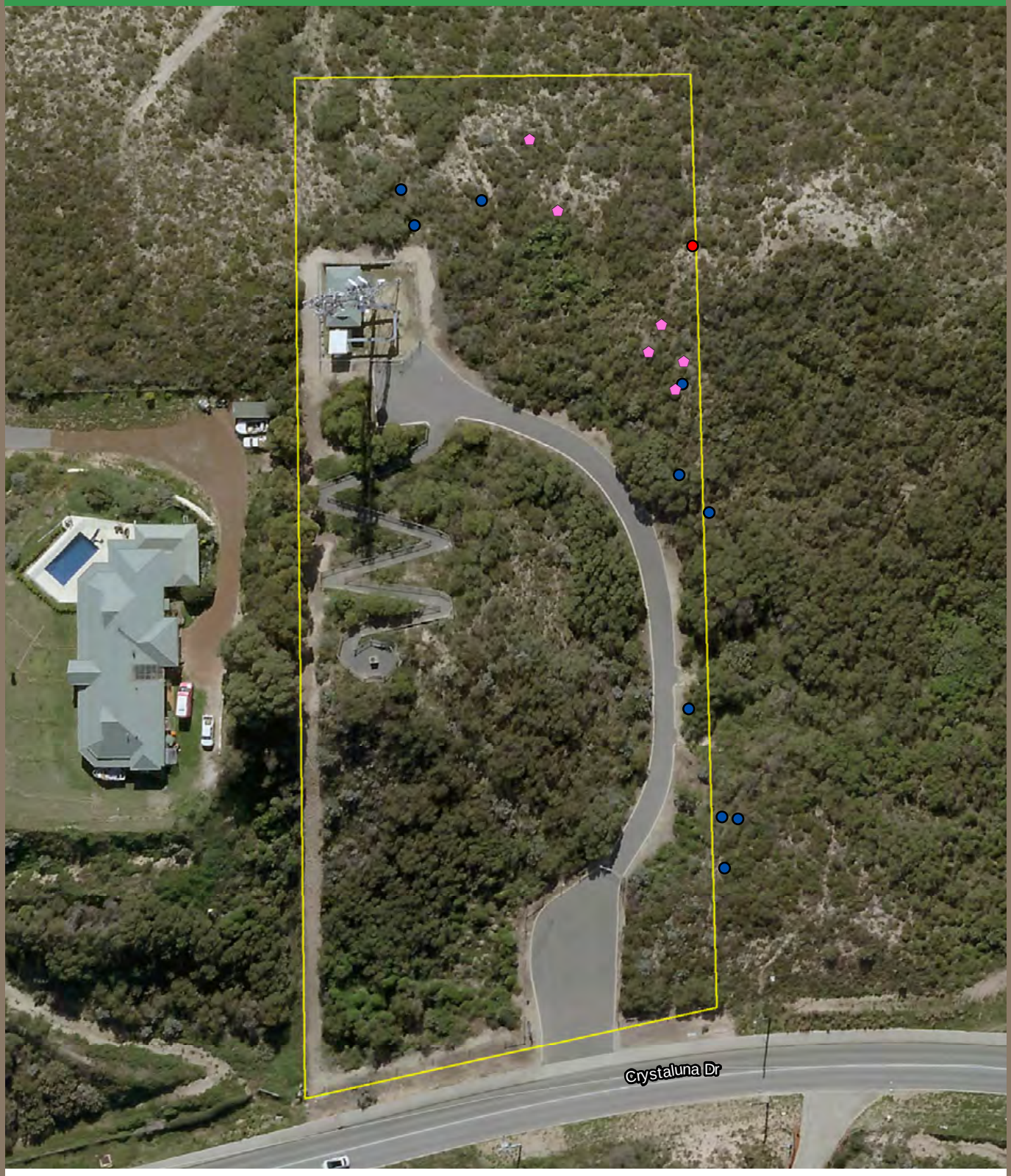
**Fauna Habitats**

- Acacia Shrubland
- Cleared



N 0 m 20 m

## FIGURE 96 - Fauna of Interest




**Legend**

- Bushland Reserves
- Local Road

**Conservation Significant Fauna**

- Perth Lined Slider

**Introduced Fauna**

- House Mouse
- Red Fox

N

0 m 20 m

## FIGURE 97 - Infrastructure


### Legend

- Access Points: Poor Condition
- Car Parkings: Good Condition
- Signages: Good Condition
- Signages: Average Condition
- Reserve Structures: Good Condition
- Reserve Structures: Average Condition
- Reserve Structures: Poor Condition
- Other

**Paths**

- Bitumen
- Fire Break

**Fences**

- Property
- Three-strand Rural
- Utility
- Fence Repair Recommended



N 0 m 20 m

## FIGURE 98 - Recommended Revegetation


**Legend**

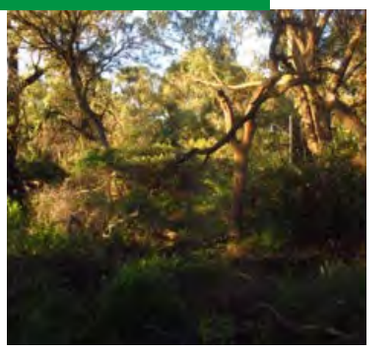
- Bushland Reserves
- Local Road

**Recommended Revegetation Areas**

- Low Density (1 per 4 $m^2$)
- Degraded Vegetaion

N

0 m 20 m



# Tuart Park

*Swanson Way, Secret Harbour*

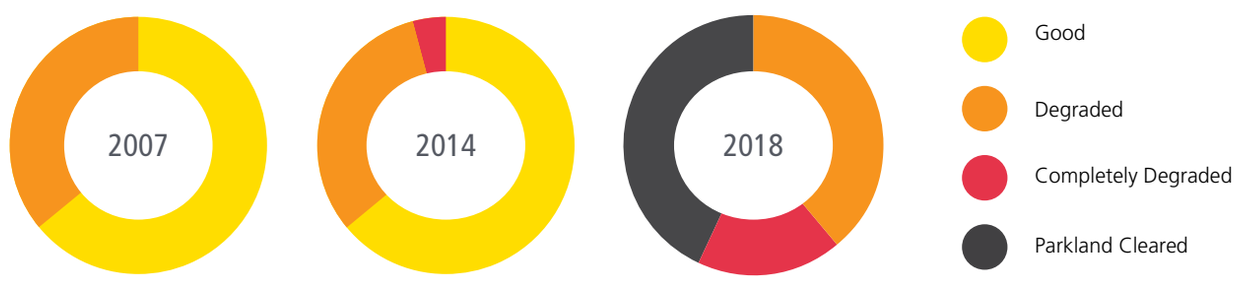
Tuart Park (4.62 ha) is located within a residential area and is popular for recreation. The reserve has picnic areas, a children's playground, turfed areas and an artificial pond.

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 degraded tuart woodlands and landscaped planted areas.

## Conservation Significant Species and Communities

- The inferred Floristic Community Type in the survey area is considered equivalent to FCT SCP24 – *Northern Spearwood shrublands and woodlands.* This FCT is listed as a Priority 3 community by DBCA and has been listed as a subcommunity of the TEC, *Banksia Woodlands of the Swan Coastal Plain.*
- Two fauna species listed as 'Marine' under the EPBC Act were recorded:
  - Silver gull *(Larus novaehollandiae)*, and
  - Magpie-lark *(Grallina cyanoleuca)*.
- Contains potential Black Cockatoo foraging, roosting and breeding habitat.

## Vegetation Condition (%)




Note: the previous assessments did not include the Parkland Cleared area of the reserve.

## Fauna Habitat

Seventeen native fauna species, comprising, 15 bird and two mammal species were recorded during the field survey. The full list of fauna species is available in Appendix D.

**TABLE 28 - Tuart Park Fauna Habitat**

| | |
|---|---|
| Tuart woodland over shrubland | Habitat for bushland birds and native bat species. |
| Isolated tuarts | Potential black cockatoo roosting and breeding habitat.<br>Habitat for other birds. |

## Dieback

No evidence of dieback was observed.

## Proposed Management Actions

**TABLE 29 - Summary of Management Actions for Tuart Park**

| Major Threats/Issues | Management Actions | Priority |
|---|---|---|
| Weed Invasion | Ongoing control of weeds as per Figures 92-94 – particularly near the entry road and the path. | High |
| Dieback | Additional dieback assessments to be undertaken as part of future Bushland Management Plan reviews. | Low |
| Degradation of vegetation | Revegetation aimed at minimising erosion of the sand dune; repair fencing (Figures 97-98). | Medium |
| Feral animals | Ongoing feral animal control. Include another fauna survey in future Management Plan reviews to note potential changes in fauna species composition. | Low |
| Poorly maintained infrastructure | Undertake a drainage infrastructure assessment inclusive of a broader catchment analysis to identify why the poorly functioning stormwater drain remains full of water (see Figure 108). | Low |

## FIGURE 99 - Vegetation Type


**Legend**

- Bushland Reserves
- Local Road
- Releve Locations

**Vegetation Types**

- Eg
- EgBaNE
- Lg
- Open Water
- Cleared

## FIGURE 100 - Vegetation Condition


**Legend**

- Bushland Reserves
- Local Road

**Vegetation Condition**

- Degraded (1.81 ha)
- Completely Degraded (0.81 ha)
- Cleared (1.85 ha)
- Open Water (0.15 ha)

Refer to Appendix B for Vegetation Type Descriptions



N 0 m 50 m

## FIGURE 101 - Annual Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Annual Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Solanum nigrum*

## FIGURE 102 - Grassy Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Grass Weeds Density (%)**

- 5-25

N

0 m 50 m

## FIGURE 103 - Broadleaf Weeds

**Legend**

- Bushland Reserves
- Priority Weed Management Areas

**Broadleaf Perennial Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Pelargonium capitatum*

Refer to Appendix C for Weed Species Locations and Treatments

## FIGURE 104 - Woody Weeds

**Legend**

- Bushland Reserves

**Woody Weeds Density (%)**

- 5-25

**Weed Point Mapping**

- **Ficus carica*
- **Leptospermum laevigatum*

Refer to Appendix C for Weed Species Locations and Treatments



N 0 m 50 m

## FIGURE 105 - Fauna Habitats

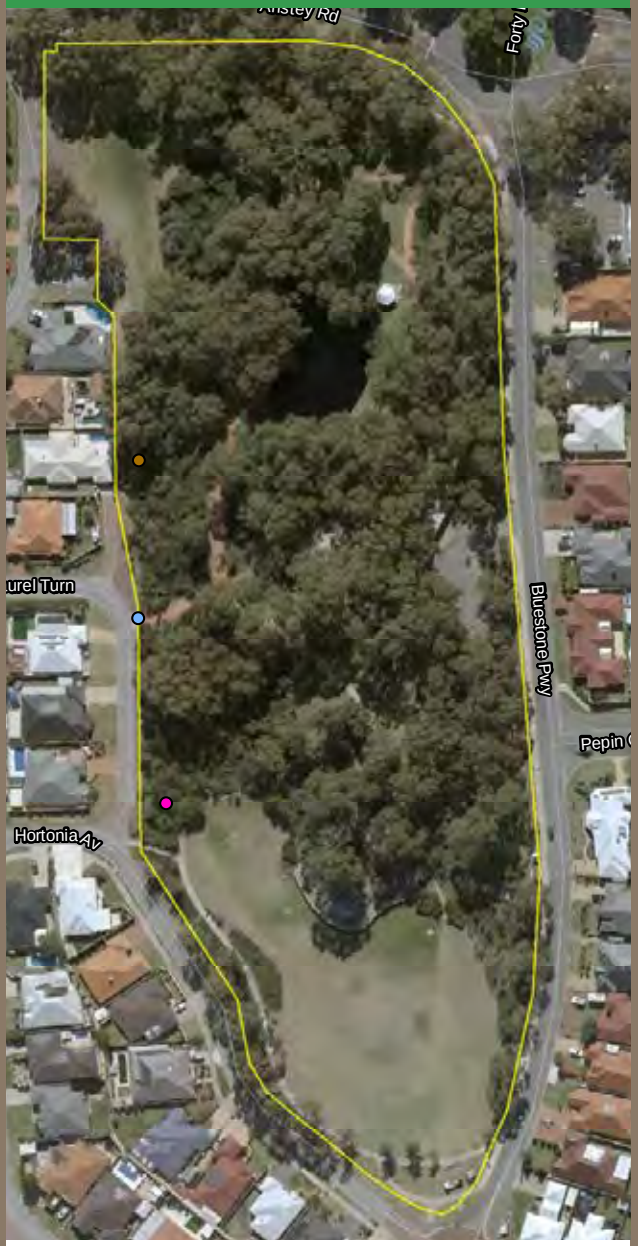

### Legend

- Bushland Reserves
- Local Road
- Habitat Assessment Locations

**Fauna Habitats**

- Isolated Tuarts
- Tuart Woodland over Shrubland
- Open Water
- Cleared

## FIGURE 106 - Fauna of Interest




### Legend

- Bushland Reserves
- Local Road

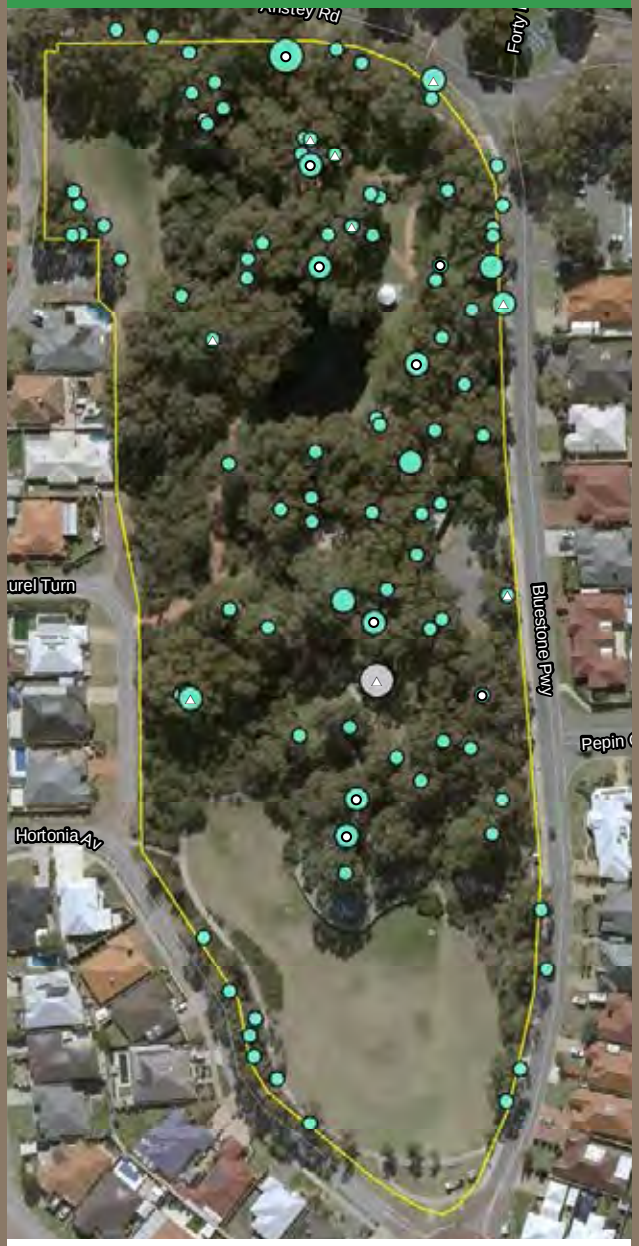
**Introduced Fauna**

- Black Rat
- Cat
- Laughing Turtle-Dove

N

0 m 50 m

## FIGURE 107 - Black Cockatoo Breeding




### Legend

- Bushland Reserves
- Local Road

**Black Cockatoo Potential Breeding Trees**

Tuart (*Eucalyptus gomphocephala*)

- 500 - 1000 mm
- 1000 - 2000 mm
- >2000 mm

Stag

- 500 - 1000 mm
- >2000 mm

**Black Cockatoo Breeding Trees**

- Potentially contains hollows
- Contains hollows with estimated diameter > 120 mm

## FIGURE 108 - Infrastructure


### Legend

- Bins: Good Condition
- Access Points: Good Condition
- Car Parkings: Good Condition
- Signages: Good Condition
- Signages: Average Condition
- Reserve Structures: Good Condition
- Reserve Structures: Average Condition
- Reserve Structures: Poor Condition
- Other

**Paths**

- Dirt Trail (Recommend Closing)
- Paved

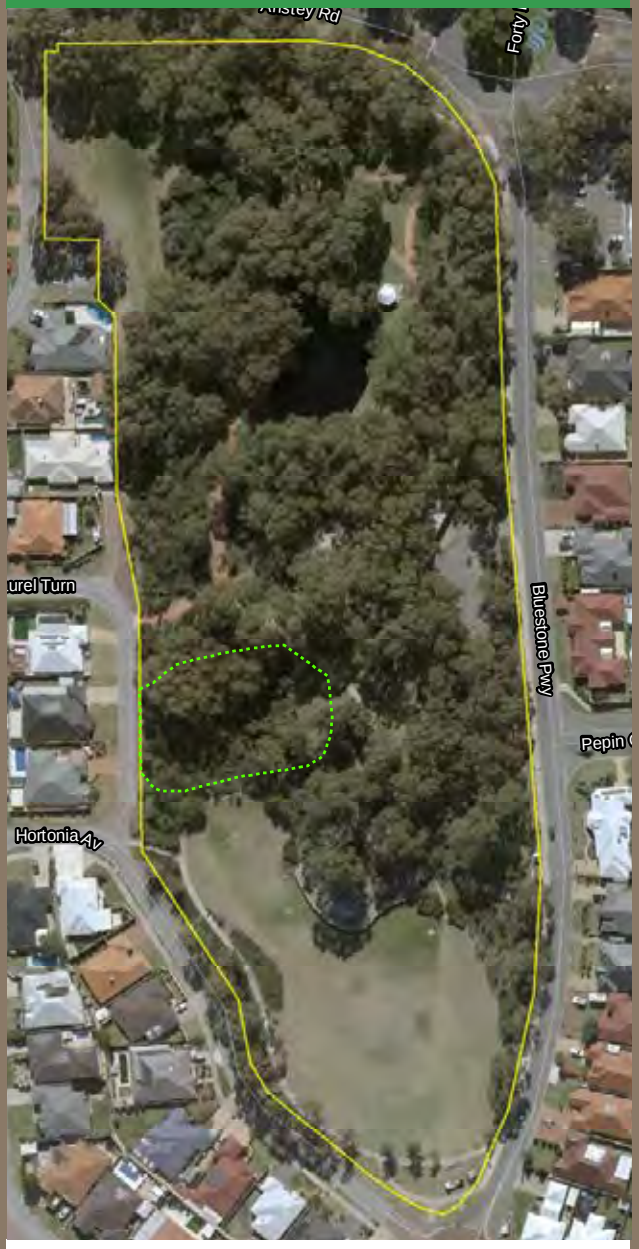
**Fences**

- Bollard
- Hedge
- Property
- Three-strand Rural



N 0 m 50 m

## FIGURE 109 - Recommended Revegetation




### Legend

Bushland Reserves

Local Road

**Recommended Revegetation Areas**

Low Density (1 per 4 $m^2$)

N

0 m 50 m

# 15 Implementation

## 15.1 Weed Control

The ultimate objective for rehabilitating areas of degraded vegetation is to remove any invasive weeds prior to revegetating the site with appropriate native species.

A weed control program for preparing a site for revegetation has been prepared by the Department of Water and Environment Regulation. Key recommendations are as follows:

- ideally one or two years before planting or seeding, a broad spectrum herbicide should be applied to the revegetation area
- a follow-up application in autumn is also required
- a third spray can be applied ten weeks after the second spray to control opportunistic weeds, and
- a final spray is required just before planting.

Weed control methods should be guided by the Implementation Table with timing and detailed methodology for targeted weed species and other aggressive/invasive weeds are provided in Appendix C. Weeds species should be targeted according to the Weed Suite Mapping presented in the individual reserve snapshots.

## 15.2 Revegetation

Revegetation actions seek to:

- maintain and enhance local vegetation quality
- create fauna habitat by providing a diverse mix of species
- use species that will survive with minimal ongoing maintenance
- use species that were recorded during the 2018 field survey
- enhance the amenity of the reserve
- minimise the introduction and spread of weeds
- restrict unauthorised access and the associated effects (trampling, littering etc.), and
- minimise soil erosion.

Proposed planting mixes are shown in Appendix E. It is recommended that no seeds are collected from beyond 50 km away from the study area. Prior to seedling planting, site preparation activities are required to be undertaken to ensure successful revegetation. Sites are to be revegetated in order of priority, as identified in the Implementation Table.

Revegetation works are to continue post initial planting to ensure revegetation efforts improve vegetation condition within the revegetation site. Ongoing management activities will include revegetation monitoring, and follow up weed control and infill planting if identified as necessary by the monitoring.

## 15.3 Implementation Table

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Alf Powell Reserve** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | Weed control ~ 3.2 ha.<br>Undertake weed control of mapped weed suites (see Alf Powell Reserve snapshot for mapping and Appendix C for treatment methods).<br>Prioritise the reserve boundary, pockets of native vegetation and along any paths. | $16,000 | O | PS | Ongoing | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 2 | Undertake dieback assessments as part of future Bushland Management Plan reviews. | TBD | O | SPE | 2024/2025 | **Low** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation | 3 | Revegetation of mapped revegetation area using the minimum plant densities shown in Figure 29 and species list in Appendix E, ensuring weed spraying is undertaken prior to tubestock planting and new seedlings are protected by tree guards. | $2,300 | O | PS | 2020/2021 | **Medium** |
| | 4 | Manage current areas of revegetation, including weed control, watering, pest control, fencing in areas that have public access, maintenance of stakes and covers and removal of stakes and covers once plants have reached a suitable size. | Officer time | O | PS | Ongoing | **High** |
| | 5 | Initiate a seed bank to collect and store seed from local bushland areas, which can be used for revegetation within the reserve (either by direct seeding or grow at a nursery for future revegetation projects). | Officer time | O | PS | Ongoing | **Low** |
| **Access** | | | | | | | |
| To restrict access to conservation areas | 6 | Replace missing gates identified in Figure 30. | $1,200 | C | PS | 2019/2020 | **Medium** |
| | 7 | Close informal tracks identified by Figure 30. | Officer time | O | PS | 2019/2020 | **Medium** |
| | 8 | Formalise the central limestone track in the area where the high level of bike disturbance is currently occurring (Figure 30). | $4,200 | C | PS | 2020/2021 | **Medium** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 9 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every 5 years). | TBD | O | SPE | 2024/2025 | **Low** |
| | 10 | Investigate feasibility of incorporating the reserve into the City's existing Feral Animal Control Program.<br>Red foxes and cats are prevalent at Alf Powell Reserve. | Officer time | O | PS | 2020/2021 | **Medium** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 11 | Annual litter removal. | Officer time | O | ES | Ongoing | **Medium** |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Baldivis Children's Forest** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | Weed control ~ 19 ha.<br>Progressively undertake weed control of mapped weed suites (see Baldivis Children's Forest snapshot for mapping and Appendix C for treatment methods).<br>Prioritise grasses, areas of good, very good and excellent condition vegetation, and proposed community revegetation areas prior to planting. | $98,000 | O | PS | 2020-2024 | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 2 | Undertake dieback assessments as part of future Bushland Management Plan reviews. | TBD | O | SPE | 2024/2025 | **Low** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation. | 3 | Ensure weed spraying is undertaken prior to community planting events. | TBD | O | PS | TBD | **High** |
| | 4 | At the end of each winter, the City to liaise with Baldivis Children's Forest to confirm areas planted. Revegetation areas should then be reflected on the City's Intramaps for future reference. | Officer time | O | SPE | Ongoing | **Medium** |
| **Access** | | | | | | | |
| To restrict access to conservation areas and ensure visitor safety | 5 | Add signage stating that the wetland walk is prone to flooding. | $200 | C | PS | 2019/2020 | **High** |
| | 6 | Add signage to warn public of electric fence along southern boundary. | $300 | C | PS | 2019/2020 | **High** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 7 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every 5 years). | TBD | O | SPE | 2024/2025 | **Medium** |
| | 8 | Incorporate the reserve into the City's existing Feral Animal Control Program.<br>Red Foxes are prevalent at Baldivis Children's Forest. | TBD | O | PS | 2019/2020 | **High** |
| | 9 | Install four additional Black Cockatoo Nesting Boxes. | $2,000 | C | PS | 2020/2021 | **Medium** |
| | 10 | Add additional 'beware of snake' signs within the reserve, particularly within the vicinity of the wetland areas. | $500 | C | PS | 2019/2020 | **High** |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Baldivis Nature Reserve** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread and prevent the introduction of new weeds within the reserve | 1 | Weed removal; the species recorded as 'Monocot sp.', should be recollected once it is in flower to confirm species and its appropriate control methods. | Officer time | O | PS | 2021/2022 | **High** |
| | 2 | Weed control ~ 9 ha; Undertake weed control of mapped weed suites (see Baldivis Nature Reserve snapshot for mapping and Appendix C for treatment methods). | $45,000 | O | PS | 2019/2020 - 2021/2022 | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 3 | Undertake dieback assessments as part of future Bushland Management Plan reviews. | TBD | O | SPE | 2024/2025 | **Low** |
| **Access** | | | | | | | |
| To restrict access to conservation areas and ensure visitor safety | 4 | Fix the broken and missing pedestrian gates shown in Figure 52 to limit bicycle access into the Reserve. | $1,800 | C | PS | 2020/2021 | **Medium** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 5 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan .reviews, to monitor trends over time (every 5 years). Specific focus should be given to the brushtail possum population. | TBD | O | SPE | 2024/2025 | **Medium** |
| | 6 | Incorporate the reserve into the City's existing Feral Animal Control Program. | TBD | O | PS | 2019/2020 | **High** |
| | 7 | Install four additional black cockatoo Nesting Boxes. | $2,000 | C | PS | 2020/2021 | **Medium** |
| | 8 | Install four additional brushtail possum Nesting Boxes. | $200 | C | PS | 2020/2021 | **Medium** |
| | 9 | Add additional 'beware of snake' signs within the reserve. | $200 | C | PS | 2019/2020 | **High** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 10 | Annual litter removal. | Officer time | O | ES | Ongoing | Medium |
| | 11 | Install additional signage to discourage illegal dumping of litter. | $200 | C | PS | 2019/2020 | Medium |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Dixon Road Conservation Precinct** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | Weed control ~ 60 ha.<br>Progressively undertake weed control of mapped weed suites (see Dixon Road Conservation Precinct snapshot for mapping and Appendix C for treatment methods).<br>Prioritise removal of bridal creeper and control of weeds in areas of very good-good condition vegetation. | $300,000 | O | PS | 2020-2024 | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 2 | Undertake dieback assessments as part of future Bushland Management Plan reviews. | TBD | O | SPE | 2024/2025 | **Low** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation. | 3 | Revegetation of mapped revegetation areas (~8.4 ha) using the minimum plant densities shown in Figure 65 and species list in Appendix E, ensuring weed spraying is undertaken prior to tubestock planting and new seedlings are protected by tree guards. | $336,000 | O | PS | Ongoing | **High** |
| | 4 | Manage current areas of revegetation, including weed control, watering, pest control, fencing in areas that have public access, maintenance of stakes and covers and removal of stakes and covers once plants have reached a suitable size. | Officer time | O | PS | Ongoing | **High** |
| | 5 | Initiate a seed bank to collect and store seed from local bushland areas, which can be used for revegetation within the reserve (either by direct seeding or grow at a nursery for future revegetation projects). | Officer time | O | PS | Ongoing | **High** |
| **Access** | | | | | | | |
| To restrict access to conservation areas and ensure visitor safety | 6 | Close and rehabilitate all informal BMX and motorcycle trails shown on Figure 64.<br>Access points should be restricted to pedestrians only. | $600 | O | PS | 2019/2020 | **Medium** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 7 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every 5 years). Specific focus should be given to the quenda population. | TBD | O | SPE | 2024/2025 | **Low** |
| | 8 | Continue the City's existing Feral Animal Control Program. Red foxes, rabbits and cats are prevalent at Dixon Road Conservation Precinct. | Officer time | O | PS | Ongoing | **High** |
| | 9 | Install signage to inform visitors that dogs must be kept on leashes. | $300 | C | PS | 2020/2021 | **Low** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 10 | Annual litter removal. | Officer time | O | ES | Ongoing | Low |
| **Public Safety** | | | | | | | |
| To ensure visitor safety | 11 | Inform Rangers of illegal camps within the reserve. | Officer time | O | PS | 2019/2020 and when required moving forward | High |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Karnup School Site** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | A recent fire has given weeds the opportunity to dominate.<br>Weed control should be adopted to manage new infestations as they appear. | Officer time | O | PS | Ongoing | **High** |
| | 2 | Weed control ~ 1.7 ha.<br>Undertake weed control of mapped weed suites (see Karnup School Site snapshot for mapping and Appendix C for treatment methods).<br>Prioritise the southern and eastern boundaries as well as areas affected by the fire. | $8,500 | O | PS | 2019/2020 | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 3 | Complete a dieback assessment, including soil testing. | $2,500 | O | PS | 2019/2020 | **High** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation | 4 | Fix the broken and missing pedestrian gates shown in Figure 53 to limit bicycle access into the Reserve. | $1,800 | C | PS | 2019/2020 | **Medium** |
| | 5 | Manage current areas of revegetation, including weed control, watering, pest control, fencing in areas that have public access, maintenance of stakes and covers and removal of stakes and covers once plants have reached a suitable size. | Officer time | O | PS | Ongoing | **Medium** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 6 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every 5 years). | TBD | O | SPE | 2024/2025 | **Low** |
| | 7 | Continue the City's existing Feral Animal Control Program. | Officer time | O | PS | 2019/2020 | **Low** |
| | 8 | Install two Black Cockatoo Nesting Boxes. | $1,000 | C | PS | 2022/2023 | **Medium** |
| | 9 | Install two Bat nesting boxes. | $100 | C | PS | 2023/2024 | **Low** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 10 | Annual litter removal. | Officer time | O | ES | Ongoing | **Low** |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Karnup Townsite** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | Weed control ~ 12ha.<br>Progressively undertake weed control of mapped weed suites (see Karnup Townsite snapshot for mapping and Appendix C for treatment methods).<br>Prioritise the northeast of the reserve and patches of *Watsonia meriana* var. *bulbillifera*. | $60,000 | O | PS | 2019/2020 -2021/2022 | **Medium** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 2 | Complete a dieback assessment, including soil testing. | $2,500 | O | SPE | 2019/2020 | **High** |
| | 3 | Replace information signage at current dieback stations and install a new dieback station with appropriate signage in the location identified by Figure 88. | $500 | C | PS | 2019/2020 | **High** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation | 4 | Revegetation of mapped revegetation areas (~0.7 ha) using the minimum plant densities shown in Figure 89 and species list in Appendix E, ensuring weed spraying is undertaken prior to tubestock planting and new seedlings are protected by tree guards. Should dieback be detected within the reserve, a new species list of dieback resistant plants will need to be derived. | $6,000 | O | PS & SPE | 2024/2025 | **Low** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 5 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every 5 years).<br>Specific focus should be given to the brushtail possum population. | TBD | O | SPE | 2024/2025 | **Medium** |
| | 6 | Continue the City's existing Feral Animal Control Program. Foxes are prevalent at Karnup Townsite. | Officer time | O | PS | 2019/2020 | **High** |
| | 7 | Install four black cockatoo nesting boxes. | $2,000 | C | PS | 2022/2023 | **Medium** |
| | 8 | Install four brushtail possum nesting boxes. | $200 | C | PS | 2023/2024 | **Low** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 9 | Annual litter removal. | Officer time | O | ES | Ongoing | **Low** |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Mandurah Hill** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | Weed control ~ 0.8 ha.;<br>Undertake weed control of mapped weed suites (see Mandurah Hill snapshot for mapping and Appendix C for treatment methods).<br>Prioritise vegetation mapped as 'Degraded' by Figure 91. | $4,000 | O | PS | 2023/2024 | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of Dieback | 2 | Undertake dieback assessments as part of future Bushland Management Plan reviews. | TBD | O | SPE | 2024/2025 | **Low** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation | 3 | Allow 12 months for degraded areas to regenerate with native species.<br>Further weed control and revegetation will be required if the vegetation doesn't regenerate naturally. | Officer time | O | PS & SPE | 2020/2021 | **Medium** |
| | 4 | Revegetation of mapped revegetation areas (~0.1 ha) using the minimum plant densities shown in Figure 98 and species list in Appendix E, ensuring weed spraying is undertaken prior to tubestock planting and new seedlings are protected by tree guards. | $300 | O | PS | 2022/2023 | **Medium** |
| **Access** | | | | | | | |
| To restrict access to conservation areas | 5 | Remove and replace 75 m of fencing in the northwest corner of the reserve (see Figure 97). | $1,000 | C | PS | 2023/2024 | **Low** |
| | 6 | Repair the 2 m of 3-strand rural fencing bordering the lookout pathway (see Figure 97). | $100 | C | PS | 2023/2024 | **Low** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 7 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every five years). | TBD | O | SPE | 2024/2025 | **Low** |
| | 8 | Incorporate the reserve into the City's existing Feral Animal Control Program. | Officer time | O | PS | 2019/2020 | **High** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 9 | Annual litter removal. | Officer time | O | ES | Ongoing | **Low** |

**TABLE 30 -** Implementation Table

| Objective | Recommendation Number | Management Action | Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|---|---|---|
| **Tuart Park** | | | | | | | |
| **Weed Control** | | | | | | | |
| To minimise the spread, and prevent the introduction of new weeds within the reserve | 1 | Weed control ~ 4 ha.<br>Undertake weed control of mapped weed suites (see Tuart Park snapshot for mapping and Appendix C for treatment methods).<br>Prioritise areas of native vegetation and ensure that garden plants do not encroach upon natural areas. | $20,000 | O | PS | 2021/2022 | **High** |
| **Dieback** | | | | | | | |
| To prevent and/or treat the spread of dieback | 2 | Undertake dieback assessments as part of future Bushland Management Plan reviews. | TBD | O | SPE | 2024/2025 | **Low** |
| **Revegetation** | | | | | | | |
| To improve the condition of native vegetation within the reserve through revegetation | 3 | Revegetation of mapped revegetation areas (~0.2 ha) using the minimum plant densities shown in Figure 109 and species list in Appendix E, ensuring weed spraying is undertaken prior to tubestock planting and new seedlings are protected by tree guards. | $1,500 | O | PS | 2023/2024 | **Low** |
| | 4 | Manage current areas of revegetation, including weed control, watering, pest control, fencing in areas that have public access, maintenance of stakes and covers and removal of stakes and covers once plants have reached a suitable size. | Officer time | O | PS | Ongoing | **Medium** |
| **Fauna** | | | | | | | |
| To protect native fauna values within the reserve | 5 | Continue with long-term monitoring of the fauna populations in future Bushland Management Plan reviews, to monitor trends over time (every 5 years). | TBD | O | SPE | 2024/2025 | **Low** |
| | 6 | Install two bat nesting boxes. | $100 | C | PS | 2021/2022 | **Low** |
| **Litter** | | | | | | | |
| To remove litter and enhance recreation value within the reserve | 7 | Annual litter removal. | Officer time | O | ES | Ongoing | **Low** |
| **Infrastructure** | | | | | | | |
| To ensure all infrastructure is well maintained and performing its desired function | 8 | Undertake a drainage infrastructure assessment inclusive of a broader catchment analysis to identify why the poorly functioning stormwater drain remains full of water. | Officer time | O | ES | 2022/2023 | **Low** |

Team Plan – O: Operational, C: Capital

Teams – PS: Parks Services, SPE: Strategic Planning and Environment, ES: Engineering Services

Costs are estimates only. Weed control costs have been estimated based on an indicative cost of $0.5 per $m^2$ for spraying the mapped weed suites

Refer to Appendix C and Appendix E for detailed weed control methods and proposed revegetation species list.

The implementation of these management actions is ultimately subject to securing funding relative to other operational priorities.

## 15.4 Bushfire Risk Mitigation

In view of the City's Bushfire Risk Management Plan, the following action is proposed to encompass all reserves in this Plan with the aim of reducing bushfire risk for the assets in proximity:

Engage a consultant to undertake a bushfire risk assessment and recommend actions to reduce the risk rating held by adjacent properties. Recommended actions must not detrimentally impact upon the biodiversity conservation or landscape amenity values of the reserves.

| Potential Cost | Team Plan | Team | Indicative Timing | Priority |
|---|---|---|---|---|
| $12,000 | O | PS | 2020/2021 | **High** |

## 15.5 Measuring Success

The City's Parks Services and Strategic Planning and Environment teams will meet at the start of each calendar year to discuss and review:

- the completion of management actions identified for the financial year
- the plan to undertake uncompleted management actions during the remainder of the financial year
- management actions that are scheduled to be undertaken during the next financial year
- the success of previously implemented management actions, and
- lessons learnt and potential improvements.

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# 17 Appendix A Legislation, Background Information and Conservation Codes

## Federal *Environment Protection* and *Biodiversity 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), and
- a water resource, in relation to coal seam gas development and large coal mining development.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. 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 EPBC Act is administered by the Federal Department of the Environment and Energy (DotEE).

## State *Biodiversity Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) recently replaced the outdated *Wildlife Conservation Act 1950*. The objects of the BC Act are:

- to conserve and protect biodiversity and biodiversity components in the State, and
- to promote ecologically sustainable use of biodiversity components in the State.

The BC Act's associated *Biodiversity Conservation Regulations 2018* are administered by the DBCA and provide the licensing arrangements for activities involving the State's fauna and flora.

Under the BC Act the Minster for the Environment can list a native species or ecological community as "Threatened" if a species are considered to be at risk of extinction or a community is at risk of becoming eligible for being a collapsed ecological community. The BC Act provides protection for threatened species, including conservation of their habitats and measures to conserve threatened ecological communities and critical habitats.

The State conservation level of flora and fauna species are listed on the *Wildlife Conservation (Rare Flora) Notice 2018* and *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

## 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

Primary Industries and Regional Development (DPIRD) which are prohibited organisms or organisms for which a declaration under Section 22(2) is in force. The main purposes of the BAM Act and its regulations are to:

- prevent new animal and plant pests and diseases from entering Western Australia
- manage the impact and spread of those pests already present in the state
- safely manage the use of agricultural and veterinary chemicals, and
- increase control over the sale of agricultural products that contain violative chemical residues.

## Introduced plants (weeds)

### Declared Pests

The DPIRD 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. Among the factors considered in categorising Declared Pests as Category C1 to C3 (with C3 being the most severe pests):

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

### Weeds of National Significance

To help focus national efforts to address weed problems in Australia, a list of Weeds of National Significance (WoNS) was compiled. The assessment of WoNS is based on four major criteria:

- invasiveness
- impacts
- potential for spread, and
- environmental, social and economic impacts.

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

## Conservation Codes for Western Australian Flora and Fauna (DPaW 2017)

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

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

**T Threatened Species**

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

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

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

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

**CR Critically Endangered species**

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

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

**EN Endangered Species**

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

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

**VU Vulnerable Species**

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

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

**Extinct Species**

**EX Extinct Species**

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

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

**Specially Protected Species**

**MI Migratory Species**

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

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment.

Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

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

**CD Species of Special Conservation Interest (Conservation Dependent Fauna)**

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

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

**OS Other Specially Protected Fauna**

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

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

**P Priority species**

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

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

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

**1 Priority 1: Poorly-Known Species**

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

**2 Priority 2: Poorly-Known Species**

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

**3 Priority 3: Poorly-Known Species**

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

**4 Priority 4: Rare, Near Threatened and Other Species in need of Monitoring**

(a) Rare: Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

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

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

**Ecological Communities**

Federal legislation

Under the EPBC Act, a person must not undertake an action that has or will have a significant impact on a listed TEC without approval from the Australian Government Minister for the Environment, unless those actions are not prohibited under the EPBC Act. A description of each of these categories of TECs is presented in Appendix 2. The current EPBC Act list of TECs can be located on the DEE (2017d) website.

State legislation

A TEC is defined under the EP Act as an ecological community listed, designated or declared under a written law or a law of the Australian Government as Threatened, Endangered or Vulnerable. There are four State categories of TECs (DEC 2010b):

- presumed totally destroyed (PD)
- critically endangered (CR)
- endangered (EN), and
- vulnerable (VU).

A description of each of these TEC categories is presented in Appendix 2. TECs are gazetted as such (DBCA 2017d) and some Western Australian TECs listed by DBCA (2016) are also listed as Threatened under the EPBC Act.

Ecological communities identified as Threatened, but not listed as TECs, are classified as Priority Ecological Communities (PECs). These communities are under threat, but there is insufficient information available concerning their distribution to make a proper evaluation of their conservation status. DBCA categorises PECs according to their conservation priority, using five categories, P1 (highest conservation significance) to P5 (lowest conservation significance), to denote the conservation priority status of such ecological communities.

# 17 Appendix B Vegetation Type Descriptions and Extent

| ALF POWELL RESERVE | | | | | |
|---|---|---|---|---|---|
| **Vegetation Type Code** | **Vegetation Type Description** | **Sites** | **Extent (HA) in the Survey** | **Extent (%) in the Survey** | **Representative Photo** |
| XpHc | *Xanthorrhoea preissii, Acacia saligna* tall closed shrubland over *Hardenbergia comptoniana, Acacia lasiocarpa* var. *lasiocarpa* mid sparse shrubland over *Lepidosperma calcicola, Lomandra maritima, Scabiosa atropurpurea* low open shrubland. | APQ01 | 1.42 | 14.3 |  |
| Ar*Sa | Acacia rostellifera tall shrubland over Xanthorrhoea preissii mid isolated clumps of shrubs over **Scabiosa atropurpurea, Opercularia vaginata, Lomandra hermaphrodita* low shrubland. | APQ02 | 2.6 | 26.1 |  |
| Ne | Non-endemic species of trees and shrubs | n/a | 2.36 | 23.7 | |
| Xp | *Xanthorrhoea preissii* | n/a | 0.07 | 0.7 | |
| Cleared Areas | | | 3.5 | 35.2 | |
| **Total Area** | | | **9.95** | **100** | |

## BALDIVIS CHILDREN'S FOREST

| Vegetation Type Code | Vegetation Type Description | Sites | Extent (HA) in the Survey | Extent (%) in the Survey | Representative Photo |
|---|---|---|---|---|---|
| EgBaNE | Altered Vegetation Type over non-endemic species, includes; *Eucalyptus gomphocephala* mid open forest over *Banksia attenuata, Banksia sessilis* var. *cygnorum, Nuytsia floribunda* low woodland over *Trymalium floribundum, Diplolaena dampieri, Banksia praemorsa* mid sparse shrubland *Acacia rostellifera, Spyridium globulosum, Hibbertia cuneiformis* mid open shrubland over *Gahnia trifida, Lomandra maritima* tall isolated clumps of sedges. | - | 13.73 | 67.51 |  |
| MrGt | *Melaleuca rhaphiophylla* low closed forest over *Gahnia trifida* mid closed sedgeland over *Baumea juncea* low sparse sedgeland. | BCF01 BCF02 | 2.5 | 12.25 |  |
| EgLg | *Eucalyptus gomphocephala* mid open forest over *Banksia attenuata* low open woodland over *Lepidosperma gladiatum* low closed sedgeland. | BCF03 | 0.35 | 1.7 |  |
| Er | *Eucalyptus rudis over weeds.* | - | 1.09 | 5.34 | |
| Cleared Areas | | | 2.7 | 13.2 | |
| **Total Area** | | | **20.4** | **100** | |

# 17 Appendix B Vegetation Type Descriptions and Extent (continued)

| BALDIVIS NATURE RESERVE | | | | | |
|---|---|---|---|---|---|
| **Vegetation Type Code** | **Vegetation Type Description** | **Sites** | **Extent (HA) in the Survey** | **Extent (%) in the Survey** | **Representative Photo** |
| BaBm | *Eucalyptus marginata, Allocasuarina fraseriana, Banksia attenuata* low woodland over *Banksia menziesii* tall isolated clumps of shrubs over *Jacksonia sternbergiana* mid isolated shrubs over *Hibbertia hypericoides, Gompholobium tomentosum, Lepidosperma squamatum* shrubland and isolated sedges. | BNRQ01<br>BNRQ02 | 6.6 | 47.8 |  |
| CcBa | *Corymbia calophylla* mid woodland over *Banksia attenuata, Banksia grandis* low open woodland over *Allocasuarina fraseriana, Acacia lasiocarpa* var. *lasiocarpa, Jacksonia sternbergiana* mid open shrubland over *Hibbertia hypericoides, Gompholobium tomentosum, Dasypogon bromeliifolius* low isolated clumps of shrubs over *Tetraria octandra, Lepidosperma squamatum* low isolated clumps of Sedges | BNRQ03 | 0.99 | 7.17 |  |
| AgCcNE | *Agonis flexuosa, Corymbia calophylla* and Non-endemic *Eucalyptus* over weeds. | - | 0.73 | 5.33 | |
| Ne | Non-endemic trees and shrubs | - | 0.16 | 1.2 | |
| Cc | Isolated Corymbia calophylla | - | 0.20 | 1.5 | |
| Cleared Areas | | | 5.11 | 37 | |
| **Total Area** | | | **13.8** | **100** | |

## DIXON ROAD CONSERVATION PRECINCT

| Vegetation Type Code | Vegetation Type Description | Sites | Extent (HA) in the Survey | Extent (%) in the Survey | Representative Photo |
|---|---|---|---|---|---|
| BlXp | *Banksia littoralis* low woodland over *Xanthorrhoea preissii* tall closed shrubland over *Gahnia trifida* tall sparse sedgeland over P*hyllanthus calycinus, Rhagodia baccata, Kennedia coccinea* low sparse shrubland. | DRCQ01 | 0.19 | 0.35 |  |
| EgAr | *Eucalyptus gomphocephala* mid open forest over *Acacia rostellifera, Xanthorrhoea preissii, Templetonia retusa* tall open shrubland over *Conostylis aculeata* subsp. *Preissii, Acanthocarpus preissii, Gompholobium tomentosum* low isolated shrubs. | DRCQ02<br>DRCQ03 | 52.69 | 82.34 |  |
| Ar | *Rows of Acacia rostellifera.* | DRCR01 | 1.2 | 1.88 | |
| Eg | Isolated *Eucalyptus gomphocephala.* | - | 1.04 | 1.65 | |
| Rehabilitation Area | | | 1.27 | 1.98 | |
| Cleared Areas | | | 7.62 | 11.8 | |
| **Total Area** | | | **64** | **100** | |

# 17 Appendix B Vegetation Type Descriptions and Extent (continued)

| KARNUP SCHOOL SITE | | | | | |
|---|---|---|---|---|---|
| **Vegetation Type Code** | **Vegetation Type Description** | **Sites** | **Extent (HA) in the Survey** | **Extent (%) in the Survey** | **Representative Photo** |
| AflBa | *Agonis flexuosa, Banksia menziesii, Banksia attenuata* mid woodland over *Corymbia calophylla, Xylomelum occidentale low* isolated trees over *Kunzea glabrescens, Macrozamia riedlei* mid isolated shrubs over *Mesomelaena pseudostygia, Tetraria octandra* tall sparse sedgeland over *Hibbertia hypericoides, Gompholobium tomentosum, Hibbertia racemosa* low open shrubland. | KSQ01 | 1.37 | 69.2 |  |
| AflXo | Parkland cleared area; *Agonis flexuosa, Xylomelum occidentale* over grassland of weeds, with some rehabilitation. | - | 0.32 | 16.16 |  |
| NE | Non-endemic trees and shrubs. | - | 0.01 | 0.5 | |
| P | *Pinus* sp. | - | 0.01 | 0.5 | |
| Cleared Areas | | | 0.27 | 13.64 | |
| **Total Area** | | | **1.98** | **100** | |

## KARNUP TOWNSITE

| Vegetation Type Code | Vegetation Type Description | Sites | Extent (HA) in the Survey | Extent (%) in the Survey | Representative Photo |
|---|---|---|---|---|---|
| CcBm | *Corymbia calophylla* mid open forest *over Allocasuarina fraseriana, Banksia attenuata, Banksia menziesii* low woodland over *Macrozamia riedlei* mid isolated shrubs *over Tetraria octandra* mid sedgeland and *Opercularia echinocephala, Hibbertia hypericoides, Dampiera pedunculata* low open shrubland. | KTQ01<br>KTQ06<br>KTQ07 | 4.95 | 38 |  |
| CfPc | *Eucalyptus marginata* low isolated clumps of trees over *Calytrix fraseri, Acacia lasiocarpa* var. *lasiocarpa, Macrozamia riedlei* mid shrubland over *Phlebocarya* ciliata, *Dasypogon bromeliifolius, Hovea pungens* low open shrubland. | KTQ02 | 0.46 | 3.6 |  |
| KgBa | *Banksia attenuata, Banksia menziesii* low open forest over *Kunzea glabrescens* tall shrubland over *Phlebocarya ciliata, Dasypogon bromeliifolius, Conostylis aculeata* subsp. *Preissii* low shrubland. | KTQ03<br>KTQ04<br>KTQ05 | 7.27 | 56 |  |
| Cleared Areas | | | 0.29 | 2.4 | |
| **Total Area** | | | **12.97** | **100** | |

## MANDURAH HILL

| Vegetation Type Code | Vegetation Type Description | Sites | Extent (HA) in the Survey | Extent (%) in the Survey | Representative Photo |
|---|---|---|---|---|---|
| ArAl | *Acacia rostellifera, Spyridium globulosum, Olearia axillaris* mid shrubland over *Acacia lasiocarpa* var. *lasiocarpa, Opercularia vaginata, Phyllanthus calycinus* low open shrubland over *Austrostipa flavescens, *Bromus diandrus, *Lolium rigidum* tall open grassland. | MHQ01<br>MHQ02 | 0.77 | 77 |  |
| Cleared Areas | | | 0.23 | 23 | |
| **Total Area** | | | **1** | **100** | |

# 17 Appendix B Vegetation Type Descriptions and Extent (continued)

| KARNUP SCHOOL SITE | | | | | |
|---|---|---|---|---|---|
| **Vegetation Type Code** | **Vegetation Type Description** | **Sites** | **Extent (HA) in the Survey** | **Extent (%) in the Survey** | **Representative Photo** |
| EgBaNE | Altered Vegetation Type over non-endemic species, includes: *Eucalyptus gomphocephala* mid open forest over *Banksia attenuata, Banksia sessilis* var. *cygnorum, Nuytsia floribunda* low woodland over *Trymalium floribundum, Diplolaena dampieri, Banksia praemorsa* mid sparse shrubland *Acacia rostellifera, Spyridium globulosum, Hibbertia cuneiformis* mid open shrubland over *Gahnia trifida, Lomandra maritima* tall isolated clumps of sedges. | TPR01<br>TPR02 | 2.5 | 53.57 |  |
| Lg | Lepidosperma gladiatum sedgeland. | - | 0.06 | 1.30 | |
| OW | Open Water. | - | 0.15 | 3.34 | |
| Eg | Isolated *Eucalyptus gomphocephala.* | - | 0.08 | 1.75 | |
| Cleared Areas | | | 1.9 | 40.04 | |
| **Total Area** | | | **9.38** | **100** | |

# 17 Appendix C Weed Species List - Locations and Treatment Methods

## ANNUAL WEEDS

| Species | Common Name | Status | Control Method | Treatment Time | Alf Powell Reserve | Baldivis Children's Forest | Baldivis Nature Reserve | Dixon Road Conservation | Karnup School Site | Karnup Townsite | Mandurah Hill | Tuart Park |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Arctotheca calendula* | Cape Weed | | Bs Bl | Aug – Nov | | ✓ | | | | | | |
| *Centaurium pulchellum* | | | Bs | Oct – Nov | ✓ | | | | | | | |
| *Cerastum glomeratum* | Mouse Ear Chickweed | | Bs | Aug – Dec | | | | ✓ | | | | ✓ |
| *Crassula glomerata* | | | Bs | Sep – Dec | ✓ | ✓ | | ✓ | | | | |
| *Cuscuta ?epithymum* | Lesser Dodder | | H | Aug – Dec | | | | | | | ✓ | |
| *Euphorbia peplus* | Petty Spurge | | Bs | Jul – Nov | | ✓ | | | | | | |
| *Fumaria capreolata* | Whiteflower Fumitory | | Bs | Jun – Sep | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| *Fumaria densiflora* | Denseflower Fumitory | | Bs | Jun – Sep | | | | | | | ✓ | |
| *Fumaria muralis* | Wall Fumitory | | Bs | Jun – Dec | | ✓ | | | | | | |
| *Galium murale* | Small Goosegrass | | Bs | Aug – Dec | | | | ✓ | | | | |
| *Heliophila pusilla* | | | Bs | Aug – Nov | | ✓ | | | | | | |
| *Hypochaeris glabra* | Smooth Cats-ear | | H Bs Bl | Aug – Nov | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| *Leontodon arvensis* | Cretan Weed | | Bs | Aug – Nov | | | | ✓ | | | | |
| *Lysimachia arvensis* | Pimpernel | | Bs | Apr – Sep | ✓ | | | ✓ | | ✓ | | ✓ |
| *Medicago sp.* | | | Bl Bs | Jun – Jul | | | | ✓ | | | | |
| *Minuarta mediterranea* | | | Bs | Aug – Nov | | | | ✓ | | | ✓ | |
| *Orobanche minor* | Lesser Broomrape | | H Bs | Sep – Nov | | | | | ✓ | | | |
| *Osteospermum ecklonis* | | | Bs | Apr – May | | | | ✓ | | | | |
| *Petrorhagia dubia* | | | H | Jul – Nov | | ✓ | | ✓ | | ✓ | ✓ | |
| *Raphanus raphanistrum* | Wild Radish | | H Bs | Apr - Nov | ✓ | | | ✓ | | | | |
| *Senecio condylus* | | | Bl | Sep - Oct | ✓ | | | | | | | |
| *Solanum nigrum* | Black Berry Nightshade | | H Bs | Jan – Dec | | | ✓ | ✓ | | | | ✓ |
| *Sonchus oleraceus* | Common Sowthistle | | Bl | Aug - Oct | ✓ | | ✓ | ✓ | | | ✓ | ✓ |
| *Trifolium campestre* var. *campestre* | Hop Clover | | H Bl | Jul - Nov or Jan | | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| *Trifolium dubium* | Suckling Clover | | H Bs | Aug - Oct | ✓ | | ✓ | ✓ | | | | |
| *Ursinia anthemoides* | Ursinia | | H Bs | Jul – Nov | | | ✓ | | ✓ | ✓ | | |
| *Verbesina encelioides* | | | H Bs | Feb - Jul or Dec | ✓ | | | | | | | |
| *Wahlenbergia capensis* | Cape Bluebell | | H Bs | Sep – Nov | | | | | ✓ | | | |

## BROADLEAF PERENNIAL WEEDS

| Species | Common Name | Status | Control Method | Treatment Time | Alf Powell Reserve | Baldivis Children's Forest | Baldivis Nature Reserve | Dixon Road Conservation | Karnup School Site | Karnup Townsite | Mandurah Hill | Tuart Park |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acetosella vulgaris* | Sorrel | | Bs | Aug – Nov | | ✓ | | | | | | |
| *Arctotheca calendula* | Cape Weed | | Bs | Jul – Aug | ✓ | | ✓ | ✓ | | | | |
| *Asphodelus fistulosus* | Onion Weed | | H Bs | Jun – Oct | ✓ | | ✓ | ✓ | | | | |
| *Carpobrotus edulis* | Hotentot Fig | | H | N/A | | ✓ | | | | | | |
| *Conyza bonariensis* | Flaxleaf Fleabane | | Bs | Jul – Dec | ✓ | | | | | | | |
| *Euphorbia peplus* | Petty Spurge | | Bs | Jul – Jan | | | ✓ | ✓ | | | ✓ | |
| *Euphorbia terracina* | Geraldton Carnation Weed | | Bs | Jun – Aug | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| *Foeniculum vulgare* | Fennel | | Bs | Aug – Sep | ✓ | | | ✓ | | | | |
| *Gazania linearis* | | | H Bs | N/A | ✓ | | | ✓ | | | | |
| *Lupinus angustifolius* | Narrowleaf Lupin | | H Bs Bl | Jun – Oct | | | ✓ | | | | | |
| *Lupinus cosentinii* | | | H Bs | Aug – Nov | | ✓ | | | | | | |
| *Lupinus luteus* | Yellow Lupin | | H Bs | Aug – Nov | | ✓ | | | | | | |
| *Pelargonium capitatum* | Rose Pelargonium | | H Bs | Jun – Oct | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| *Scabiosa atropurpurea* | Purple Pincushion | | H Bs | Aug – Dec or Jan – Apr | ✓ | | | | | | | |
| *Taraxacum khatoonae* | Dandelion | | Bs | Aug – Oct | ✓ | | | | | | | |
| *Trachyandra divaricata* | Strapweed | | Bs | Jul – Sep | | | | | | | ✓ | |
| *Vicia sativa* subsp. *nigra* | | | Bs | Jun – Aug | | ✓ | | | | | | |
| *Vinca major* | Blue Periwinkle | | H Bs | Jan – Nov | | | | ✓ | | | | |

# 17 Appendix C Weed Species List - Locations and Treatment Methods (continued)

## BULBOUS WEEDS

| Species | Common Name | Status | Control Method | Treatment Time | Alf Powell Reserve | Baldivis Children's Forest | Baldivis Nature Reserve | Dixon Road Conservation | Karnup School Site | Karnup Townsite | Mandurah Hill | Tuart Park |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Asparagus asparagoides* | Bridal Creeper | WoNS, Declared Pest | Bs | Apr – Aug | | | | ✓ | | | | |
| *Babiana tubulosa* | | | Bs | Jul – Oct | | ✓ | ✓ | | | | | |
| *Freesia alba x leichtlinii* | Wild Gladiolus | | Bs | Aug – Nov | | | ✓ | | | | | |
| *Freesia sp* | | | Bs | Jul – Aug | | | | | ✓ | ✓ | | |
| *Oxalis pes-caprae* | Soursob | | Bs | Jun – Oct | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| *Romulea rosea* | Guildford Grass | | Bs | Aug – Oct | ✓ | | | ✓ | | | | |
| *Watsonia meriana var. bulbilifera* | Bugle Lily | | Bs | N/A | | | | ✓ | | ✓ | | |

## GRASS

| Species | Common Name | Status | Control Method | Treatment Time | Alf Powell Reserve | Baldivis Children's Forest | Baldivis Nature Reserve | Dixon Road Conservation | Karnup School Site | Karnup Townsite | Mandurah Hill | Tuart Park |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Avena barbata* | Bearded Oat | | Gs | Aug - Oct | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| *Briza maxima* | Blowfly Grass | | H Gs | Sep - Oct | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| *Briza minor* | Shivery Grass | | H Gs | Sep – Oct | | | ✓ | | ✓ | | | |
| *Bromus diandrus* | Great Brome | | Bs Gs | Jun - Aug | ✓ | ✓ | | ✓ | | | ✓ | ✓ |
| *Cenchrus clandestinum* | Kikuyu Grass | | Bs | N/A | | ✓ | | | | | | |
| *Cynodon dactylon* | Couch | | H Bs Gs | Jun - Nov or Feb | ✓ | ✓ | | ✓ | | | | |
| *Ehrharta calycina* | Perennial Veldt Grass | | Gs | Aug - Nov | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| *Ehrharta longiflora* | Annual Veldt Grass | | Gs | Aug – Nov | | ✓ | ✓ | ✓ | | | | ✓ |
| *Eragrostis curvula* | African Love Grass | | Bs | Nov – Dec or Jan – May | | | | ✓ | | | | |
| *Lagurus ovatus* | Hare's Tail Grass | | Gs | Aug - Nov | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ |
| *Lolium ridgidum* | Wimmera Ryegrass | | Gs | N/A | | ✓ | | ✓ | | | ✓ | ✓ |
| *Vulpia myuros* | Rat's Tail Fescue | | H Bs | Aug – Nov | | | | | ✓ | | | |

## WOODY WEEDS

| Species | Common Name | Status | Control Method | Treatment Time | Alf Powell Reserve | Baldivis Children's Forest | Baldivis Nature Reserve | Dixon Road Conservation | Karnup School Site | Karnup Townsite | Mandurah Hill | Tuart Park |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acacia iteaphylla* | | | H F | N/A | | | | | | ✓ | | |
| *Chamaecytisus palmensis* | Tagasaste | | H Bs | N/A | | | | | ✓ | | | |
| *Ficus carica* | Common Fig | | H F | | | | | | | | | ✓ |
| *Leptospermum laevigatum* | Coast Teatree | | H F | N/A | ✓ | | ✓ | | | | | |
| *Pinus pinaster* | Pinaster Pine | | H F | N/A | ✓ | | | | | | | |
| *Polygala myrtifolia* | Myrtleleaf Milkwort | | H Bs F | N/A | | | ✓ | | | | | |
| *Ricinus communis* | Castor Oil Plant | | H F | Sep – Feb | | | ✓ | | | | | |
| *Schinus terebinthifolia* | Brazilian peppertree | | F | Nov - Feb | ✓ | | | ✓ | | | | |

## Key to species specific control treatments

| | |
|---|---|
| Bs | Spray with broad spectrum systemic herbicide (glyphosate) |
| Gs | Spray with grass selective herbicide (Verdict™ or Fusilade™) |
| Bl | Spray with a broad-leaf weed selective herbicide (Lontrel or similar) |
| H | Hand pull |
| F | Fell mature plants, treat stump with broad spectrum systemic herbicide (glyphosate) |

# 17 Appendix D Fauna Species List

| ALF POWELL RESERVE | | | | | |
|---|---|---|---|---|---|
| **Family** | **Scientific Name** | **Commoon Name** | **State** | **Federal** | **Records** |
| **Birds** | | | | | |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | *2* |
| Cacatuidae | *Cacatua tenuirostris* | Eastern Long-billed Corella | | | *2* |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | MA | *3* |
| Columbidae | *Spilopelia senegalensis* | Laughing Turtle-Dove | | | 3 |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 7 |
| Hirundinidae | *Petrochelidon nigricans* | Tree Martin | | MA | 3 |
| Laridae | *Larus novaehollandiae* | Silver Gull | | MA | 2 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 10 |
| Meliphagidae | *Gavicalis virescens* | Singing Honeyeater | | | 1 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 6 |
| Meliphagidae | *Phylidonyris novaehollandiae* | New Holland Honeyeater | | | 1 |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 1 |
| Rhipiduridae | *Rhipidura leucophrys* | Willie Wagtail | | | 4 |
| **Mammals** | | | | | |
| Canidae | *Canis familiaris* | Dog | | | 3 |
| Molossidae | *Austronomus australis* | White-striped Free-tailed Bat | | | Low activity |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | High activity |
| **Reptiles** | | | | | |
| Agamidae | *Ctenophorus adelaidensis* | Western Heath Dragon | | | 9 |
| Pygopodidae | *Aprasia repens* | Sand-plain Worm-lizard | | | 1 |
| Scincidae | *Ctenotus australis* | West-coast Long-tailed Ctenotus | | | 3 |
| Scincidae | *Hemiergis quadrilineata* | Two-toed Earless Skink | | | 2 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 3 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 10 |

## BALDIVIS CHILDREN'S FOREST

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Amphibians** | | | | | |
| Limnodynastidae | *Heleioporus eyrei* | Moaning Frog | | | *5* |
| Limnodynastidae | *Limnodynastes dorsalis* | Western Banjo Frog | | | *10* |
| **Birds** | | | | | |
| Canidae | *Canis familiaris* | Dog | | | 3 |
| Molossidae | *Austronomus australis* | White-striped Free-tailed Bat | | | Low activity |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | High activity |
| Acanthizidae | *Gerygone fusca* | Western Gerygone | | | 6 |
| Alcedinidae | *Dacelo novaeguineae* | Laughing Kookaburra | | | 5 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 3 |
| Cacatuidae | *Calyptorhynchus banksii naso* | Forest Red-tailed Black Cockatoo | VU | VU | 1 |
| Cacatuidae | *Calyptorhynchus baudinii* | Baudin's Cockatoo | EN | EN | 2 |
| Cacatuidae | *Calyptorhynchus latirostris* | Carnaby's Cockatoo | EN | EN | 8 |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | MA | 4 |
| Columbidae | *Phaps chalcoptera* | Common Bronzewing | | | 1 |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 2 |
| Cuculidae | *Cacomantis flabelliformis* | Fan-tailed Cuckoo | | MA | 3 |
| Maluridae | *Malurus splendens* | Splendid Fairy-wren | | | 9 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 1 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 1 |
| Meliphagidae | *Phylidonyris novaehollandiae* | New Holland Honeyeater | | | 2 |
| Meropidae | *Merops ornatus* | Rainbow Bee-eater | | MA | 1 |
| Pachycephalidae | *Colluricincla harmonica* | Grey Shrike-thrush | | | 2 |
| Pachycephalidae | *Pachycephala occidentalis* | Western Golden Whistler (Western Whistler) | | | 1 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 4 |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 2 |

# 17 Appendix D Fauna Species List (continued)

| BALDIVIS CHILDREN'S FOREST | | | | | |
|---|---|---|---|---|---|
| **Family** | **Scientific Name** | **Commoon Name** | **State** | **Federal** | **Records** |
| **Birds** | | | | | |
| Petroicidae | *Petroica boodang* | Scarlet Robin | | | 1 |
| Psittacidae | *Platycercus spurius* | Red-capped Parrot | | | 2 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 3 |
| Psittacidae | *Trichoglossus moluccanus* | Rainbow Lorikeet | | | 1 |
| Rhipiduridae | *Rhipidura albiscapa* | Grey Fantail | | | 7 |
| Threskiornithidae | *Threskiornis spinicollis* | Straw-necked Ibis | | MA | 1 |
| Zosteropidae | *Zosterops lateralis* | Grey-breasted White-eye (Silvereye) | | MA | 5 |
| **Mammals** | | | | | |
| Canidae | *Vulpes* | Red Fox | | | 2 |
| Macropodidae | *Macropus fuliginosus melanops* | Western Grey Kangaroo | | | 10 |
| Molossidae | *Austronomus australis* | White-striped Free-tailed Bat | | | Low activity |
| Molossidae | *Ozimops kitcheneri* | Western Free-tailed Bat | | | Low activity |
| Muridae | *Rattus* | Black Rat | | | 3 |
| Peramelidae | *Isoodon fusciventer* | Quenda | P4 | | 3 |
| **Reptiles** | | | | | |
| Agamidae | *Pogona minor* | Western Bearded Dragon | | | 1 |
| Elapidae | *Notechis scutatus* | Tiger Snake | | | 1 |
| Scincidae | *Cryptoblepharus buchananii* | Buchanan's Snake-eyed Skink | | | 3 |
| Scincidae | *Hemiergis quadrilineata* | Two-toed Earless Skink | | | 3 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 4 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 1 |
| Typhlopidae | *Anilios australis* | Southern Blind Snake | | | 1 |

## BALDIVIS NATURE RESERVE

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Amphibian** | | | | | |
| Limnodynastidae | *Heleioporus eyrei* | Moaning Frog | | | 11 |
| **Birds** | | | | | |
| Acanthizidae | *Gerygone fusca* | Western Gerygone | | | 3 |
| Accipitridae | *Haliastur sphenurus* | Whistling Kite | | MA | 6 |
| Alcedinidae | *Dacelo novaeguineae* | Laughing Kookaburra | | | 2 |
| Alcedinidae | *Todiramphus sanctus* | Sacred Kingfisher | | MA | 3 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 2 |
| Cacatuidae | *Calyptorhynchus latirostris* | Carnaby's Cockatoo | EN | EN | 5 |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | MA | 2 |
| Columbidae | *Spilopelia senegalensis* | Laughing Turtle-Dove | | | 3 |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 1 |
| Cracticidae | *Cracticus tibicen* | Australian Magpie | | | 5 |
| Cracticidae | *Cracticus torquatus* | Grey Butcherbird | | | 1 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 7 |
| Meliphagidae | *Gavicalis virescens* | Singing Honeyeater | | | 1 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 5 |
| Meliphagidae | *Phylidonyris novaehollandiae* | New Holland Honeyeater | | | 2 |
| Monarchidae | *Grallina cyanoleuca* | Magpie-lark | | MA | 1 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 2 |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 6 |
| Psittacidae | *Platycercus spurius* | Red-capped Parrot | | | 5 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 8 |
| Psittacidae | *Trichoglossus moluccanus* | Rainbow Lorikeet | | | 1 |
| Rhipiduridae | *Rhipidura leucophrys* | Willie Wagtail | | | 1 |
| Threskiornithidae | *Threskiornis moluccus* | Australian White Ibis | | | 2 |

# 17 Appendix D Fauna Species List (continued)

## BALDIVIS NATURE RESERVE

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Mammals** | | | | | |
| Felidae | *Felis catus* | Cat | | | 2 |
| Molossidae | *Austronomus australis* | White-striped Free-tailed Bat | | | Low activity |
| Phalangeridae | *Trichosurus vulpecula hypoleucus* | Koomal, Common Brushtail Possum | | | 7 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | Medium activity |
| **Reptiles** | | | | | |
| Agamidae | *Ctenophorus adelaidensis* | Western Heath Dragon | | | 1 |
| Scincidae | *Cryptoblepharus buchananii* | Buchanan's Snake-eyed Skink | | | 3 |
| Scincidae | *Hemiergis quadrilineata* | Two-toed Earless Skink | | | 2 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 5 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 16 |

## DIXON ROAD CONSERVATION PRECINCT

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Amphibian** | | | | | |
| Limnodynastidae | *Heleioporus eyrei* | Moaning Frog | | | 6 |
| Limnodynastidae | *Limnodynastes dorsalis* | Western Banjo Frog | | | 6 |
| **Birds** | | | | | |
| Acanthizidae | *Gerygone fusca* | Western Gerygone | | | 5 |
| Accipitridae | *Haliastur sphenurus* | Whistling Kite | | MA | 2 |
| Alcedinidae | *Dacelo novaeguineae* | Laughing Kookaburra | | | 1 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 8 |
| Cacatuidae | *Cacatua tenuirostris* | Eastern Long-billed Corella | | | 5 |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | MA | 3 |
| Columbidae | *Phaps chalcoptera* | Common Bronzewing | | | 1 |
| Columbidae | *Spilopelia senegalensis* | Laughing Turtle-Dove | | | 1 |

## DIXON ROAD CONSERVATION PRECINCT

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Birds** | | | | | |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 9 |
| Cracticidae | *Cracticus tibicen* | Australian Magpie | | | 13 |
| Cuculidae | *Cacomantis flabelliformis* | Fan-tailed Cuckoo | | MA | 2 |
| Cuculidae | *Chrysococcyx lucidus* | Shining Bronze Cuckoo | | MA | 2 |
| Falconidae | *Falco longipennis* | Australian Hobby | | | 2 |
| Hirundinidae | *Petrochelidon nigricans* | Tree Martin | | MA | 3 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 3 |
| Meliphagidae | *Gavicalis virescens* | Singing Honeyeater | | | 2 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 5 |
| Meropidae | *Merops ornatus* | Rainbow Bee-eater | | MA | 2 |
| Pachycephalidae | *Colluricincla harmonica* | Grey Shrike-thrush | | | 1 |
| Pachycephalidae | *Pachycephala occidentalis* | Western Golden Whistler (Western Whistler) | | | 3 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 3 |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 3 |
| Psittacidae | *Platycercus spurius* | Red-capped Parrot | | | 2 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 4 |
| Rhipiduridae | *Rhipidura albiscapa* | Grey Fantail | | | 5 |
| Zosteropidae | *Zosterops lateralis* | Grey-breasted White-eye (Silvereye) | | MA | 5 |
| **Mammals** | | | | | |
| Canidae | *Vulpes* | Red Fox | | | 4 |
| Leporidae | *Oryctolagus cuniculus* | Rabbit | | | 14 |
| Peramelidae | *Isoodon fusciventer* | Quenda | P4 | | 17 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | Low activity |

# 17 Appendix D Fauna Species List (continued)

## DIXON ROAD CONSERVATION PRECINCT

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Reptiles** | | | | | |
| Elapidae | *Pseudonaja affinis* | Dugite | | | 3 |
| Scincidae | *Ctenotus australis* | West-coast Long-tailed Ctenotus | | | 4 |
| Scincidae | *Hemiergis quadrilineata* | Two-toed Earless Skink | | | 1 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 4 |
| Scincidae | *Morethia lineoocellata* | West-coast Pale-flecked Morethia | | | 1 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 21 |
| Varanidae | *Varanus gouldii* | Bungarra or Sand Goanna | | | 1 |

## KARNUP SCHOOL SITE

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Amphibian** | | | | | |
| Limnodynastidae | *Heleioporus eyrei* | Moaning Frog | | | 12 |
| **Birds** | | | | | |
| Acanthizidae | *Gerygone fusca* | Western Gerygone | | | 5 |
| Cracticidae | *Cracticus torquatus* | Grey Butcherbird | | | 1 |
| Maluridae | *Malurus splendens* | Splendid Fairy-wren | | | 3 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 1 |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 1 |
| Petroicidae | *Petroica boodang* | Scarlet Robin | | | 1 |
| Psittacidae | *Platycercus spurius* | Red-capped Parrot | | | 1 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 6 |
| Rhipiduridae | *Rhipidura albiscapa* | Grey Fantail | | | 2 |

## KARNUP SCHOOL SITE

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Mammals** | | | | | |
| Molossidae | *Austronomus australis* | White-striped Free-tailed Bat | | | Low activity |
| Molossidae | *Ozimops kitcheneri* | Western Free-tailed Bat | | | Low activity |
| Muridae | *Rattus* | Black Rat | | | 1 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | Low activity |
| Vespertilionidae | *Vespadelus regulus* | Southern Forest-bat | | | Low activity |
| **Reptiles** | | | | | |
| Pygopodidae | *Aprasia repens* | Sand-plain Worm-lizard | | | 1 |
| Scincidae | *Cryptoblepharus buchananii* | Buchanan's Snake-eyed Skink | | | 1 |
| Scincidae | *Hemiergis quadrilineata* | Two-toed Earless Skink | | | 2 |
| Scincidae | *Lerista elegans* | West Coast Four-toed Lerista | | | 1 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 5 |
| Scincidae | *Morethia lineoocellata* | West-coast Pale-flecked Morethia | | | 1 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 5 |

## KARNUP TOWNSITE

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Amphibian** | | | | | |
| Limnodynastidae | *Heleioporus eyrei* | Moaning Frog | | | 6 |
| **Birds** | | | | | |
| Acanthizidae | *Gerygone fusca* | Western Gerygone | | | 3 |
| Alcedinidae | *Dacelo novaeguineae* | Laughing Kookaburra | | | 1 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 10 |
| Cacatuidae | *Calyptorhynchus banksii naso* | Forest Red-tailed Black Cockatoo | VU | VU | 19 |
| Cacatuidae | *Calyptorhynchus baudinii* | Baudin's Cockatoo | EN | EN | 7 |
| Cacatuidae | *Calyptorhynchus latirostris* | Carnaby's Cockatoo | EN | EN | 1 |

# 17 Appendix D Fauna Species List (continued)

| KARNUP TOWNSITE | | | | | |
|---|---|---|---|---|---|
| **Family** | **Scientific Name** | **Commoon Name** | **State** | **Federal** | **Records** |
| **Birds** | | | | | |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | MA | 2 |
| Cracticidae | *Cracticus tibicen* | Australian Magpie | | | 8 |
| Cracticidae | *Cracticus torquatus* | Grey Butcherbird | | | 1 |
| Maluridae | *Malurus splendens* | Splendid Fairy-wren | | | 9 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 2 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 13 |
| Meropidae | *Merops ornatus* | Rainbow Bee-eater | | MA | 3 |
| Monarchidae | *Grallina cyanoleuca* | Magpie-lark | | MA | 1 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 4 |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 5 |
| Psittacidae | *Platycercus spurius* | Red-capped Parrot | | | 1 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 1 |
| **Mammals** | | | | | |
| Canidae | *Canis familiaris* | Dog | | | 2 |
| Canidae | *Vulpes* | Red Fox | | | 1 |
| Cervidae | *Dama* | Fallow Deer | | | 2 |
| Leporidae | *Oryctolagus cuniculus* | Rabbit | | | 1 |
| Molossidae | *Ozimops kitcheneri* | Western Free-tailed Bat | | | Low activity |
| Muridae | *Rattus* | Black Rat | | | 1 |
| Phalangeridae | *Trichosurus vulpecula hypoleucus* | Koomal, Common Brushtail Possum | | | 24 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | Low activity |
| Vespertilionidae | *Vespadelus regulus* | Southern Forest-bat | | | Low activity |

## KARNUP TOWNSITE

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Reptiles** | | | | | |
| Scincidae | *Cryptoblepharus buchananii* | Buchanan's Snake-eyed Skink | | | 5 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 3 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 4 |

## MANDURAH HILL

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Birds** | | | | | |
| Acanthizidae | *Sericornis frontalis* | White-browed Scrubwren | | | 4 |
| Accipitridae | *Hamirostra isura* | Square-tailed Kite | | | 1 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 5 |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 1 |
| Cracticidae | *Cracticus torquatus* | Grey Butcherbird | | | 1 |
| Maluridae | *Malurus splendens* | Splendid Fairy-wren | | | 4 |
| Meliphagidae | *Gavicalis virescens* | Singing Honeyeater | | | 1 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 3 |
| Zosteropidae | *Zosterops lateralis* | Grey-breasted White-eye (Silvereye) | | MA | 1 |
| **Mammals** | | | | | |
| Canidae | *Vulpes* | Red Fox | | | 2 |
| Macropodidae | *Macropus fuliginosus melanops* | Western Grey Kangaroo | | | 3 |
| Muridae | *Mus musculus* | House Mouse | | | 10 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | Medium activity |

# 17 Appendix D Fauna Species List (continued)

## MANDURAH HILL

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Reptiles** | | | | | |
| Diplodactylidae | *Strophurus spinigerus* | South-western Spiny-tailed Gecko | | | 1 |
| Pygopodidae | *Lialis burtonis* | Burton's Legless Lizard | | | 1 |
| Pygopodidae | *Pletholax gracilis* | Keeled Legless Lizard | | | 1 |
| Scincidae | *Ctenotus australis* | West-coast Long-tailed Ctenotus | | | 3 |
| Scincidae | *Lerista lineata* | Perth Lined Slider | P3 | | 6 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 4 |
| Scincidae | *Tiliqua rugosa* | Bobtail | | | 5 |
| Typhlopidae | *Anilios australis* | Southern Blind Snake | | | 1 |

## TUART PARK

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Reptiles** | | | | | |
| Acanthizidae | *Smicrornis brevirostris* | Weebill | | | 7 |
| Anatidae | *Anas superciliosa* | Pacific Black Duck | | | 13 |
| Anatidae | *Chenonetta jubata* | Australian Wood Duck (Wood Duck, Maned Duck) | | | 1 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 8 |
| Columbidae | *Ocyphaps lophotes* | Crested Pigeon | | | 2 |
| Columbidae | *Phaps chalcoptera* | Common Bronzewing | | | 2 |
| Columbidae | *Spilopelia senegalensis* | Laughing Turtle-Dove | | | 1 |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 15 |
| Cracticidae | *Cracticus tibicen* | Australian Magpie | | | 2 |
| Cracticidae | *Cracticus torquatus* | Grey Butcherbird | | | 4 |
| Laridae | *Larus novaehollandiae* | Silver Gull | | MA | 2 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 9 |
| Monarchidae | *Grallina cyanoleuca* | Magpie-lark | | MA | 1 |

## TUART PARK

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Reptiles** | | | | | |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 2 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 2 |
| Rhipiduridae | *Rhipidura leucophrys* | Willie Wagtail | | | 1 |
| **Mammals** | | | | | |
| Felidae | *Felis catus* | Cat | | | 1 |
| Molossidae | *Ozimops kitcheneri* | Western Free-tailed Bat | | | Low activity |
| Muridae | *Rattus* | Black Rat | | | 1 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | Low Activity |

## OVERALL

| Family | Scientific Name | Commoon Name | State | Federal | Records |
|---|---|---|---|---|---|
| **Amphibians** | | | | | |
| Limnodynastidae | *Heleioporus eyrei* | Moaning Frog | | | 40 |
| Limnodynastidae | *Limnodynastes dorsalis* | Western Banjo Frog | | | 16 |
| **Birds** | | | | | |
| Acanthizidae | *Gerygone fusca* | Western Gerygone | | | 22 |
| Acanthizidae | *Sericornis frontalis* | White-browed Scrubwren | | | 4 |
| Acanthizidae | *Smicrornis brevirostris* | Weebill | | | 7 |
| Accipitridae | *Haliastur sphenurus* | Whistling Kite | | MA | 8 |
| Accipitridae | *Hamirostra isura* | Square-tailed Kite | | | 1 |
| Alcedinidae | *Dacelo novaeguineae* | Laughing Kookaburra | | | 9 |
| Alcedinidae | *Todiramphus sanctus* | Sacred Kingfisher | | MA | 3 |
| Anatidae | *Anas superciliosa* | Pacific Black Duck | | | 13 |
| Anatidae | *Chenonetta jubata* | Australian Wood Duck (Wood Duck, Maned Duck) | | | 1 |
| Cacatuidae | *Cacatua roseicapilla* | Galah | | | 38 |
| Cacatuidae | *Cacatua tenuirostris* | Eastern Long-billed Corella | | | 7 |

# 17 Appendix D Fauna Species List (continued)

| OVERALL | | | | | |
|---|---|---|---|---|---|
| Family | Scientific Name | Commoon Name | State | Federal | Records |
| **Birds** | | | | | |
| Cacatuidae | *Calyptorhynchus banksii naso* | Forest Red-tailed Black Cockatoo | VU | VU | 20 |
| Cacatuidae | *Calyptorhynchus baudinii* | Baudin's Cockatoo | EN | EN | 9 |
| Cacatuidae | *Calyptorhynchus latirostris* | Carnaby's Cockatoo | EN | EN | 14 |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | MA | 14 |
| Columbidae | *Ocyphaps lophotes* | Crested Pigeon | | | 2 |
| Columbidae | *Phaps chalcoptera* | Common Bronzewing | | | 3 |
| Columbidae | *Spilopelia senegalensis* | Laughing Turtle-Dove | | | 7 |
| Corvidae | *Corvus coronoides* | Australian Raven | | | 26 |
| Cracticidae | *Cracticus tibicen* | Australian Magpie | | | 15 |
| Cracticidae | *Cracticus torquatus* | Grey Butcherbird | | | 8 |
| Cuculidae | *Cacomantis flabelliformis* | Fan-tailed Cuckoo | | MA | 3 |
| Falconidae | *Falco longipennis* | Australian Hobby | | | 2 |
| Hirundinidae | *Petrochelidon nigricans* | Tree Martin | | MA | 6 |
| Laridae | *Larus novaehollandiae* | Silver Gull | | MA | 4 |
| Maluridae | *Malurus splendens* | Splendid Fairy-wren | | | 25 |
| Meliphagidae | *Anthochaera carunculata* | Red Wattlebird | | | 32 |
| Meliphagidae | *Gavicalis virescens* | Singing Honeyeater | | | 5 |
| Meliphagidae | *Lichmera indistincta* | Brown Honeyeater | | | 33 |
| Meliphagidae | *Phylidonyris novaehollandiae* | New Holland Honeyeater | | | 5 |
| Meropidae | *Merops ornatus* | Rainbow Bee-eater | | MA | 6 |
| Monarchidae | *Grallina cyanoleuca* | Magpie-lark | | MA | 3 |
| Pachycephalidae | *Colluricincla harmonica* | Grey Shrike-thrush | | | 3 |
| Pachycephalidae | *Pachycephala occidentalis* | Western Golden Whistler (Western Whistler) | | | 4 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 14 |

| OVERALL | | | | | |
|---|---|---|---|---|---|
| Family | Scientific Name | Commoon Name | State | Federal | Records |
| **Birds** | | | | | |
| Pardalotidae | *Pardalotus striatus* | Striated Pardalote | | | 20 |
| Petroicidae | *Petroica boodang* | Scarlet Robin | | | 2 |
| Psittacidae | *Platycercus spurius* | Red-capped Parrot | | | 9 |
| Psittacidae | *Platycercus zonarius* | Australian Ringneck | | | 21 |
| Psittacidae | *Trichoglossus moluccanus* | Rainbow Lorikeet | | | 2 |
| Rhipiduridae | *Rhipidura albiscapa* | Grey Fantail | | | 14 |
| Rhipiduridae | *Rhipidura leucophrys* | Willie Wagtail | | | 6 |
| Threskiornithidae | *Threskiornis moluccus* | Australian White Ibis | | | 2 |
| Threskiornithidae | *Threskiornis spinicollis* | Straw-necked Ibis | | MA | 1 |
| Zosteropidae | *Zosterops lateralis* | Grey-breasted White-eye (Silvereye) | | MA | 11 |
| **Mammals** | | | | | |
| Canidae | *Canis familiaris* | Dog | | | 5 |
| Canidae | *Vulpes* | Red Fox | | | 9 |
| Cervidae | *Dama* | Fallow Deer | | | 2 |
| Felidae | *Felis catus* | Cat | | | 3 |
| Leporidae | *Oryctolagus cuniculus* | Rabbit | | | 15 |
| Macropodidae | *Macropus fuliginosus melanops* | Western Grey Kangaroo | | | 13 |
| Molossidae | *Austronomus australis* | White-striped Free-tailed Bat | | | N/A |
| Molossidae | *Ozimops kitcheneri* | Western Free-tailed Bat | | | N/A |
| Muridae | *Mus musculus* | House Mouse | | | 10 |
| Muridae | *Rattus* | Black Rat | | | 6 |
| Peramelidae | *Isoodon fusciventer* | Quenda | P4 | | 20 |
| Phalangeridae | *Trichosurus vulpecula hypoleucus* | Koomal, Common Brushtail Possum | | | 31 |
| Vespertilionidae | *Chalinolobus gouldii* | Gould's Wattled Bat | | | N/A |
| Vespertilionidae | *Vespadelus regulus* | Southern Forest-bat | | | N/A |

# 17 Appendix D Fauna Species List (continued)

| OVERALL | | | | | |
|---|---|---|---|---|---|
| Family | Scientific Name | Commoon Name | State | Federal | Records |
| **Reptiles** | | | | | |
| Agamidae | *Ctenophorus adelaidensis* | Western Heath Dragon | | | 11 |
| Agamidae | *Pogona minor* | Western Bearded Dragon | | | 1 |
| Diplodactylidae | *Strophurus spinigerus* | South-western Spiny-tailed Gecko | | | 1 |
| Elapidae | *Notechis scutatus* | Tiger Snake | | | 1 |
| Elapidae | *Pseudonaja affinis* | Dugite | | | 3 |
| Pygopodidae | *Aprasia repens* | Sand-plain Worm-lizard | | | 2 |
| Pygopodidae | *Lialis burtonis* | Burton's Legless Lizard | | | 1 |
| Pygopodidae | *Pletholax gracilis* | Keeled Legless Lizard | | | 1 |
| Scincidae | *Cryptoblepharus buchananii* | Buchanan's Snake-eyed Skink | | | 12 |
| Scincidae | *Ctenotus australis* | West-coast Long-tailed Ctenotus | | | 10 |
| Scincidae | *Hemiergis quadrilineata* | Two-toed Earless Skink | | | 10 |
| Scincidae | *Lerista elegans* | West Coast Four-toed Lerista | | | 1 |
| Scincidae | *Lerista lineata* | Perth Lined Slider | P3 | | 6 |
| Scincidae | *Menetia greyii* | Common Dwarf Skink | | | 28 |
| Scincidae | *Morethia lineoocellata* | West-coast Pale-flecked Morethia | | | 2 |
| Scincidae | *Tiliqua rugosa rugosa* | Bobtail | | | 62 |
| Typhlopidae | *Anilios australis* | Southern Blind Snake | | | 2 |
| Varanidae | *Varanus gouldii* | Bungarra or Sand Goanna | | | 1 |
| Meliphagidae | *Phylidonyris novaehollandiae* | New Holland Honeyeater | | | 5 |
| Meropidae | *Merops ornatus* | Rainbow Bee-eater | | MA | 6 |
| Monarchidae | *Grallina cyanoleuca* | Magpie-lark | | MA | 3 |
| Pachycephalidae | *Colluricincla harmonica* | Grey Shrike-thrush | | | 3 |
| Pachycephalidae | *Pachycephala occidentalis* | Western Golden Whistler (Western Whistler) | | | 4 |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler | | | 14 |

# 17 Appendix E Revegetation Species List

| ALF POWELL RESERVE | |
|---|---|
| *Acacia cochlearis* | *Hakea prostrata* |
| *Acacia lasiocarpa* | *Hardenbergia comptoniana* |
| *Acacia rostellifera* | *Jacksonia furcellata* |
| *Acacia saligna* | *Jacksonia sternbergiana* |
| *Clematis linearifolia* | *Kennedia prostrata* |
| *Conostephium pendulum* | *Lepidosperma calcicola* |
| *Conostylis aculeata* | *Lomandra hermaphrodita* |
| *Conostylis candicans* | *Lomandra maritima* |
| *Dianella revoluta* | *Melaleuca systena* |
| *Eremophila glabra* | *Opercularia vaginata* |
| *Gompholobium tomentosum* | *Pimelea calcicola* |
| *Grevillea preissii* | *Thomasia cognata* |

| BALDIVIS CHILDREN'S FOREST | |
|---|---|
| *Acacia cochlearis* | *Hakea prostrata* |
| *Acacia lasiocarpa* | *Hardenbergia comptoniana* |
| *Acacia rostellifera* | *Jacksonia sternbergiana* |
| *Acacia saligna* | *Lepidosperma gladiatum* |
| *Banksia attenuata* | *Lepidosperma longitudinale* |
| *Baumea juncea* | *Melaleuca rhaphiophylla* |
| *Clematis linearifolia* | *Melaleuca systena* |
| *Conostephium pendulum* | *Olearia axillaris* |
| *Dianella revoluta* | *Opercularia vaginata* |
| *Eremophila glabra* | *Pimelea calcicola* |
| *Eucalyptus gomphocephala* | *Rhagodia baccata* |
| *Eucalyptus rudis* | *Templetonia retusa* |
| *Gompholobium tomentosum* | *Tetraria octandra* |
| *Gahnia trifida* | *Thomasia cognata* |
| *Grevillea preissii* | |

# 17 Appendix E Revegetation Species List (continued)

| BALDIVIS NATURE RESERVE | |
|---|---|
| *Acacia lasiocarpa* | *Hardenbergia comptoniana* |
| *Allocasuarina fraseriana* | *Hibbertia hypericoides* |
| *Banksia attenuata* | *Hovea trisperma* |
| *Banksia grandis* | *Jacksonia sternbergiana* |
| *Banksia menziesii* | *Kunzea glabrescens* |
| *Conostephium pendulum* | *Lepidosperma squamatum* |
| *Conostylis aculeata* | *Leucopogon propinquus* |
| *Corymbia calophylla* | *Macrozamia riedlei* |
| *Dasypogon bromeliifolius* | *Petrophile linearis* |
| *Daviesia triflora* | *Phlebocarya ciliata* |
| *Dianella revoluta* | *Pimelea rosea* |
| *Eucalyptus marginata* | *Tetraria octandra* |
| *Gompholobium tomentosum* | *Xanthorrhoea preissii* |

| DIXON ROAD CONSERVATION PRECINCT | |
|---|---|
| *Acacia cochlearis* | *Gompholobium tomentosum* |
| *Acacia rostellifera* | *Hardenbergia comptoniana* |
| *Acacia saligna* | *Kennedia coccinea* |
| *Acanthocarpus preissii* | *Kennedia prostrata* |
| *Banksia littoralis* | *Leucopogon australis* |
| *Clematis linearifolia* | *Lomandra maritima* |
| *Conostylis aculeata* | *Phyllanthus calycinus* |
| *Conostylis aculeata subsp. preissii* | *Rhagodia baccata* |
| *Desmocladus asper* | *Spyridium globulosum* |
| *Dianella revoluta* | *Templetonia retusa* |
| *Dodonaea hackettiana* | *Tetraria octandra* |
| *Eremophila glabra* | *Thomasia cognata* |
| *Eucalyptus gomphocephala* | *Xanthorrhoea preissii* |
| *Gahnia trifida* | |

# 17 Appendix E Revegetation Species List (continued)

| KARNUP SCHOOL SITE | |
|---|---|
| *Acacia lasiocarpa* | *Hibbertia hypericoides* |
| *Agonis flexuosa* | *Hibbertia racemosa* |
| *Allocasuarina fraseriana* | *Kennedia prostrata* |
| *Banksia attenuata* | *Kunzea glabrescens* |
| *Banksia ilicifolia* | *Leucopogon propinquus* |
| *Banksia menziesii* | *Macrozamia riedlei* |
| *Bossiaea eriocarpa* | *Mesomelaena pseudostygia* |
| *Chamaecytisus palmensis* | *Opercularia vaginata* |
| *Conostephium pendulum* | *Petrophile linearis* |
| *Conostylis aculeata* | *Philotheca spicata* |
| *Corymbia calophylla* | *Phlebocarya ciliata* |
| *Dasypogon bromeliifolius* | *Tetraria octandra* |
| *Daviesia triflora* | *Xylomelum occidentale* |
| *Gompholobium tomentosum* | |

| KARNUP TOWNSITE | |
|---|---|
| *Acacia lasiocarpa* | *Hibbertia racemosa* |
| *Acacia rostellifera* | *Hovea pungens* |
| *Acacia stenoptera* | *Jacksonia furcellata* |
| *Agonis flexuosa* | *Kennedia prostrata* |
| *Allocasuarina fraseriana* | *Kunzea glabrescens* |
| *Anigozanthos manglesii* | *Lepidosperma pubisquameum* |
| *Banksia attenuata* | *Lepidosperma calcicola* |
| *Banksia menziesii* | *Leucopogon nutans* |
| *Boronia ramosa* | *Lomandra caespitosa* |
| *Bossiaea eriocarpa* | *Lomandra hermaphrodita* |
| *Calytrix fraseri* | *Lomandra preissii* |
| *Conostephium pendulum* | *Lomandra sericea* |
| *Conostylis aculeata* | *Lyginia imberbis* |
| *Corymbia calophylla* | *Macrozamia riedlei* |
| *Dasypogon bromeliifolius* | *Opercularia echinocephala* |
| *Daviesia triflora* | *Persoonia saccata* |
| *Dianella revoluta* | *Petrophile linearis* |
| *Eucalyptus marginata* | *Philotheca spicata* |
| *Gompholobium confertum* | *Phlebocarya ciliata* |
| *Gompholobium tomentosum* | *Schoenus curvifolius* |
| *Hardenbergia comptoniana* | *Tetraria octandra* |
| *Hemiandra glabra* | *Xylomelum occidentale* |
| *Hibbertia hypericoides* | |

# 17 Appendix E Revegetation Species List (continued)

| MANDURAH HILL | |
|---|---|
| *Acacia cochlearis* | *Leucopogon australis* |
| *Acacia lasiocarpa* | *Lomandra maritima* |
| *Acacia rostellifera* | *Melaleuca systena* |
| *Clematis linearifolia* | *Olearia axillaris* |
| *Conostylis aculeata* | *Opercularia vaginata* |
| *Conostylis candicans* | *Phyllanthus calycinus* |
| *Dianella revoluta* | *Pimelea ferruginea* |
| *Gompholobium tomentosum* | *Rhagodia baccata* |
| *Hardenbergia comptoniana* | *Scaevola thesioides* |
| *Hibbertia spicata* | *Spyridium globulosum* |
| *Kennedia prostrata* | *Trymalium ledifolium* |

| TUART PARK | |
|---|---|
| *Acacia cochlearis* | *Gompholobium tomentosum* |
| *Acacia lasiocarpa* | *Grevillea preissii* |
| *Acacia rostellifera* | *Hakea prostrata* |
| *Acacia saligna* | *Hardenbergia comptoniana* |
| *Acanthocarpus preissii* | *Jacksonia furcellata* |
| *Banksia attenuata* | *Jacksonia sternbergiana* |
| *Banksia praemorsa* | *Kennedia prostrata* |
| *Clematis linearifolia* | *Hibbertia cuneiformis* |
| *Conostephium pendulum* | *Lomandra maritima* |
| *Conostylis aculeata* | *Macrozamia riedlei* |
| *Conostylis candicans* | *Spyridium globulosum* |
| *Eucalyptus gomphocephala* | *Trymalium floribundum* |
| *Gahnia trifida* | |

CITY OF ROCKINGHAM

# Bushland Management Plan

city of Rockingham

where the coast comes to life