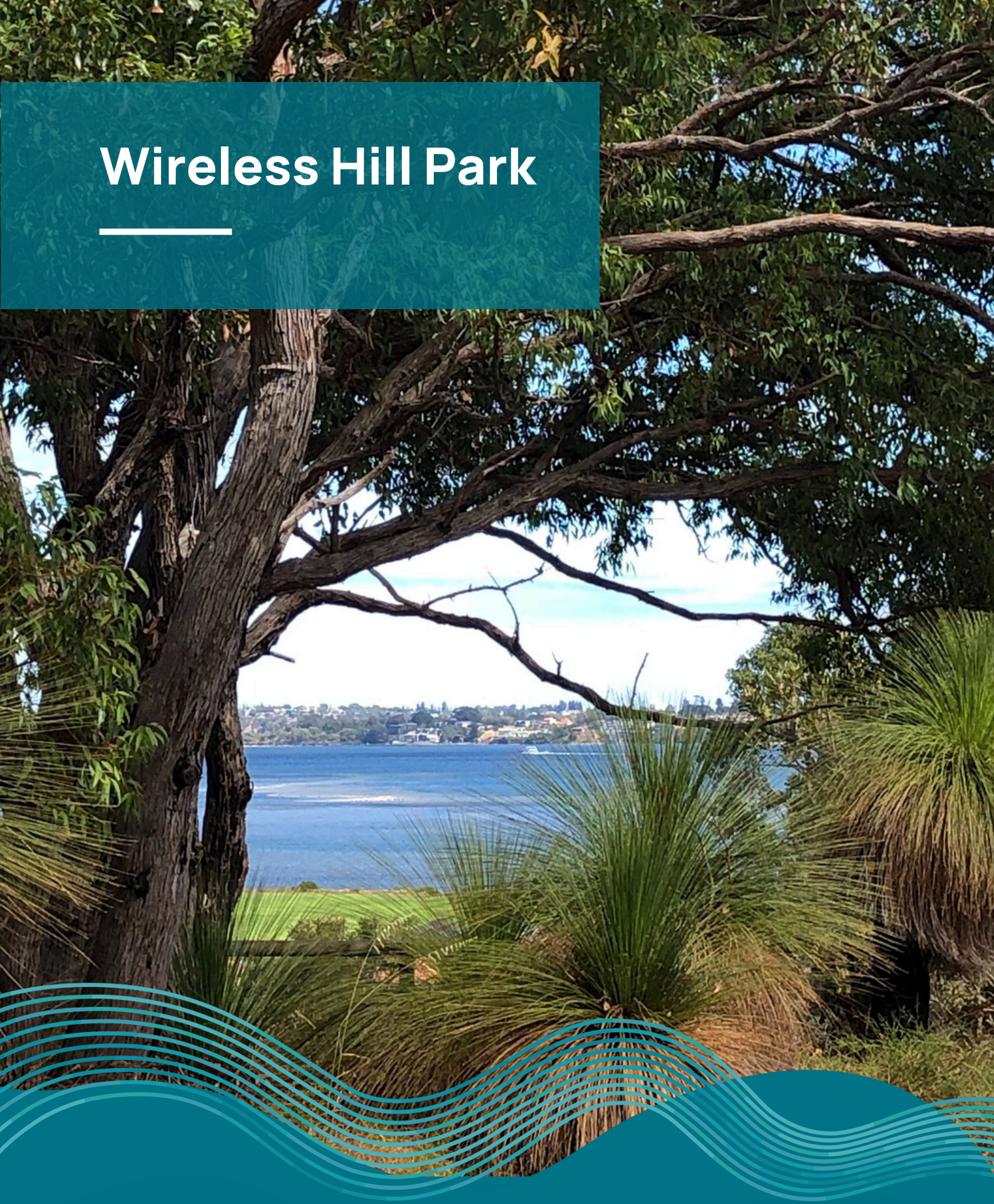
Wireless Hill Park



Strategic Management Plan
2024-2028

City of
Melville

Executive Summary

The *Wireless Hill Park Strategic Management Plan 2024-2028* updates and replaces the *Wireless Hill Reserve Management Plan 2017-2022*. The scope of this plan is the 37.54 hectares of bushland in Wireless Hill Park.

Wireless Hill Park is listed as a regionally significant bushland by the Government of Western Australia (as Bush Forever Site 336) and forms part of regional greenway and regional bushland/wetland linkage.

The following assets are of regional, state and/or national significance:

- 1 threatened ecological community
  - *Banksia Woodlands of the Swan Coastal Plain* are Endangered under the Environment Protection and Biodiversity Conservation Act 1999
- 2 heritage sites
  - *Scarred Tree is a registered Aboriginal Site*
  - *Heritage* Trails are listed on the WA Heritage Register
- 9 reference sites established
  - 10 m x 10 m quadrats used for regional and local surveys
- 1 Priority Flora species
  - *Jacksonia sericea* (Waldjumi) is listed by the WA Department of Parks and Wildlife as requiring monitoring/management, as a Priority 4 species
- 33 native flora species in low abundance
  - *Conospermum triplinervium (Tree smokebush) (now extinct onsite)*
  - *13 of these* species were recorded in 2022
- 88 Very Large Habitat trees
- 2 Priority Reptiles
  - *Lerista lineata, Lined Skink is listed by the WA Department of Parks and Wildlife as requiring monitoring/management, as a Priority 4 species*
  - *Lucasium alboguttatum, White-spotted Ground Gecko is at the southern end of its distribution in the Perth region and was listed as regionally significant by the Government of Western Australia* in assessing Bush Forever Sites
- 7 Priority birds
  - *Calyptorhynchus banksii naso, Red-tailed Black-Cockatoo and Zanda latirostris, Carnaby's Black-Cockatoo are listed as Matters of National Environmental Significance under the Environment Protection and Biodiversity Conservation Act 1999 as threatened species*
  - *Merops ornatus, Rainbow Bee-eater is listed as a Matter of National Environmental Significance under the Environment Protection and Biodiversity Conservation Act 1999 as a migratory species*
  - *Acanthiza apicalis, Inland Thornbill, Smicrornis brevirostris, Weebill, Anthochaera lunullata, Western Wattlebird and Turnix varia, Painted Button- quail were listed as regionally significant by the Government of Western Australia in assessing Bush Forever Sites*
  - *Acanthiza chrysorrhoa, Yellow-rumped Thornbill and Daphoenositta chrysoptera, Varied Sittella* are assumed to be extinct on site

219 native plant species have been recorded onsite, including 188 during the 2022 surveys. 82 weed species have also been recorded in 2022.

A total of 59 native animal species (1 bat, 14 reptile, 38 bird and 6 invertebrate species) have be confirmed onsite but it is expected that many more may be present. The assemblage is expected to be highly diverse for an urban reserve, underpinning the reserve's importance for fauna in the City of Melville. The fauna inventory includes:

- Previously unrecorded, the *Ninox novaeseelandiae* Southern Boobook Owl has been recorded roosting in tree adjacent to Wireless Hill (anecdotal evidence by City of Melville staff), so it is assumed that they have persisted on site despite not being recorded formally during the fauna surveys

Of the threats considered for targeted management, the very high impact threats were:

- 5 weed species/groups
  - *Schinus terebinthifolius,* Brazilian Pepper
  - *Asparagus asparagoides, Bridal Creeper*
  - *Lachenalia reflexa, Soldiers*
  - *Moraea flaccida, One leaf Cape Tulip*
  - *Chasmanthe floribunda, African Cornflag*
  - *perennial clumping grasses*
- 1 pathogen
  - *Phytophthora cinnamomi*, Dieback
- 1 Physical Disturbance
  - *Informal* tracks totalling 333m to be closed and revegetated

The major priorities for management should be:

- Increasing numbers of canopy species planted across the site, particularly species as a food source for Black Cockatoos
- Re-establish populations of key native plant species (Conospermum triplinervium (Tree smokebush), Lechenaultia floribunda, Lobelia gibbosa, Hypocalymma angustifolium, Regelia inops, Banksia grandis, Banksia ilicifolia)
- Confirm presence of remaining at risk flora species
- Eliminate selected weed species of high priority or in low numbers
- Contain spread of Lachenalia reflexa which has significantly increased on site
- Continue wood weed removal of shrubs and trees, retaining any very large weed trees as standing dead habitat trees where possible
- Contain pathogen Phytophthora cinnamomi, Dieback
- Close informal tracks and revegetate
- Install bird watering station

Recommended Reference

The recommended reference for this document is:

City of Melville (2024) *Wireless Hill Park Strategic Management Plan 2024-2028*

Acknowledgements

City of Melville would like to acknowledge the contribution of the following personnel during preparation of the strategic management plan:

- The City of Melville
  - Kellie Fowler and Jacklyn Kelly, Natural Areas Officers
  - Bonnie Lacey, Environmental Education Officer
- Natural Area Consulting Management Services
  - Karri Grant, Senior Environmental Scientist
  - John Wei

Acronyms and Definitions

ANZECC	Australian and New Zealand Environment and Conservation Council
DBH	Diameter at Breast Height
DEC	(WA) Department of Environment and Conservation
DEP	(WA) Department of Environmental Protection
DPaW	(WA) Department of Parks and Wildlife
DBCA	(WA) Department of Biodiversity, Conservation and Attractions
EPBC Act	Environment Protection and Biodiversity Conservation Act
FCT	Floristic Community Type
ha	hectares
Melville	City (rather than suburb) unless specifically stated otherwise
NAAMP	Natural Areas Asset Management Plan
PEC	Priority Ecological Community (as defined and listed by DPaW)
WAPC	Western Australian Planning Commission

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Figures

1 Introduction

1.1 Background

The *Wireless Hill Park Strategic Management Plan 2024-2028* updates and replaces the *Wireless Hill Reserve Management Plan 2017-2022* (City of Melville, 2008).

The Strategic Management Plan is structured with the major headings of assets and threats in accordance with the NAAMP framework, whereby assets are maintained or enhanced by the management of threats (using the strategies and guidelines) as summarised in Figure 1. Guidelines and procedures outline current best practice methodologies to apply to reserve management, to ensure efficiency and consistency across all natural areas.

Priorities for Protection from Threats								Threats impacting on assets and therefore subject to Management	Techniques for Management of Threats									
BIODIVERSITY ASSETS								THREATS	STRATEGIES AND GUIDELINES									
Bush Forever Reserves	Ecological Community Sites	Wetland Sites	Heritage Sites	Community Interest Sites	Reference Sites	Native Flora Species	Native Fauna Species		Sign, Path and Barrier Guidelines	Bushfire Strategy	Weed Control Strategy & Guidelines	Revegetation Strategy & Guidelines	Feral Animal Strategy and Guidelines	Diseases and Pathogen Guidelines	Stormwater Management Strategy	Reticulation Guidelines	Acid Sulfate Soils Guidelines	Community Engagement
X	X		X	X	X	X		Physical Disturbance	X	X	X	X	X	X	X	X	X	X
X	X		X	X		X	X	Fire		X	X	X				X		X
X	X	X	X	X		X	X	Weeds		X	X	X				X		X
X	X					X	X	Habitat Loss				X	X					X
X	X					X	X	Feral Animals				X	X					X
X	X	X	X	X	X	X	X	Diseases & Pathogens	X					X				X
X	X	X	X		X	X	X	Stormwater							X			X
						X		Reticulation								X		
X	X	X	X			X	X	Acid Sulfate Soils									X	
X	X	X	X			X		Climate Change			X	X						

Figure 1 Documents used to Maintain/Enhance Assets by Managing Threats

Red = Strategy intended to Prevent, Eliminate, Contain or Manage impacts from threat
Orange = Strategy or Guideline to Manage secondary impacts from threats

1.2 Objectives

Under the framework of the NAAMP, the objectives of this and all City of Melville Strategic Reserve Plan/s are to:

- document:
- the extent and/or abundance and condition of assets;
- the present and potential level and extent of impacts of threats;
- any changes evident in the assets and threats over time;
- record historical data sets;
- reserve-specific risk-based management priorities;
- management strategies relevant to the specific reserve; and
- discuss:
- reserve specific application of strategies and make reserve specific recommendations regarding the implementation of strategies.

1.3 Location and Tenure

The scope of this report is the 37.54 hectares of bushland in Wireless Hill Park (Reserve 33422, and Lots 50, 100, 223, 14758, 14759 and 14760, and part lot 52).

The park is located in the suburb of Ardross in the north of the City of Melville, as shown in Figure 2. It is bounded by Canning Highway to the north, Davy Street to the south, McCallum Crescent to the east and Barnard Street to the west, and is predominantly surrounded by residential development.

Figure 2 Location of Wireless Hill Park

The original bushland was cleared in 1911 for the development of a radio telecommunications station and planted with perennial veldt grass for soil stabilisation, which has since become a major weed on site. Since the City of Melville purchased the site in 1969 it has worked to protect, maintain and enhance its environmental, aesthetic, recreational and cultural heritage values.

2 Assets

2.1 Overview

Assets are used as indices where they are significant and/or vulnerable to loss or degradation without targeted action. The value of assets are reviewed periodically as they will occasionally change (e.g. the significance of an occurrence of a species may be downgraded if it is recorded in more reserves over time with additional targeted surveys). A change in the value of an asset is applicable to that asset in all natural areas in the City of Melville, including in reserves with current endorsed strategic reserve management plans.

The bushland in Wireless Hill Park was ranked as Tier 1 in terms of its overall value in the NAAMP.

2.2 Reserve Assets

2.2.1 Bush Forever

Bush Forever Sites are properties listed as containing regionally significant bushland by the Government of Western Australia (2000). Bush Forever is not subject to ongoing revision and therefore the Bush Forever status of reserves is expected to remain unchanged for the foreseeable future. However under the NAAMP, Bush Forever status is considered in terms of:

- prioritising management resources between reserves, and
- managing sites and species within reserves to ensure reserves continue to meet the Bush Forever criteria for which they were listed.

Bush Forever Site 336 (Wireless Hill Park, Ardross) covers the majority of Wireless Hill Park, as shown in Figure 3.

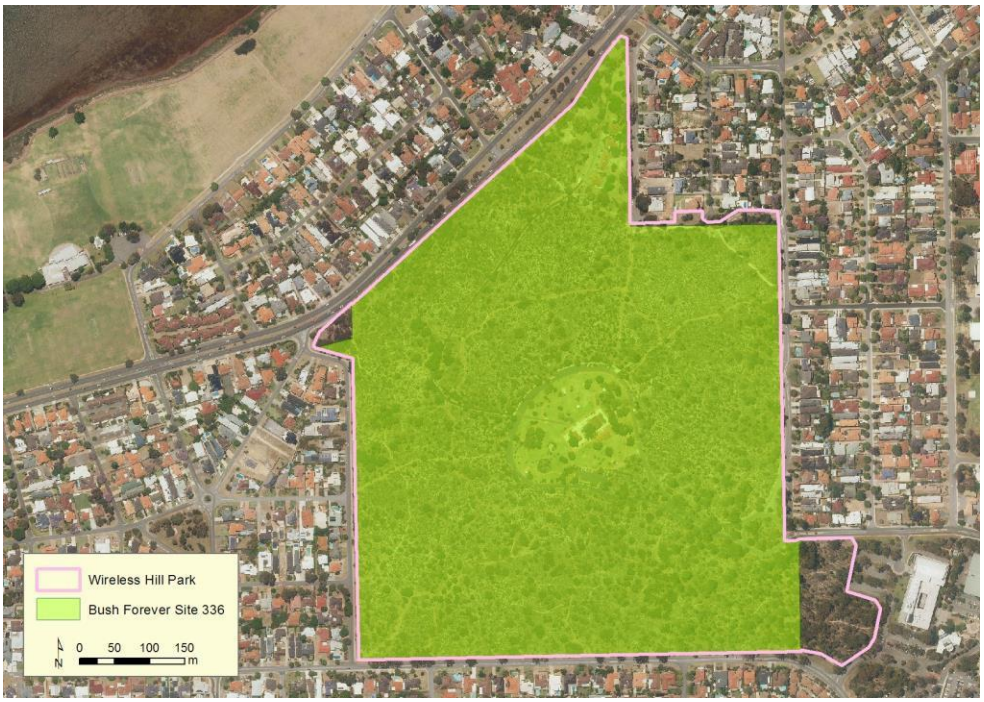

Figure 3 Bush Forever Site 336

Bush Forever Site 336 met four (out of a possible seven) criteria for listing, and the Bush Forever Site's characterisation applies to all the bushland covered in this strategic reserve management plan.

The Bush Forever values of Site 336, for the purposes of the management of sites and species onsite, are:

1. **Representation of ecological communities (Areas that as a suite represent the range of ecological communities and the places in which these communities merge):**
    - The site is representative of one Floristic Community Type (FCT 28 *Spearwood Banksia attenuata* or *Banksia attenuata – Eucalyptus* woodlands), and the transition between the Karrakatta - Central and South vegetation complex and the Bassendean - Central and South vegetation complex.
2. **Rarity (Areas containing rare or threatened communities or species, or species of restricted distribution)**
    - The species recorded on the site and listed as significant in the Bush Forever assessment were:
    - one gecko: *Lucasium alboguttatum*, White Spotted Ground Gecko (previously named *Diplodactylus alboguttatus*)
    - three plants: *Jacksonia sericea* (P3), *Conospermum triplinervium* and *Astroloma macrocalyx*.
    - Whilst not listed in the Bush Forever assessment in 2000, the following significant species have since been documented onsite:
    - Two birds: *Zanda latirostris, Carnaby's Black-Cockatoo* and Calyptorhynchus banksii naso, Forest Red-tailed Black-Cockatoo. They are both migratory birds that are listed as a threatened species.
    - All Banksia Woodlands of the Swan Coastal Plain were declared a Threatened Ecological Community, a Matter of National Environmental Significance (MNES) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) in 2016.
    - Wireless Hill has large areas of Very Good and Good condition Banksia Woodland vegetation, meeting the criteria for the threatened ecological community as patches over 2ha in size
3. **Scientific or evolutionary importance (Areas containing evidence of evolutionary processes either as fossilised material or as relict species and areas containing unusual or important geomorphological or geological sites; Areas of recognised scientific and educational interest as reference sites or as examples of the important environmental processes at work)**
    - Two flora quadrats were established onsite in 1994 as part of a survey of the Swan Coastal Plain undertaken by CALM to develop a regional vegetation classification (Floristic Community Types based on groups of co-occurring plants) (Gibson, Keighery, Keighery, Burbridge, & Lyons, 1995). Subsequent research has been undertaken to re-locate these quadrats. Due to GPS changes over time, exact relocation is not possible.
4. **Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values (Attributes which taken alone do not establish regional significance, but which can add to the value of bushland and enhance its contribution to Bush Forever)**
    - This criterion likely refers to the site's National Trust of Australia (WA) Classification, the site forming part of a significant potential bushland/wetland linkage, and 'some existing protection' of the site as a City of Melville reserve.

2.2.2 Ecological Linkages

Ecological linkages can increase the effective size of flora populations, and increase available habitat for individual animals, and help maintain genetic diversity for animals and plants by providing connections between groups of animals and plants in isolated bushland remnants. The level of connection between Wireless hill and adjacent habitat can help determine the long-term persistence of a species on site.

The Government of Western Australia (2000) included Wireless Hill Park in the following linkages (Figure 4):

- Regional Greenway 24, Swan River; and Regional Greenway 82, Piney Lakes - Wireless Hill - Swan River (Alan Tingay and Associates, 1998); and
- Regional bushland/wetland linkage 50 (Government of Western Australia, 2000).

Figure 4 Linkages Containing Wireless Hill Park

Whilst Wireless Hill Park forms part of a significant bushland/wetland linkage, the bushland has been moderately isolated from other terrestrial bushland remnants for approximately 40 years. The connectivity between 1953 and 2014 is shown in Figure 5 to Figure 12. The current extent and connectivity of remnant bushland in the vicinity remained relatively unchanged after 1995.

The management of vegetation within linkages is outside the scope of strategic reserve plans and is dealt with through processes such as Local Planning Scheme, Urban Forest Strategy and verge and streetscape policies.

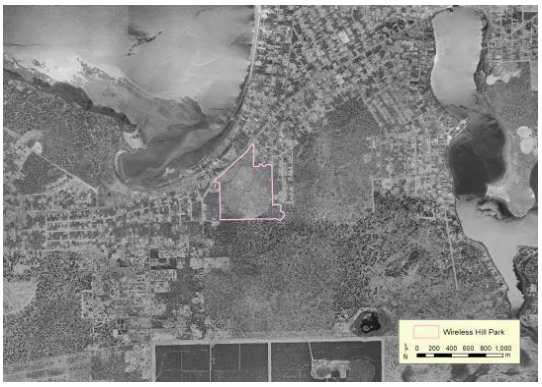

Figure 5 Wireless Hill Park 1953

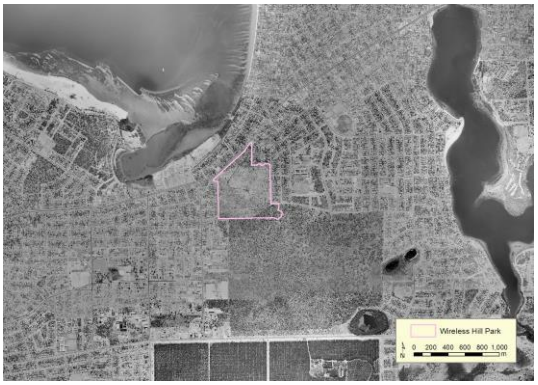

Figure 6 Wireless Hill Park 1965

Figure 7 Wireless Hill Park 1974

Figure 8 Wireless Hill Park 1979

Figure 9 Wireless Hill Park 1985

Figure 10 Wireless Hill Park 1995

Figure 11 Wireless Hill Park 2014


Figure 12 Wireless Hill 2023

2.3 Site Assets

2.3.1 Ecological Communities

Due to its history as a radio telecommunications station, Wireless Hill underwent significant vegetation change. The areas that were unequivocally cleared at some point in aerial photos between 1953 and 2014 are shown in Figure 13. Additional modifications to the vegetation would have occurred, including annual burning of the site while the communications facility was operational (Smith, 1985).

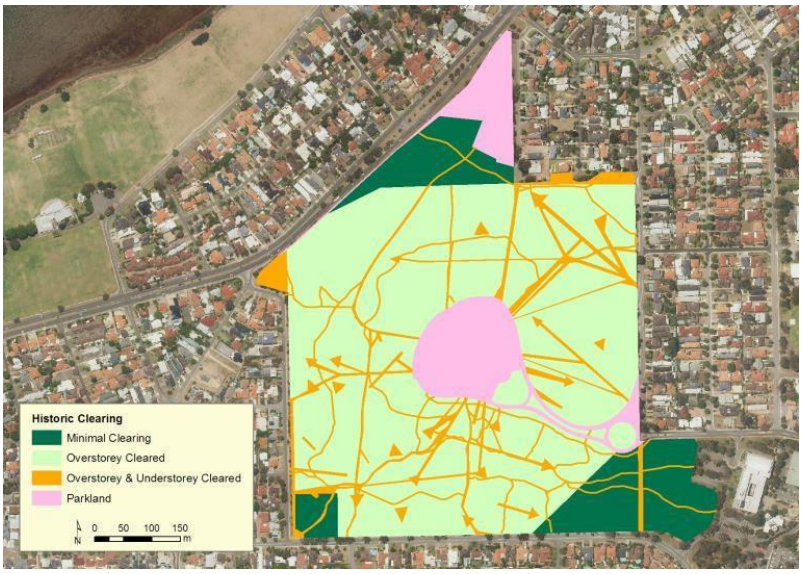

Figure 13 Historical Clearing Evident in Aerial Photography 1953 Onwards

The vegetation was characterised in *Bush Forever. Volume 2: Directory of Bush Forever Sites* (Government of Western Australia, 2000) as a vegetation association of:
Corymbia calophylla Woodland over *Eucalyptus marginata, Banksia attenuata* and *Banksia menziesii* Low Woodland over *Xanthorrhoea preissii, Macrozamia fraseri* and *Stirlingia latifolia Open* Heath to Shrubland

Vegetation boundary maps presented in previous management plans for Wireless Hill Park have been inconsistent, however the vegetation communities presented in Figure 16 are considered representative of close to the original communities prior to clearing. The vegetation has naturally germinated from a persistent seed bank. The reserve was vested with the City of Melville in 1969 and the aerial images below show vegetation regrowth since 1953.

Figure 14 Vegetation in 1953

Figure 15 Vegetation in 1985

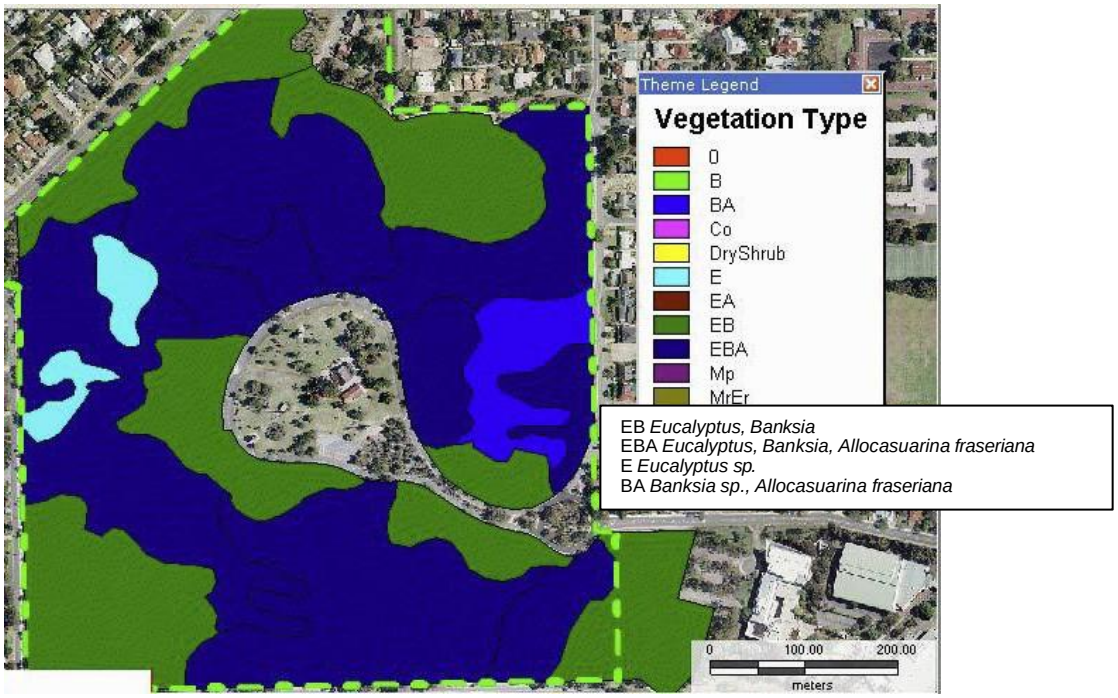

Figure 16 Vegetation Map in 2008 Management Plan

The vegetation classified is a Threatened Ecological Community of national conservation significance. *Banksia Woodlands of the Swan Coastal Plain* that is listed as a Matter of National Environmental Significance, and Endangered, under the Environment Protection and Biodiversity Conservation Act 1999. Only the vegetation in good condition or above meets the criteria for the TEC listing. The significance of the vegetation in Wireless Hill Park is shown in Table 1.

Table 1 Significance of Ecological Community in Wireless Hill Park

Vegetation Association	Vegetation Complex	Community Types	Vegetation Types	Area (ha)
Banksia attenuata / Banksia menziesii woodland	Bassendean – Central and South Karrakatta – Central and South **High Significance** Both Vegetation Complexes with 10-30% uncleared	FCT 28 'Spearwood Banksia attenuata or Banksia attenuata – Eucalyptus woodlands'. **Very High Significance** Threatened Ecological Community	Banksia and Allocasuarina species on upland areas / Eucalyptus and Banksia species on upland areas **Low Significance** Multiple occurrences in Melville	27.88

Further detailed floristic surveys would need to be undertaken to fully elucidate the plant patterns within Wireless Hill Park, however some patterns can be ascertained:

- A comprehensive survey for orchids across the park in *Baseline Orchid Surveys – Wireless Hill Park* (Waters A. , 2012); and
- In a partial systematic survey (undertaken during 2016 survey) of selected other species

Whilst many species are distributed across the entire park, in the south of Wireless Hill Park there appears to be a change in floristics associated with the lower-lying terrain reflected in:

- the absence of *Jacksonia sericea* (Figure 17); and
- the presence of *Caladenia discoidea* (Figure 18), *Pterostylis recurva* (Figure 19) and *Pyrorchis nigricans* (Figure 20).
- Some species concentrated on the exposed northern and western slopes (Figure 21-28)

Figure 17 *Jacksonia sericea* (Waldjumi) Orchid) Distribution

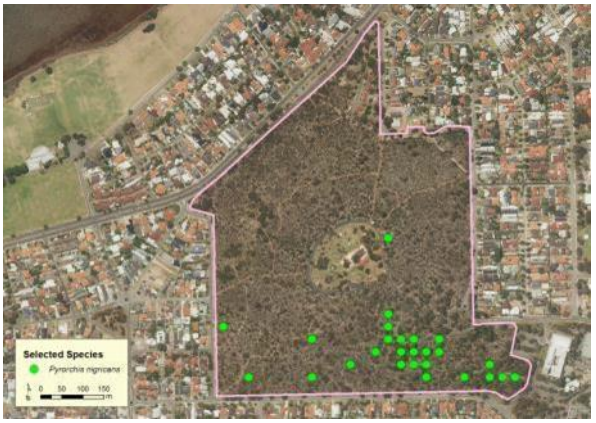

Figure 20 Pyrorchis nigricans (Red Beak Orchid) Distribution

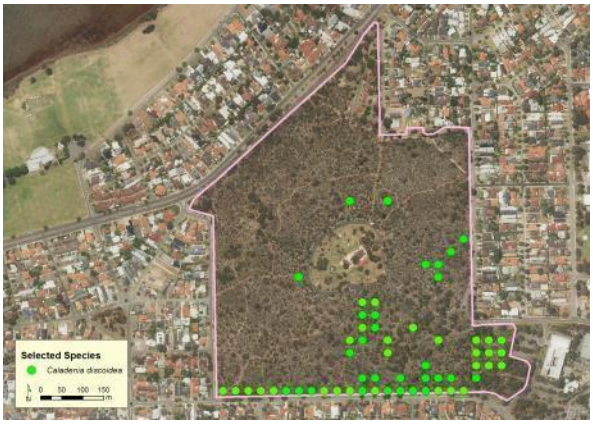

Figure 18 *Caladenia discoidea* (Dancing Distribution

Figure 21 *Acacia pulchella* (Prickly Moses) Distribution

Figure 19 *Pterostylis recurva* (Jug Orchid) Distribution

Figure 22 *Banksia sessilis* (Parrot Bush) Distribution

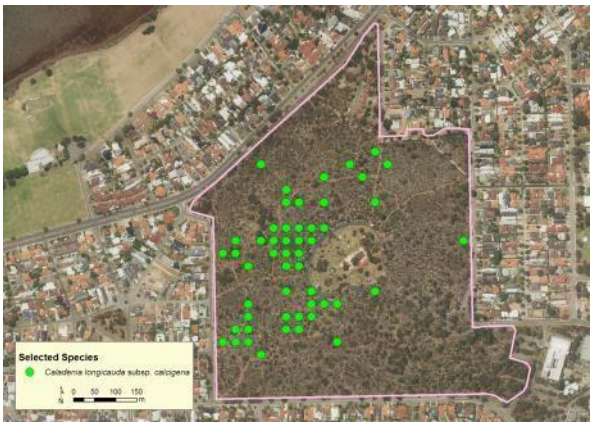

Figure 23 *Caladenia longicauda* (common White Spider Orchid) Distribution

Figure 24 *Eucalyptus gomphocephala* (Tuart) Distribution

Figure 25 *Grevillea vestita* Distribution

Figure 26 *Melaleuca systena* (Coastal Honeymyrtle) Distribution

Figure 27 *Phyllanthus calycinus* (False Boronia) Distribution

Figure 28 *Pimelea rosea* (Rose Banjine) Distribution

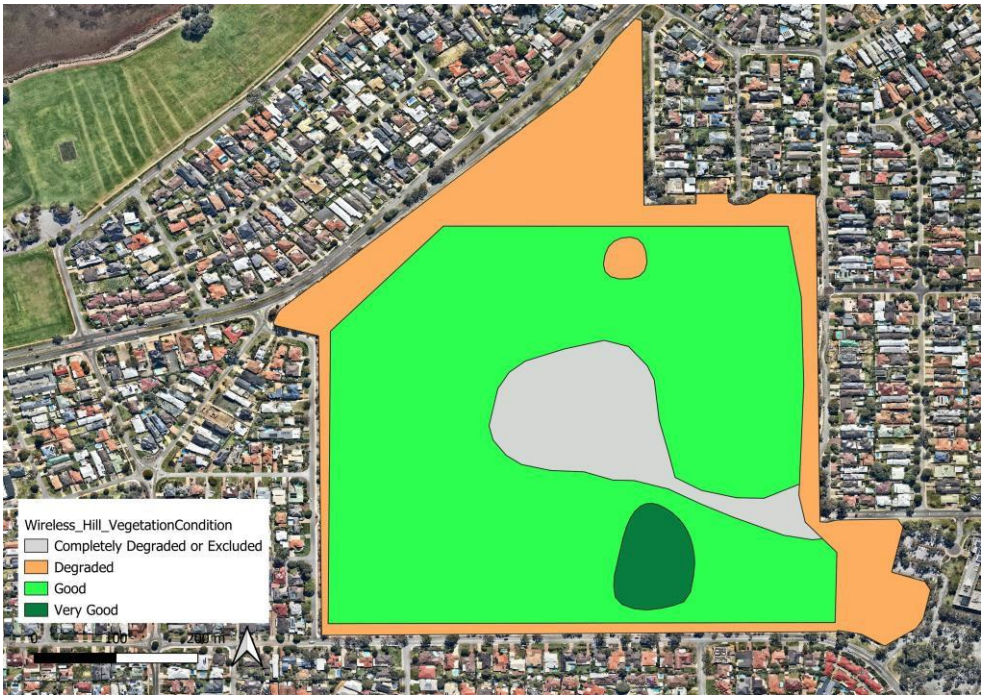

Figure 29 Vegetation Condition mapping 2022

The majority of the park is considered in good condition, with one section of Very Good condition centered around the wildflower walk. The edge of the reserve is degraded and suffers from edge effects.

The ecological communities for which objectives apply are listed in Table 2.

Table 2 Ecological Community Indices

Values	Condition Rating	Percentage condition Prior	Percentage condition 2022	Assets 2008-2017
Very High Significance Threatened Ecological Community	Very Good	Not previously mapped	1.18ha	Not Assessable
	Good		26.7ha	
	Degraded		10.52ha	

2.3.2 Fauna Habitat

Very large trees are important habitat sites for a number of resident and migratory birds and bats onsite:

- many birds rely on tree hollows for nesting (Birdlife Australia, 2013);
- roost sites (in tree hollows and under flaking/rough bark) are a critical habitat requirement for bats (Hosken, 1996); and
- The size of trees is one of the critical factors in determining the likelihood of hollow formation in trees (Gibbons & Lindenmayer, 2002).

The locations of the very large dead trees and live native trees (trunk diameter at breast height greater than 50 cm) are shown in Figure 30. Large habitat trees are generally confined to the south-eastern corner where there was no or minimal historical clearing.

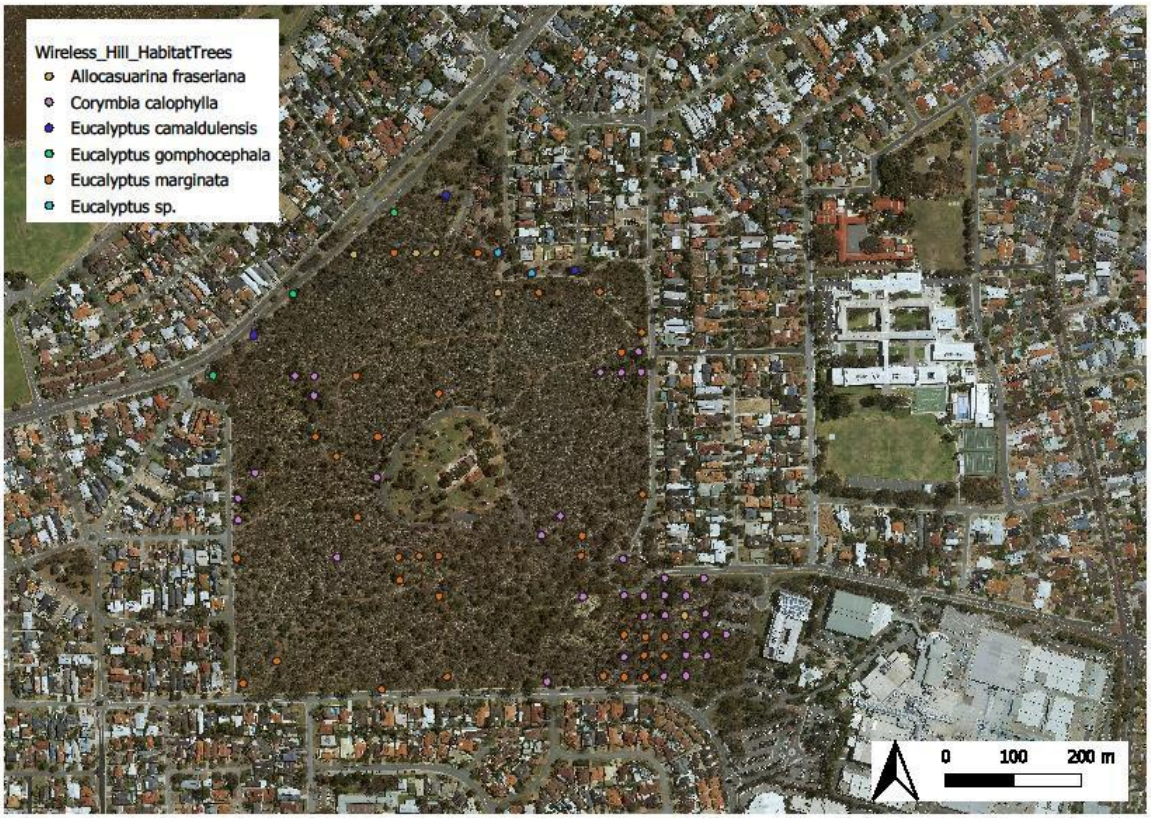

Figure 30 Distribution of Native Habitat Trees in 2022

The numbers of very large trees by species are listed in Table 3. Wireless Hill has a fairly low density of very large trees compared with other bushland areas in the City of Melville, as shown in Table 4. Fewer large trees were recorded in the 2022 survey compared with 2016, and a general trend of decreasing large trees across City of Melville bushlands.

Revegetation objectives should focus on restoring canopy cover, especially in the Very Good condition part of the reserve. Given a lack of large habitat trees available, protection of existing large trees should also be a priority. There are several hollow dependent fauna present in the reserve, so consideration should be given to whether artificial hollows might provide short term habitat in conjunction with revegetation of canopy species.

Table 3 Numbers of Very Large Trees by Species

Species		2016		2022	
		Alive	Dead	Alive	Dead
Allocasuarina fraseriana	Sheoak	3		5	
Corymbia calophylla	Marri	65	3	34	4
Eucalyptus gomphocephala	Tuart	10		4	
Eucalyptus marginata	Jarrah	34	7	31	3
Eucalyptus camaldulensis (non-native)				3	
Eucalyptus sp. (non-native)				4	
Total		**112**	**10**	**81**	**7**

Table 4 Numbers of Very Large Trees per Hectare in Melville Reserves

Species	Estuarine Reserves (5 reserves)	North-West Reserves (3 reserves)	Bullcreek Reserves (7 reserves)	Booragoon Lake (1 reserve)	Quenda (1 reserve)	Ken Hurst (1 reserve)	Central (2 reserves)	Blue Gum Lake (1 reserve)	Heathcote Reserve (1 reserve)	Piney Lakes Reserve (1 reserve)	Wireless Reserve (1 reserve)	South-Eastern Reserves (11 reserves)	Eastern Reserves (3 reserves)	Modified Reserves Karrakatta (5 reserves)	Modified Reserves Bassendean (7 reserves)
Live Native	11	10*	7*	3	3	2*	2	2	2	2	2	1	<1	<1	<1
Dead	2	2*	<1*	<1	0	<1*	0	<1	0	<1	<1	<1	<1	<1	<1
Total	**13**	**12**	**7**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**0**	**0**	**0**

The fauna habitat for which objectives apply are listed in Table 5.

Table 5 Fauna Habitat Sites Indices

Values	Habitat Sites	/ Hectare 2008	Trees / Hectare 2016	Trees / Hectare 2022	Assets 2014-2017
Medium Very Large Trees	Live Native Tree	No Data	3	2	Decreased
	Dead Tree		<1	<1	

2.3.3 Wetlands

Wetlands are defined in Schedule 5 of the *Environmental Protection Act 1986* as areas 'of seasonally, intermittently or permanently waterlogged or inundated land, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary' and wetlands can be categorised in accordance with Table 6.

Table 6 Wetland Types

WATER LONGEVITY	LANDFORM				
	BASIN	CHANNEL	FLAT	SLOPE	HIGHLAND
Permanent Inundation	Lake	River	-	-	-
Seasonal Inundation	Sumpland	Creek	Floodplain	-	-
Intermittent Inundation	Playa	Wadi	Barlkarra	-	-
Seasonal Waterlogging	Dampland	Trough	Palusplain	Paluslope	Palusmont

Source: Government of Western Australia (2000)

Wireless Hill Park contains no wetlands identified in the DPaW's *Geomorphic Wetlands Swan Coastal Plain* dataset, based on the regional scale mapping of Hill *et al.* (1996).

There are no wetland indices in the Wireless Hill Park.

2.3.4 Heritage

Wireless Hill Park is not included on the current National Heritage List, although it was included in the Register of the National Estate that the National Heritage List replaced.

The description of the history of the park in the Register of the National Estate (Department of the Environment and Energy, 2017) was:

Perth Wireless Station at Wireless Hill Park was one of the first official radio stations approved for construction in Australia and the fifth to come into operation. Building and construction of the site commenced in 1912 and on 30 September 1912 the Australian Post Master General's Department commissioned the station. The buildings were constructed by the PWD of Western Australia under the direction of Hillson Beasley. The complex comprised a group of cottages at the north end of the site and three operations buildings at the south end of the site on the crest of a ridge together with the mast and a number of sundry structures. The cottages are believed to have initially accommodated the construction staff and later, the operational staff of the facility. From 1912, the wireless operators transmitted from the Operators Building. The station was used continuously between 1912-67 as the main coastal radio communications centre for the State. In the 1920s, it became a feeder station for international radiograms. In addition, a short wave experimental broadcasting station run by Amalgamated Wireless Australia (AWA) shared the facilities with the commercial radio station 6PR from 1931 and the police radio network. From 1942, the AWA experimental operation was removed and the remaining operators were all shifted into the Engine House which became the Main Transmitter Hall. Some wireless operators moved to Bassendean with the setting up of a receiving station there. From 1943 the Wireless Hill station was used as an alternative for international shortwave radio messages. In 1946, these operators returned to Applecross; the former Operators Room became offices. The facility was decommissioned in 1967 and the mast was dismantled. The site and improvements passed to the City of Melville for community purposes in 1968.

The City of Melville Local Government Inventory states that Wireless Hill Park (comprising brick and tile radio operations buildings, brick and tile staff accommodation buildings, concrete tower bases, culturally modified landscape settings and urban bushland) has cultural heritage significance for the following reasons:

- radio telecommunications provided one of the important links between Australia and the rest of the world at a time when these links were significant to a relatively small community in one of the most remote cities in the world;
- the radio communications station has played a part in the development of commercial radio broadcasting and experimental shortwave radio as well as functioning as a communications vehicle for state government instrumentalities and marine safety;
- it once contained all the elements of a working radio communications station from the

nascent development to eventual phasing out; the place retains sufficient fabric to remain a fine example of an early radio communications station;
- the place was one of five main radio telecommunication stations in Australia participating in international, national, state-wide and regional radio communications and broadcasting;
- the mast is remembered as a highly visible and prominent landmark both by day and with its lighting at night, until decommissioned; today, the park forms the basis of a highly valued area of urban bushland.

The City of Melville Local Government Inventory also noted that:
The Aboriginal name for Wireless Hill is 'Yagan's Lookout' and has always been a significant place for communication by the Beeliar Nyoongars. Fires were used for communication, one example was signalling the movement of fish along the Swan River. Wireless Hill was a food gathering area, as well as gathering medicinal plants by the women.

A number of heritage sites/portions of the heritage sites are associated with buildings and parkland areas that are outside the scope of this management plan. The bushland itself contains heritage sites listed on:
- the WA Cultural Heritage Inquiry System
- Place 18725 Melville Scarred Tree (the location of which is not shown in this plan but is in the south east of the park)
- the WA Heritage Register
- Heritage Place No. 17795 Heritage Trails - Wireless Hill (Constructed from 1969)
- the City of Melville's Municipal Heritage Inventory
- the Heritage Trail component of Place 'AR01' - Wireless Hill Park, Museum, Four Houses, Heritage Trails, Moreton Bay Fig Tree and Eucalyptus Tree

The vegetation onsite was significantly modified by the clearing of trees and shrubs within 300m of the base of the mast to facilitate the construction of a wireless communications station. This commenced in 1911 and was followed latter by planting of introduced grasses to suppress dust, and annual burning to impede vegetation regrowth until the station was decommissioned in 1967. The extent of the array of aerial wires associated with the communications station over its lifetime is shown in Figure 31.

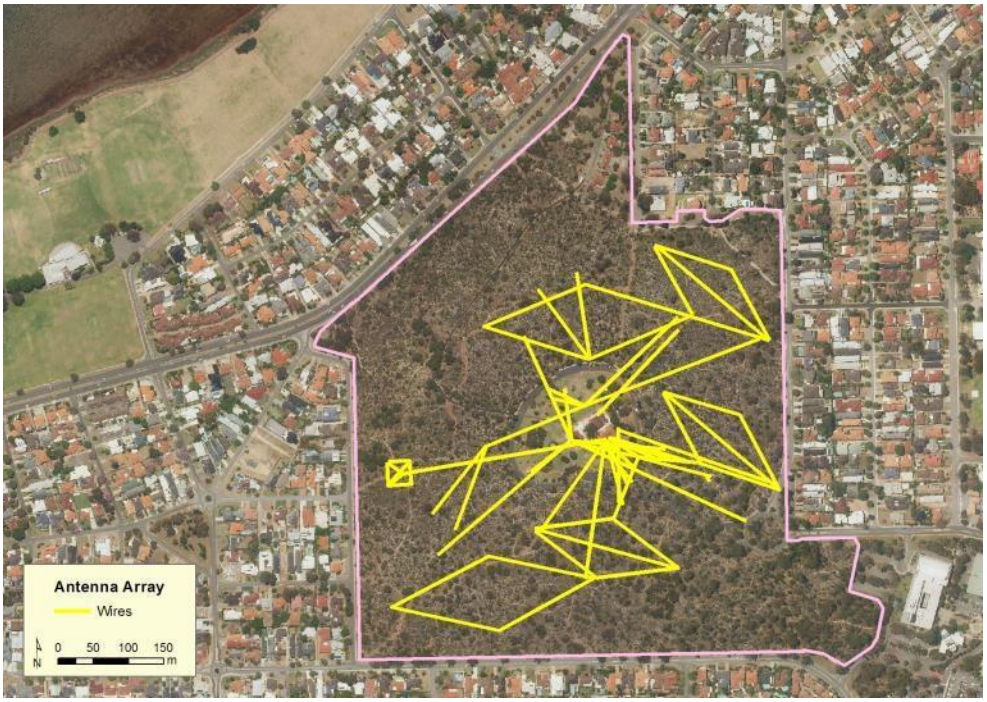

Figure 31 Radio antenna arrays across Wireless Hill

The heritage site indices are listed in Table 7.

Table 7 Heritage Sites Indices

Values	Habitat Sites	2008	2017	2022	Assets 2008-2022
Very High Site on WA Aboriginal Sites Register	Place 18725 Melville Scarred Tree	Not Assessed	Not Assessed	Present	Maintained
Very High Site on WA Heritage Register	Heritage Place No. 17795 Heritage Trails - Wireless Hill Station Walk Yagan's Genunny Wildflower Walk	1,520 m	1,520 m	1,520 m	Maintained

2.3.5 Community Interest

Wireless Hill is a large native bushland attracting visitors from the wider community to view the seasonal array of wildflowers, learn about the indigenous and European history of the area and enjoy the lovely native surrounds and views to the Swan River. Nearby residents regularly walk and exercise along the various paths.

The Friends of Wireless Hill, formed originally in 1985 and re-formed in 2000, are a local community group of volunteers who actively contribute to on-ground works including revegetation, weeding, watering, guided wildflower walks, public education, photo- monitoring, undertaking surveys and providing a community voice for the protection of the park. The group have been instrumental in attracting regular grant funding to facilitate a large area of hand weeding in the wildflower walk, as well as undertaking on-ground maintenance of various parts of the reserve, clocking up many volunteer hours to enhance the bushland. The friends group have a number of planting sites, both current and proposed, as shown in Figure 32.

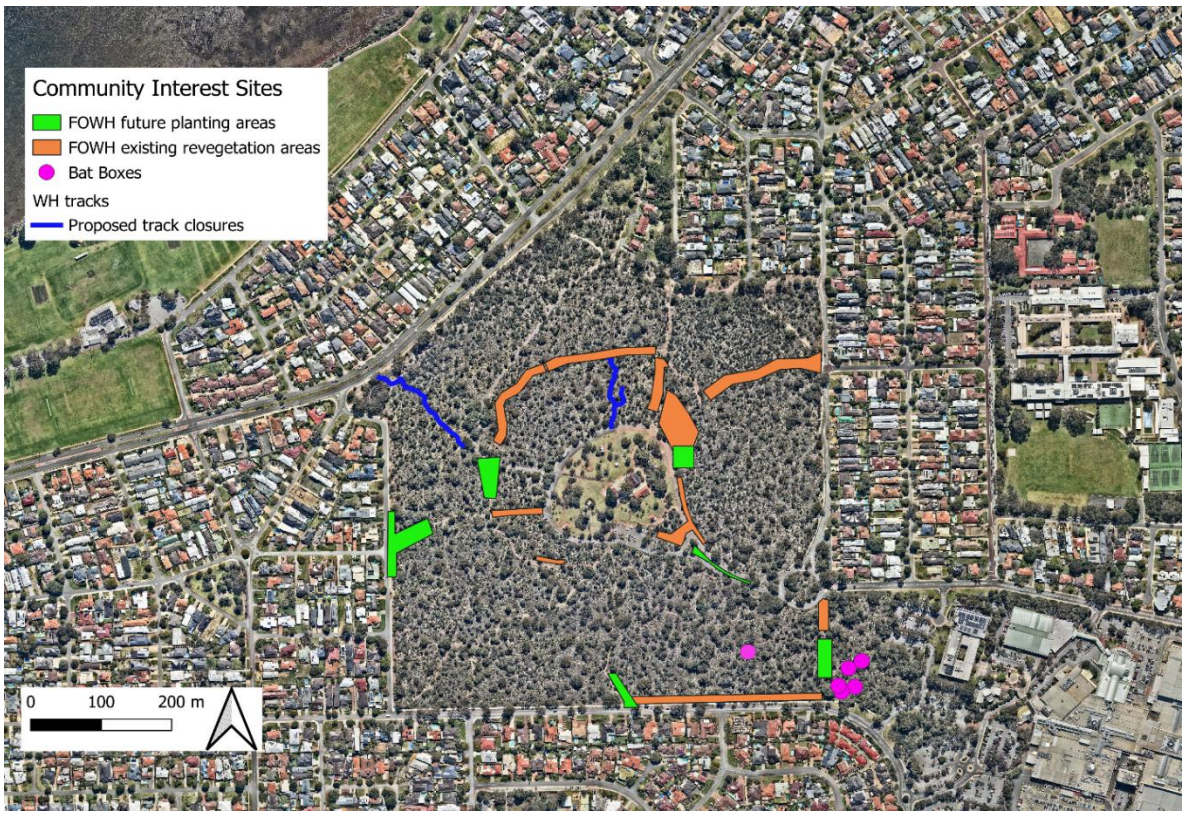

Figure 32 Community Interest Sites

Revegetation areas are chosen by the Friends of Wireless Hill based on criteria such as absence or low occurrence of natural revegetation and easy access to water.

Potential revegetation areas have been mapped as part of the 2022 surveys, as shown in Figure 33. Revegetation sites are those areas where native vegetation cover is lower than desired, and meets one of the following criteria, either:

1. Be an informal pedestrian path that is not part of the 'formal' network in a reserve or one that the City wishes to close off
2. There are no native plants or natural litter over areas greater than 100m2 (in which a rectangle with a minimum side of two metres can fit)
3. The combined cover of weeds and bare ground (bare ground does not include large rocks or natural litter) is greater than 25% for an area greater than 250m2 (in which a rectangle with a minimum side of two metres can fit)

These areas are recommended to be added to the revegetation sites over the life of the management plan.

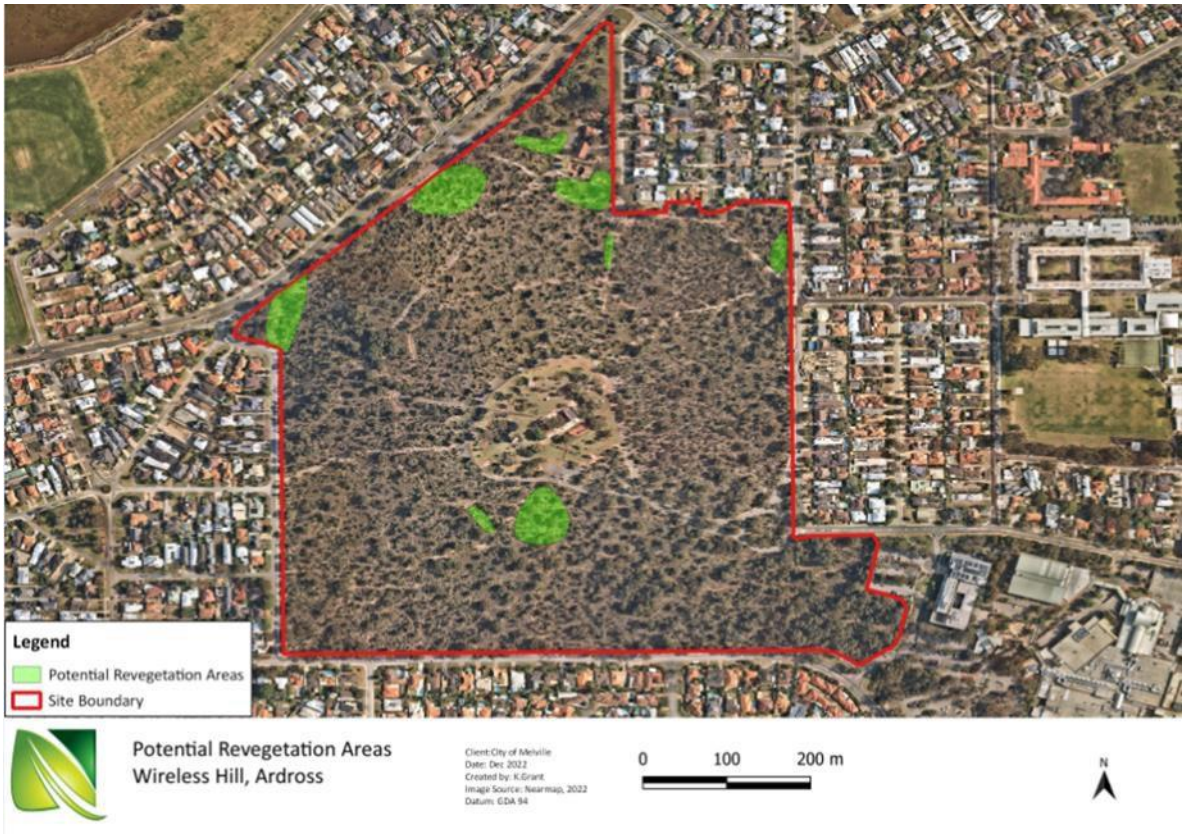

Figure 33 Potential Revegetation Areas identified during 2022 surveys

The reserve has a ‘No Spray’ zone in the reserve, as shown in Figure 34. This area is where hand weeding is undertaken by the group in place of herbicide application. It subject to review and dependent on group capacity.

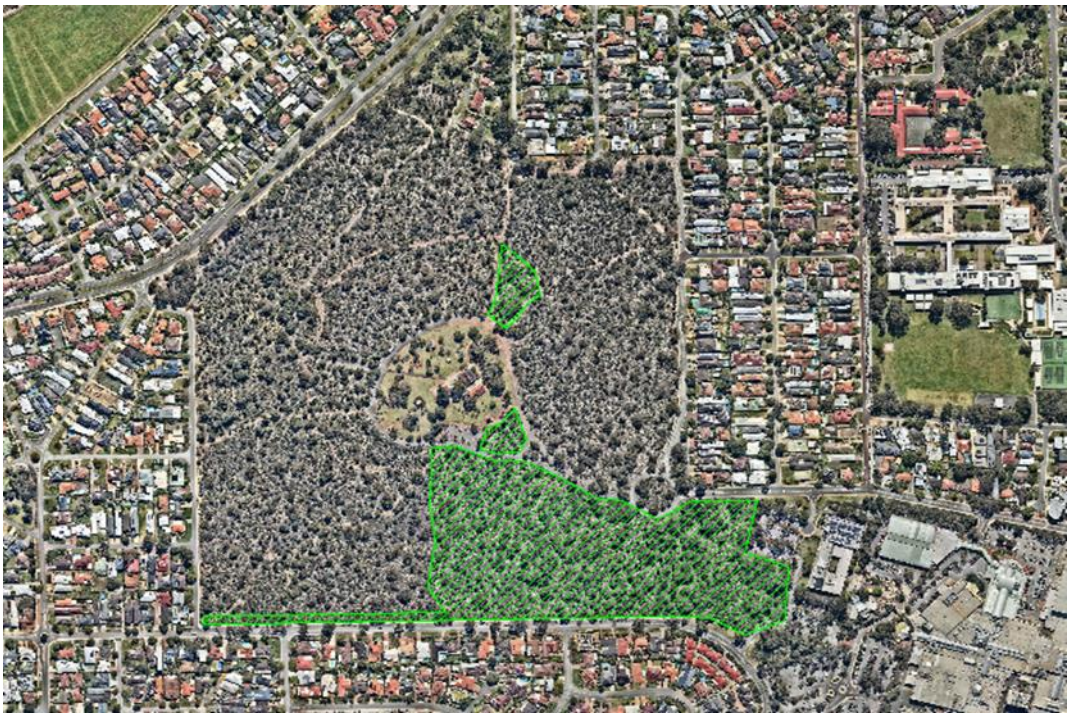

Figure 34 Friends of Wireless Hill no spray zone

A summary of community interest sites is listed in Table 8. The number of nesting boxes installed has not increased since 2016, whilst the active revegetation areas have decreased.

Table 8 Community Interest Sites 2022

Community Interest Sites	Total
Bat Boxes	7
Restoration Sites	1.751 ha
Closed Tracks	333m

No revegetation sites have so far been assessed against the completion criteria or met completion criteria in Table 9, at which point they stop being treated as revegetation sites.

Table 9 Revegetation Objectives

Revegetation Category	Objectives
Establishment of individual plants or artificial hollows	• Plants > 5 years old • Hollows used by target species • A minimum number of plants or artificial hollows
Rehabilitation Reinstating self-sustaining and functional ecosystems based on local species, but not aspiring to fully replace all of the original components of an ecosystem.	• Plants > 5 years old • Gaps between native plants < 1 m x 1 m • Weed cover < 25% and bare ground <25% in any 100 m^2 area (in which a rectangle with a minimum side of 2 m can fit) • A number of shrubs/trees (the number varying between sites) • Diversity criteria generally not set
Restoration of vegetation Reinstating the composition, structure, function and dynamics of pre-existing indigenous ecosystems	• Diversity and density measurements benchmarked against reference site

2.3.6 Reference

Reference sites provide opportunities for long-term monitoring and research. The reference sites that have been established in the Wireless Hill Park are shown in Figure *35*. 9 sites for flora have been established as well as multiple locations for fauna monitoring.

Figure 35 Current reference sites established.

Additional information on historical reference sites which have been lost are shown in Appendix 5.

The reference sites for which objectives apply are listed in Table 10.

Table 10 Reference Site Indices

Values	Reference Sites	Number of Sites 1994	Number of Sites 2022	Assets 2008-2017
High Regional Flora Reference Site	100 m^2 quadrat	2 sites	2 sites (sites established but not comparable to historical)	Maintained
Medium Local Flora Reference Site	100 m^2 quadrat	0	7 sites	Increased

2.4 Species

2.4.1 Native Flora

A total of 219 native plant species have been historically recorded in the park. The flora inventory is included in Table 39 in Appendix 1 with Wireless Hill having 188 native plant species recorded during the 2022 surveys.

Maps and further comments for high value species are provided in Appendix 1.

Wireless Hill has one priority flora species, *Jacksonia sericea* (Waldjumi). Its distribution is shown in Figure 36. It is also noted as growing in the garden beds within the lawned area, which was outside the scope of this survey.

Table 11 Native Flora Indices

Species Values	Mammals	Status	2017 Survey	2022 Survey
High Priority 4 species (DBCA listed)	*Jacksonia sericea*	Population maintained	Present	Present

Figure 36 Jacksonia sericea Distribution 2022

Plants at Risk of Local Extinction
There appear to be a significant number of species restricted in extent/abundance in Wireless Hill Park:

- 33 species were categorised as having few plants or clumps in the park in *Wildflowers in Wireless Hill Park* (McGrath, 1999) and/or *Plants at Wireless Hill* (Creed, 2012) (Table 12).
  - 13 of those species were found during 2022 surveys and their populations have been maintained.
  - 20 species should be selectively surveyed or adhoc sightings reported.
- 4 orchid species were deemed to be in low numbers in 2012 in Baseline Orchid Surveys – Wireless Hill Park (Waters A. , 2012);
  - *Thelymitra campanulata* (Shirt Orchid) and *Thelymitra crinita* (Blue Lady Orchid) have both been confirmed in the 2022 surveys.
  - *Pheladenia deformis* (Blue Fairy Orchid) and *Pterostylis barbata* (Bird Orchid) should be added to the at risk species and surveys to confirm their presence carried out.

Table 12 Species with Restricted Distributions / in Low Abundance

Species	**Comments Plants at Wireless Hill** (McGrath, 1999)	**Comments Wildflowers in Wireless Hill Park** (Creed, 2012)	**Comments 2022**
Acacia applanata	-	Rare in bush	Species maintained
Astroloma ciliatum	2 plants • near the Davy St. boundary, not far west of the slab path • just to the south of the southwest concrete path, among trees	-	Name change to *Styphelia discolor*. Not found in 2022. Presence should be confirmed.
Astroloma macrocalyx	1 plant • just north of ring road (different plant mapped in 2016)	-	Name change to *Styphelia macrocalyx*. Not found in 2022. Presence should be confirmed.
Banksia grandis	Southeast – other than plantings	-	Species maintained
Banksia ilicifolia	Not numerous, nearly all in in northern half	-	Species maintained
Billardiera fraseri	-	Base of marri in Median Strip	Not found in 2022. Presence should be confirmed.
Chordifex sinuosus	-	Not common	Not found in 2022. Presence should be confirmed.
Conostylis juncea	No comments – but noted present	Few on Wildflower Walk on northern path	Species maintained
Conospermum triplinervium	1 area • southern area, east of slab track		Not found in 2022. Assumed Exctinct on site. Should be reintroduced through revegetation.
Cyanicula gemmata	1 plant • northeast	-	Not found in 2022. Presence should be confirmed.
Eucalyptus gomphocephala	-	-	Species maintained

Hypocalymma angustifolium	-	One plant adjacent to Barnard St	Not found in 2022. Should be reintroduced through revegetation.
Johnsonia pubescens	2 areas • southeast corner • near Munsey St	-	Not found in 2022. Presence should be confirmed.
Juncus subsecundus	-	Not common	Not found in 2022. Presence should be confirmed.
Lechenaultia floribunda	2-3 areas • east side of path from centre of Davy St • north side of path east of McCallum Cr	Few plants upper southeast	Not found in 2022. Should be reintroduced through revegetation.
Lobelia gibbosa	Northern park including uphill side of old entrance	Single plant at edge of road	Not found in 2022. Should be reintroduced through revegetation.
Lomandra caespitosa	-	Rare in western part of bushland	Species maintained
Lomandra hermaphrodita	Only a few clumps recorded, but could be others	-	Species maintained
Lomandra integra	-	Few on Wildflower Walk	Not found in 2022. Presence should be confirmed.
Melaleuca trichophylla	-	Several plants together, western part of park,	Not found in 2022. Presence should be confirmed.
Nuytsia floribunda	Mainly near centre	A few trees	Species maintained
Olearia elaeophila	1 plant • just south of southwest path	-	Not found in 2022. Presence should be confirmed.
Pheladenia deformis	Scattered	Rare, on northern slope	Not found in 2022. Presence should be confirmed.
Pithocarpa cordata	2 plants • on rise near heritage trail • southeast	-	Not found in 2022. Presence should be confirmed.
Prasophyllum parvifolium	1 plant • in deep Sheoak litter on east side near McCallum Cr	-	Not found in 2022. Presence should be confirmed.
Pterostylis barbata	-	-	Not found in 2022. Presence should be confirmed.
Pterostylis recurva	1 plant • East of slab path and south of Almondbury St	Scattered throughout bushland, especially under Allocasuarina	Species maintained
Regelia inops	1 plant • slightly east of centre	Odd plants west of grassed area	Not found in 2022. Should be reintroduced through revegetation.

Scholtzia involucrata	1 area • either side of heritage trail	-	Species maintained
Stylidium repens	-	Median strip at park entry	Not found in 2022. Presence should be confirmed.
Thelymitra campanulata	-	-	Species maintained
Thelymitra crinita	-	-	Species maintained
Verticordia densiflora var. densiflora	3 areas • south of path to McCallum Cr • between entrance and main carpark • west of centre and south of old entrance road	Groups in upper bushland	Species maintained

2.4.2 Native Fauna

The 59 native animal species (1 bat, 14 reptile, 38 bird and 6 invertebrate species) recorded in Wireless Hill Park are listed in Appendix 3.

Whilst 48 vertebrates have been confirmed in Wireless Hill Park, it is expected that as many as 104 vertebrate species may be present. The assemblage is expected to be highly diverse for an urban reserve, underpinning the reserve's importance for fauna in the City of Melville (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017).

Mammals
The one native mammal species (a bat) confirmed in Wireless Hill Park is listed in Table 44 in Appendix 3.

The terrestrial mammal assemblage is expected to be poor and has little chance of natural recovery regardless of management measures due to lack of connection with other reserves. Better ground connectivity is not possible as the reserve is surrounded by established housing and a network of roads (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017). However, the site is probably large enough to maintain small populations of Brush-tailed Possums and the Quenda (Southern Brown Bandicoot), and translocations of these two species into the reserve could be considered (Bamford, Shepherd, Browne- Cooper, & Chuk, 2017).

Only one species of bat was recorded on Wireless Hill Park but two or three species could be expected and all are likely to use the Grass Trees, bat boxes and other suitable cover across the reserve for roosting (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017).

The persistence onsite of suitable feeding and breeding habitat, rather than individual bats, is the focus of management of the bats listed in Table 13.

Table 13 Mammal Species to be Monitored

Species Values	Mammals	Status	2017 Survey	2022 Survey
Low Bushland dependent species recorded in more than 2 Melville reserves	*Chalinolobus gouldii* Gould's Wattled Bat	Resident – Large Home Range Not Breeding Onsite	Present	Present

Calls of the Gould's Wattled Bat were recorded by (Bamford, Shepherd, Browne-Cooper, & Chuk (2017) at 20:15 hrs on 12 May 2017 which suggested this bat (or bats) may not be roosting nearby as they are known to emerge before sunset. The calls were obtained over an area of burnt vegetation and airborne insects were noticeable during the late afternoon and prey items were therefore present.

Gould's Wattled Bats are expected to be partially dependent upon Wireless Hill Park as they have large home ranges and can regularly forage 5 to 10 km from roosts (Churchill, 2008). It feeds on insects (Strahan, 1998) and is an edge space aerial forager (Webala, 2010), foraging along gaps in vegetation and just below tree canopies (Churchill, 2008), usually in the open beside stands of vegetation (Bullen & McKenzie, 2008). Gould's Wattled Bats have a strong preference for roosting in large live trees (although they will also utilise dead trees and buildings where preferred habitat is not available) (Webala, 2010).

The most important habitat requirement is very large trees, as indicated in Table 14.

Table 14 Mammal Habitat Considerations for Revegetation

Mammals	Habitat Requirements	Diet
Chalinolobus gouldii Gould's Wattled Bat	Very large trees (for roosting hollows) Vegetation 1 – 20 m high (for aerial foraging)	Invertebrates

Wireless Hill has amongst the lowest recorded density of very large trees per hectare of any bushland areas in the City of Melville. There are bat boxes in Wireless Hill Park (Figure 32 in Section 2.3.5) which were found to contain roosting Gould's Wattle Bats in 2022 surveys.

Nest boxes can also provide alternative nesting opportunities for possums that may occur, or for re-introductions, and should be constructed with the entrance at the rear, against the trunk to prevent birds from using them (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017).

Reptiles and Amphibians

Wireless Hill Park is a separate management and monitoring unit for reptiles and amphibians. If extinctions occur in Wireless Hill Park, it is unlikely that reptiles and amphibians will re-colonise the park without assistance. Urban areas are likely to be effective barriers to movement of reptiles between reserves. Most reptile species are sedentary and of low mobility, suggesting that they may have limited capacity to move between patches of habitat isolated by clearing or land-use (Wilson & Valentine, 2009).

Wireless Hill Park is important for reptiles as it is large enough to support viable populations of a range of species (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017).

The 14 native reptile and amphibian species confirmed in Wireless Hill Park are listed in Table 45 in Appendix 3. Reptile species should be well-represented on Wireless Hill Park despite only two being found in the 2017 survey:

- The habitat is variable and offers suitable conditions for a range of species (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017);
- The diversity of reptiles is correlated to the size of bushland remnants on the Swan Coastal Plain with the exception of skinks, as they can persist in small reserves, and amphibians, as most are dependent on wetlands (How & Dell, 2000); and
- Assumptions need to be made as to the presence of some species not confirmed in trapping due to low detection rates. How (1998) estimated that between 250 and 300 individual reptiles/amphibians needed to be captured to be confident 80% of species were recorded in Bold Park; and

The indicator reptile and amphibian species are listed in Table 15.

Table 15 Reptile and Amphibian Indices

Value	Species	1983 Survey	1998 Survey	2017 Survey	2022 Survey	Assets 2008-2022
Very High DPaW-listed Priority 3 Fauna	*Lerista lineata* Lined Skink	Assumed Present	**Confirmed Present**	Assumed Present	**Confirmed Present**	1 Maintained
High Near end of its distribution and 'significant populations' in Bush Forever area	*Lucasium alboguttatum* White-spotted Ground Gecko	**Confirmed Present**	Not Confirmed	Not Confirmed	Assumed Present	1 Not Assessable – not present may have become extinct prior to 2008
Medium Bushland dependent species recorded in 1 or 2 Melville reserve	*Pletholax gracilis Keeled Legless Lizard* *Ramphotyphlops australis* Southern Blind Snake *Varanus gouldii Gould's Sand Goanna*	**Confirmed Present**	Assumed Present **Confirmed Present**	Assumed Present	Assumed Present	8 Maintained
Low Bushland dependent species and recorded in >2 Melville Reserves	*Ctenotus australis* Long-tailed Ctenotus *Pogona minor* Western Bearded Dragon	**Confirmed Present**	**Confirmed Present**	**Confirmed Present (Anecdotal)**	Assumed Present	
	Myobatrachus gouldii Turtle Frog *Pseudonaja affinis* Dugite	Assumed Present				
	Tiliqua rugosa rugosa Bobtail	**Confirmed Present**	**Confirmed Present**	**Confirmed Present**	**Confirmed Present**	

Assumption of presence in 2022 based on site assessment by Natural Area Consulting Species assumed present in all years preceding any confirmation of presence onsite

Of the high value reptiles to be managed:

- *Lerista lineata,* the Lined Skink, is a Priority 3 species (from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation) but an elevated conservation status may be more appropriate given the extent of its habitat that has been cleared (Maryan, Gaikhorst, O'Connell, & Callan, 2015). This skink is largely restricted to the Swan Coastal Plain south of the Swan River, including Garden and Rottnest Islands, and extending in a narrow strip approximately 20–25 km inland from the coast, south to Binningup (near Bunbury) with a single, old record from Busselton (Maryan, Gaikhorst, O'Connell, & Callan, 2015). The northern most populations occur in the City of Melville. Along with Wireless Hill Park, it was also recorded in Ern Stapleton Reserve and Wal Hughes Reserve in 1999 (Jones & Calver, 1999). The limited information on its biology suggests males are in reproductive condition during spring and females typically lay three eggs around November (Maryan, Gaikhorst, O'Connell, & Callan, 2015). It is restricted to pale sands supporting heathlands and shrublands, particularly in association with banksias (Bush, Maryan, Browne-Cooper, & Robinson, Guide to Reptiles and Frogs of the Perth Region, 2000). It shelters in leaf litter and upper layers of loose sand at bases of shrubs (Bush, Maryan, Browne-Cooper, & Robinson, Guide to Reptiles and Frogs of the Perth Region, 2000) and feeds on invertebrates (Wilson & Swan, 2008);
- *Lucasium alboguttatum, the* White-spotted Ground Gecko occurs on coastal and near coastal dunes, limestone and inland sandplains from Point Quobba (north of Carnarvon) to Perth. It is uncommon at the extreme southern end of its distribution in the Perth area (Bush, Maryan, Browne-Cooper, & Robinson, Guide to Reptiles and Frogs of the Perth

Region, 2000). Although three individuals were captured in Wireless Hill Park in December 1983 (Smith, 1985), the only specimen held by the Western Australian Museum south of the Swan River was collected in 1990 from Kensington (ALA, 2017).

The critical habitats for indicator reptiles to be considered during revegetation are summarised in Table 16.

Table 16 Reptile Habitat Considerations for Revegetation

Reptile	Habitat Description	Diet
Pseudonaja affinis Dugite	Very common in Perth region. Favoured by some disturbance and high mice numbers.	Vertebrates
Lerista lineata Lined Skink	Require shrub layer with leaf litter and loose sand at bases	Insects and other invertebrates.
Myobatrachus gouldii Turtle Frog	Not wetland dependent Requires coarse dead woody material Eats termites and other small invertebrates Burrows over summer	Invertebrates
Tiliqua rugosa rugosa Bobtail	Home range 2-2.7 ha Variety of vegetation types (including gardens) Shelters beneath dead vegetation and in burrows	Invertebrates, Slugs, Snails, Carrion Flowers and Fruit (including some weeds),
Ctenotus australis Long-tailed Ctenotus	Shrubs	Invertebrates
Ctenotus fallens West Coast Ctenotus	Low vegetation, rocks and partial cover Survives in disturbed areas with introduced grasses	Invertebrates
Lucasium alboguttatum White-spotted Ground Gecko	Nocturnal Shelters in vertical shafts of abandoned spider burrows Rarely found beneath surface debris Uncommon in Perth as is at southern end of distribution	Invertebrates and smaller reptiles
Pletholax gracilis *Keeled Legless Lizard*	Usually associated with low dense vegetation Semi-arboreal but burrows in winter Eggs deposited in soil beneath rocks or logs	Small spiders, nectar
Ramphotyphlops australis Southern Blind Snake	Spends majority of time underground but can surface at night, particularly after rain in warmer months Shelters beneath a wide variety of cover including beneath leaf litter, rocks and logs Can occur in suburban gardens	Ant eggs, larvae and pupae and termites
Varanus gouldii *Gould's Sand Goanna*	Ground dwelling but digs a burrow for shelter	Reptiles, insects, mice and carrion
Pogona minor Western Bearded Dragon	Basks on fallen timber and rocks	Invertebrates, smaller reptiles, and some vegetable matter

Habitat Description: Bush, Maryan, Browne-Cooper, & Robinson (2000).

A further consideration is that weeds that occupy extensive areas between shrubs, or have dense rooting patterns can inhibit movement and foraging of a number of reptile species (How & Dell, Vertebrate Fauna of Banksia Woodlands, 1989).

Birds

The 33 native birds confirmed in Wireless Hill Park are listed in Table 46 in Appendix 3.

Bamford, Shepherd, Browne-Cooper, & Chuk (2017) noted that the most abundant native bird species present in 2017 were Singing Honeyeaters and Silvereyes. A number of passerines not recorded on other nearby reserves such as Western Gerygones, Weebills and Striated Pardalotes were also present in good numbers. A Collared Sparrowhawk was also seen within the bushland on two separate visits indicating likely residence. The relatively low densities are likely due to sampling chance and the large area of reserve over which the birds can roam. Smaller reserves possibly attract a higher density of birds through the day due to foraging from a larger number of nearby residences. The bird assemblage recorded was not as diverse as expected given the area the reserve covers and in comparison to other reserves surveyed at the same time.

Indicator species are listed in Table 17. Native birds that are resident and/or breed in the City of Melville and require tree hollows, but are not indicator species if they have colonised Perth and compete with more vulnerable species. *Cacatua roseicapilla*, Galah, has expanded its range since European settlement and was probably originally restricted to north of the Murchison River. It is now is resident in Perth, but was only a casual non- breeding visitor in 1948 (Van Delft, 1997).

Table 17 Bird Indices

Species Values	Birds	1983 Survey	2003 Survey	2017 Survey	2022 Survey	Assets 2008-2022
High Listed by WAPC as habitat specialist with reduced populations on Swan Coastal Plain	*Acanthiza apicalis* Inland Thornbill	**Confirmed Present**	**Confirmed Present**	Assumed Present	Assumed Present	2 Maintained
	Smicrornis brevirostris Weebill	Assumed Present		**Confirmed Present**		
	Daphoenositta chrysoptera Varied Sittella	Assumed Present	**Confirmed Present**	Assumed Extinct	Assumed Extinct	1 Not Maintained
	Acanthiza chrysorrhoa Yellow-rumped Thornbill	**Confirmed Present**	Not Confirmed			Not Assessable – may have become extinct prior to 2008
High Listed by Birdlife Australia as wide-ranging with reduced populations on Swan Coastal Plain	*Anthochaera lunullata* Western Wattlebird	Assumed Present		**Confirmed Present**	Assumed Present	7 Maintained
Low Bushland dependent species	*Barnardius zonarius* Australian Ringneck	**Confirmed Present**	**Confirmed Present**	**Confirmed Present**		
	Pardalotus striatus Striated Pardalote					
	Purpureicephalus spurious Red-capped Parrot					
	Phylidonyris novaehollandiae New Holland Honeyeater	Assumed Present				
	Rhipidura fuliginosa Grey Fantail	**Confirmed Present**	Assumed Present			
	Ninox novaeseelandiae Southern Boobook Owl	**Confirmed Present**	Assumed Present		Confirmed present- Anecdotal	

Assumption of presence in 2022 based on site assessment by Natural Area Consulting Species assumed present in all years preceding any confirmation of presence onsite

Of the high value birds to be managed:

- Yellow-rumped Thornbills have not been confirmed since 1983 and are potentially locally extinct, although its change in status since the last management plan cannot be assessed as it may have gone extinct prior to 2008. Yellow-rumped Thornbill pairs will often use the same nesting site each year, although they may roam within feeding-flocks in the non-breeding season (Van Delft, 1997). They may require more than 7% cover of native vegetation with 2 km (Davis, Gole, & Dale Roberts, 2012). There is approximately 5% native vegetation in a circle extending 2 km out from the centre of Wireless Hill Park.
- Varied Sittella are rarely recorded in the Perth urban environment (Davis, Gole, & Dale Roberts, 2012). Whilst appropriate habitat is present in the form of shrubs of *Adenanthos cygnorum*, Woolly Bush and the squatter Banksias and dense vegetation, this species would have expected to have been observed in 2017 if present (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017);
- Inland Thornbills were not recorded in 2022 but assumed to be present because there is appropriate habitat and its behaviour is such that it wouldn't necessarily be detected during each and every survey. It is highly sensitive to loss and fragmentation of habitat due to urbanisation and may require more than 8% cover of native vegetation with 2 km (Davis, Gole, & Dale Roberts, 2012). There is approximately 5% native vegetation in a circle extending 2 km out from the centre of Wireless Hill Park. It may require specialised habitats and be favoured by open grassy woodlands, regardless of whether weeds contribute to the open understorey (Davis, Gole, & Dale Roberts, 2012);
- Weebills are listed as a habitat specialist in *Bush Forever* (Government of Western Australia, 2000) but are relatively common in bushland in the Perth Metropolitan Area (Van Delft, 1997) and require trees rather than bushland and builds nests in foliage of Eucalyptus and Acacia trees and shrubs (Johnstone & Storr, 2004). There are no indications of seasonal migration, and there is differing opinions as to whether they are sedentary or nomadic (Van Delft, 1997); and
- Western Wattlebirds and New Holland Honeyeaters are at the lower end of sensitivity to habitat loss and fragmentation due to urbanisation, of the bushland dependent birds in Perth (Davis, Gole, & Dale Roberts, 2012).

Other bushland dependent birds, that are either migratory or have large home ranges are listed in Table 18. *Zanda baudinii,* Baudins Black-Cockatoo was recorded in Wireless Hill Park in 1983 (Smith, 1985), there is a degree of uncertainty associated with this identification, and based on distributions it is assumed it was *Zanda latirostris*, Carnaby's Black-Cockatoo.

The following bushland dependent birds were excluded from Table 18 as they were recorded in Wireless Hill Park as vagrants, rather than regular visitors:

- *Phaps chalcoptera,* Common Bronzewing
- *Glyciphila melanops*, Tawny-crowned Honeyeater
- *Acanthorhynchus superciliosus,* Western Spinebill

Table 18 Other Bird Species to be Monitored

Species Values	Birds	Status	1983 Survey	2003 Survey	2017 Survey	2022 Surveys
Very High Matter of National Environmental Significance under EPBC Act 1999 (threatened)	*Calyptorhynchus banksii naso* Forest Red-tailed Black-Cockatoo	Regular non-breeding migrant			Confirmed Present	Assumed Present
	Zanda latirostris Carnaby's Black-Cockatoo		Confirmed Present	Confirmed Present	Confirmed Present	Assumed Present
Very High Matter of National Environmental Significance under EPBC Act 1999 (migratory)	*Merops ornatus* Rainbow Bee-eater	Regular breeding migrant	Confirmed Present	Confirmed Present		Confirmed present-anecdotal
High Listed by WAPC as wide-ranging with reduced populations on Swan Coastal Plain	*Turnix varia* Painted Button-quail	Regular Visitor		Confirmed Present	Confirmed Present	Assumed Present
Low Bushland dependent species recorded in more than 2 Melville reserves	*Hirundo nigricans* Tree Martin	Regular Visitor	Confirmed Present	Confirmed Present		
	Pachycephala rufiventris Rufous Whistler		Confirmed Present	Confirmed Present		
	Todiramphus sanctus Sacred Kingfisher		Confirmed Present			

Of the very high and high value birds to be monitored:

- *Zanda latirostris*, Carnaby's Black-Cockatoo, and *Calyptorhynchus banksii*, Red-tailed Black-Cockatoo are threatened migratory birds that would utilise Wireless Hill Park seasonally for feeding, and as a linkage between larger remnants:
- Neither species historically breeds in the area, however due to reports of Red-tailed Black Cockatoos breeding within City of Melville, one cockatoo nesting tube was installed adjacent to the reserve to encourage nesting. Its location may be reviewed due to a lack of use.
- Sites such as these are likely to provide part of an invaluable network of habitat remnants providing food resources for Carnaby's Black-Cockatoo on the Swan Coastal Plain, especially given the potential for removal of pines at Gnangara (Gole, 2003). It may also be important for the survival of the Cockatoos that reserves are not only retained, but also that native vegetation is maintained in good condition (Gole, 2003).
- Non-breeding feeding habitat is particularly important within 6 km of roost sites (DEC, 2012) and there are roost sites at Wireless Hill (Ardross) and Shirley Strickland Oval (Ardross), and potential roost sites nearby including Point Walter (Bicton), and Groves Park (Attadale) (Burnham, Barrett, Blythman, & Scott, 2010);
- These birds are granivores, so the dominant overstorey in Wireless Hill Park of Eucalypts, Banksia and Sheoaks represents a significant food source; and
- Movement corridors with breaks of less than 4 km between other foraging, breeding and roosting sites are important to allow the birds to move between these areas. (Department of Sustainability, Environment, Water, Population and Communities, 2013).
- Wireless Hill is in close proximity to confirmed roosting locations at Shirley Strickland and Attadale
- Wireless Hill has been recommended as a location for the installation of a bird watering station, as per the City's Carnaby's Cockatoo Conservation Action Plan 2023.

- the Rainbow Bee-eater, is a migratory species that breeds in Perth and has been recorded at 87 sites in the metropolitan area (Van Delft, 1997). Whilst this bird won't reside in gardens or parks (Davis, Gole, & Dale Roberts, 2012) it will construct burrows in any ground not continually disturbed, such as vacant suburban lots (Van Delft, 1997). It has been a documented breeding site since 2013.
- Painted Button-quail are scarce on the Swan Coastal Plain (but breeding in Bold Park and relatively numerous in Whiteman Park) and are not easily detected except by their calls.

The critical habitats for birds to be considered in revegetation are summarised in Table 19.

Table 19 Bird Habitat Considerations for Revegetation

Bird	Breeding Confirmed	Habitat			Diet				Comments
		Trees Only	Hollows	Bushland	Seed/Plants	Invertebrates	Nectar	Vertebrates	
Calyptorhynchus banksii naso Red-tailed Black-Cockatoo			X	X	X				Shrubs and trees for perching, nesting and foraging - also forage on mature grasses
Zanda latirostris Carnaby's Black-Cockatoo			X	X	X				
Turnix varia Painted Button-quail				X	X				
Ninox novaeseelandiae Southern Boobook Owl			X	X		X		X	Most common owl in Australia Nocturnal - Roosts during the daytime in dense canopies or in a tree-hole. Highly dependent on tree hollows for breeding Typical home range in SW WA 10-100 ha
Hirundo nigricans Tree Martin			X	X		X			Trees with hollows for breeding Shrubs as well as some open areas for foraging on insects
Purpureicephalus spurius, Red-capped Parrot			X	X		X			
Pardalotus striatus Striated Pardalote	Y	X	X			X			
Acanthiza apicalis Inland Thornbill				X		X			Dense shrubs important for protection and nest sites as well as some open areas for foraging
Acanthiza chrysorrhoa, Yellow-rumped Thornbill				X		X			
Merops ornatus Rainbow Bee-eater	Y			X		X			
Daphoenositta chrysoptera Varied Sittella		X				X			Shrubs and trees for perching Dense shrubs important for protection and nest sites as well as some open areas
Pachycephala rufiventris, Rufous Whistler		X				X			
Rhipidura fuliginosa Grey Fantail		X				X			
Smicrornis brevirostris Weebill		X				X			
Anthochaera lunulata, Western Wattlebird				X			X		Shrubs and trees for foraging, perching and nesting. Flowering plants such as Banksia, Eucalyptus, Grevillea, Hakea, Melaleuca
Phylidonyris novaehollandiae New Holland Honeyeater				X			X		
Barnardius zonarius Australian Ringneck		X	X		X				Generalist Bird – no special requirements

Zanda latirostris, Carnaby's Black-Cockatoo, and *Calyptorhynchus banksii*, Red-tailed Black-Cockatoo are generally not listed as requiring hollows in City of Melville reserves as neither migratory bird species breeds in the City. However there is an unconfirmed roosting site for *Zanda latirostris*, Carnaby's Black-Cockatoo, in Wireless Hill Park (Kabat, Scott, Kabat, & Barrett, 2012) and both species can utilise tree hollows for roosting. There have also been anecdotal sightings of a pair of *Calyptorhynchus banksia* nesting in a tree hollow within nearby Bateman Park. The City of Melville have since installed cockatoo nesting tubes at two locations in Wireless Hill Reserve and Piney Lakes Reserve in order to increase suitable nesting habitat.

Invertebrates

Historically there have been no systematic surveys for invertebrates in bushlands in the City of Melville. However, Wireless Hill Park, along with Harry Sandon Park and Wal Hughes Reserve, were surveyed for butterflies and day-flying moths by Williams (2009). In recent years invertebrates have been included in fauna surveys conducted by Natural Areas Consulting Management Services (NAMS) in 2022 in which 42 invertebrates were recorded. The Friends of Wireless Hill also conducted a targeted macroinvertebrate survey in conjunction with Spineless Wonders in 2020 identifying over 200 invertebrates represented across 96 families.

Native bee populations were surveyed between 2016-2018 by Dr Kit Prendergast which confirmed the presence of 72 species in 15 genera of native bees within Wireless Hill including previously undescribed species. The most abundant species at Wireless Hill was Amegilla (Notomegilla) chlorocyanea (73 specimens). However, this may be partly due to the bias in blue-vane traps in attracting this species (K. S. Prendergast & Hogendoorn, 2021b), as the majority of specimens were collected in blue vane traps, with relatively few observed foraging in the field (K. Prendergast, Menz, Bateman, & Dixon, 2020). None of the three conservation significant species (*Leioproctus contraries, Leioproctus douglasiellus* and *Neopasiphae simplicior*) which were previously thought could occur in the reserve were recorded.

The 5 native butterfly and 1 native day-flying moth species present are listed in Appendix 3:

- The five butterfly species were categorised by Williams (2009) in terms of the following habitat niches:
    - breeding exclusively on native plants and restricted to bushland:
        - *Neolucia agricola,* Fringed Blue, breed exclusively on the widespread native shrubs *Daviesia divaricata* and *Jacksonia sternbergiana*
- breeding on native and introduced plants, but predominantly restricted to bushland:
    - Zizina otis labradus, the Grass Blue Butterfly, occurs in bushland and urban areas but there is no evidence yet that the populations in urban areas are self-sustaining (Williams M. , 2009), although there are several generation each year (Braby, 2004)
    - breeding on both native and introduced plants, but known to be highly vagile (i.e. migratory or vagrant) and not restricted to remnant bushland:
        - *Geitoneura klugei,* Klug's Xenica, is widespread and known to breed on weeds and garden plants in addition to native plants
        - *Lampides boeticus,* Pea Blue, whose major host plants include weeds
        - *Vanessa kershawi,* the Australian Painted Lady, that breeds primarily on the exotic and widespread weed *Arctotheca calendula,* which occurs commonly on roadsides, in gardens and on vacant land, and is also known to be migratory, and as such does not rely upon bushland to sustain populations
- The resident day-flying moth present was:

- Synemon sp. (Perth), Common Spring Sun-Moth, which is the interim name for a species complex that is widespread and common in southwest Western Australia. On the Swan Coastal Plain it is associated with banksia woodlands and the only documented larval food plant is the widespread and abundant native sedge *Mesomelaena pseudostygia* (Williams, Williams, Edwards, & Coppen, 2016)

Synemon gratiosa, the Graceful Sun-Moth is a significant species that could occur in Wireless Hill Park as suitable habitat (*Lomandra hermaphrodita*, *Banksia* woodland and open herb/shrubland) is present (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017). Although it was not recorded by Williams (2009) in 6 spring and 2 autumn surveys, each along 2144 metres of tracks in Wireless Hill Park, its low abundance and low detectability means that four or more surveys are needed during its peak flying period (late summer to autumn) to ensure it is detected at a site.

The indicator species (resident bushland dependent species) are listed in Table 20.

Table 20 Invertebrate Indices

Values	Invertebrates	2009 Survey	Assets 2008-2017
Low Bushland dependent species	*Neolucia agricola* Fringed Blue	Present	3 species Maintained
	Synemon sp. (Perth) *Synemon gratiosa* (Presence TBC)		
Low Possibly bushland dependent species	*Zizina otis labradus* Grass Blue Butterfly		

The critical habitats for invertebrates to be considered during revegetation are summarised in Table 21.

Table 21 Invertebrate Habitat Considerations for Revegetation

Indicator Species	Diet and Other Requirements
Neolucia agricola Fringed Blue	The native shrubs *Daviesia divaricata and Jacksonia sternbergiana* for breeding
Synemon sp. 'Perth'	The native sedge *Mesomelaena pseudostygia* as source of food for larvae
Synemon gratiosa Graceful Sun-Moth	Native mat-rush *Lomandra hemaphrodita* as food source for larvae
Zizina otis labradus Grass Blue Butterfly	Major host breeding plants are native and introduced legumes (see native plants in Fabaceae family in Table 39) - larvae feed on young leaves, flower buds, flowers and seedbuds Prefers open areas

3 Threats

3.1 Overview

The NAAMP identified the ten most significant threats to natural areas in the City of Melville and details the impacts they can have. These threats (with the exception of stormwater and reticulation, which are specific to small bushland remnants in an urban environment) align with the major biodiversity threatening processes.

3.2 Physical Disturbance

Wireless Hill attracts some antisocial behaviour, in the form of rubbish dumping, vandalism, and has several steep areas where erosion is occurring through creating of informal tracks.

Two informal tracks have been identified in Figure 37, and marked to be closed off. One track runs through the middle of the dieback infestation, potentially spreading this disease further, and the other is a steep track down the slope causing some erosion and access for anti-social behaviour.

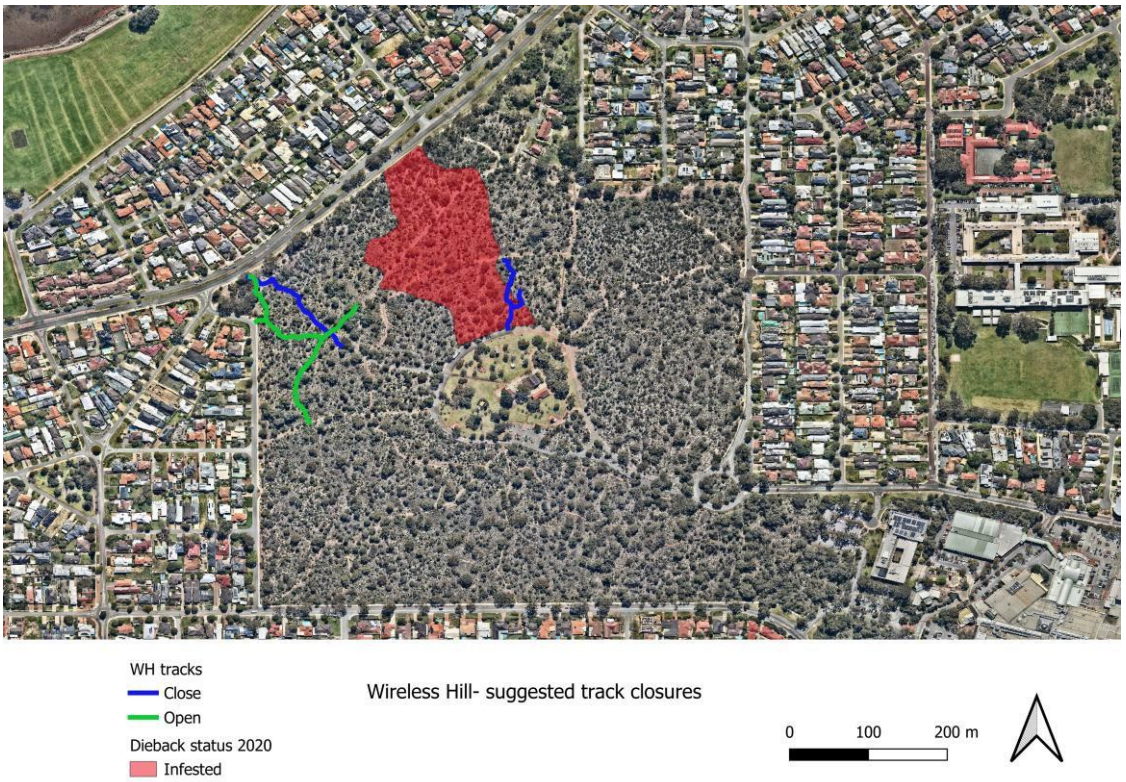

Figure 37 Suggested informal track closures

The indices for physical disturbances are shown in Table 22, with most being minimal or absent except for informal track creation, which has not been addressed.

Table 22 Physical Disturbance Indices

Impacts	Physical Disturbance	Disturbances 2008-2022	Threats 2008-2017
High Potential to substantially change ecosystem structure, composition or function	Clearing for utilities	No Data	Threat Contained
Medium Potential to moderately change ecosystem structure, composition or function	Trampling	Areas of informal path creation through bushland	Threat not contained
	Sediment/Erosion	No Data	Threats Contained
	Rubbish Dumping	Pockets of rubbish found regularly in "cubbies"	
	Tree Poisoning, Illegal Clearing, Firewood Collection	No evidence recorded	
Medium Potentially costly remediation	Vandalism	Graffiti approx. once per year	

3.3 Fire

An individual fire may not necessarily be a threat to the biodiversity, as the flora and fauna of the region has evolved in the context of, adapted to, and in part depends upon, fire. However modified fire regimes (characterised in terms of intensity, frequency, season and scale), especially in the context of external factors such as habitat fragmentation and climate change can lead to the decline and/or local extinction of species.

The two fire scenarios that were identified in the NAAMP as potential triggers for local extinctions of vulnerable species were:

- Large Fires (a fire burning more than one third of a reserve); and
- Repeat Fires (fires burning the same portions of a reserve within eight years).

Table 23 reflects that there was no evidence of large or repeat fires from 2008-2023.

Table 23 Fire Indices

Impacts	Fires	Extent of Fires 2008-2017	Extent of Fires 2008-2017	Threats
High Potential for local extinctions of ground dwelling species	Large fires	0 ha	0 ha	Prevented
High Potential for local extinctions of trees and shrubs that regenerate only from seed stored on the plant	Repeated fires	0.46 ha	0 ha	Prevented

Fires recorded between 1987-2023 are shown in Figure 38. The entire reserve was burnt in 1976, with more recent fires being small and occurring in different parts of the reserve, creating a mosaic pattern of fuel ages. Some overlap in areas to the North East and eastern edge of the reserve have occurred within a short time frame (2-3 years) however recent fires have not been repeated or large. The central area to the east of the ring road is the only section of long unburnt bushland, with no significant fire recorded since 1976, according to City of Melville records.

Figure 38 Wireless Hill Fire record 1987-2023

Banksia woodlands have been shown to require up to 16 years for some species to reach an age where sufficient seed bank has accumulated and plants are mature enough for the population to persist after fire (Ritchie, et al., 2021). A fire season following a wet winter-spring period has been shown to have a negative effect on seedling germination, and lower intensity fires also resulted in better recovery of Banksia species compared with hot summer fires (Ritchie, et al., 2021). Fauna studies have found that areas unburnt for 20-35 years maximised cone production of Banksia species, an essential food source for threatened Black Cockatoos (Ritchie, et al., 2021).

Given Wireless Hill bushland is in close proximity to the urban area, the reserve has been identified as bush-fire prone in mapping undertaken by Department of Fire and Emergency Services (DFES). The City's Bushfire Risk Management Plan outlines the risk management framework in which the reserve is assessed and proposed treatments where extreme risks were found (City of Melville, 2022-2027). The northern boundary adjoining Hickey Street and Munsey Street out to McCallum Drive has been identified as a zone which needs to have a low fuel load for the safety of adjoining properties, with recent works to remove dead wood and under-prune trees. The objective to mitigate fire risk is to maintain low fuel at ground level. Maintaining fuel loads through weed control across the reserve is also a priority.

Consideration could be given to future risk mitigation works through select burning of grass trees, however Xanthorrhoea skirts have been shown to be important ecological habitat for Quenda and a refuge during fire for invertebrates and reptiles (Brennan, Moir, & Wittkuhn, 2011). Given the frequent ignition of Wireless Hill over the years through human-induced fire, any prescribed burning or fuel reduction burning would need to balance the ecological needs of this threatened ecological community to ensure species persistence.

3.4 Weeds

There were 82 weed species recorded in the 2022 surveys, down from 94 weed species recorded in the previous management plan. This reduction is due in part to the previous plan listing native species as weeds on site, which were excluded from the 2022 survey; these species are still noted in Table 25. The weed inventory and distribution maps are listed in Appendix 2.

The extents of weeds in 2022 (based on presence at 30m grid points) are listed in Table 24. The following assumptions were made in terms of trends 2008-2022 where comparable data was not available:

- weeds were prevented if not observed in 2022;
- weeds were contained if percentages were relatively unchanged; and
- weeds were not assessable if widespread.

Impact	Weeds	2008	2012 (grasses only)	2016	2022	Threats 2008-2022
Very High	Arum Lily Asparagus Fern Blackberry Golden Dodder Lantana Madeira Vine Narrowleaf Cottonbush Paterson's Curse Tamarisk Willows	0%		0%	0%	10 Prevented
	One Leaf Cape Tulip	0%		0%	1 clump	Increased
	Soldiers	3%		5%	25%	
	Bridal Creeper	0%		<1%	3 individuals	Contained
	Brazilian Pepper	0%		<1%	Present	
	Perennial Clumping Grass	94%	93%	97%	86%	Decreased
High	Giant Grasses	0%		0%	0%	1 Prevented
	Annual Grasses	Incompatible Data	64%	Incompatible Data	86%	Increased
	Clumping Geophytes	Incomplete Data (12% - *Freesia alba x leichtlinii* and *Watsonia meriana var. bulbillifera*)		87%	92%	
	Perennial Running Grass	No Data	No Data	1%	>1%	Contained
	Shrubs and Trees	Incomplete Data (9% - *Chamelaucium uncinatum* and *Chamaecytisus palmensis*)		17%	15%	
Medium	Perennial Weeds	Incomplete Data		92%		1 Not Assessable
Low	Annual Weeds	Incomplete Data		98%		1 Not Assessable

Table 24 Weed Indices

Most of the Very High impact weeds have either been prevented, contained or decreased between 2008-2022. The exception to this is *Lachenalia reflexa,* which has seen a marked increase by 20% in distribution across the reserve. This should be the focus of weed control efforts, as it has the potential to spread very quickly and become highly invasive. Once established in bushland it is very difficult to control. It primarily reproduces by seed and can be spread by human and animal activity over larger distances (Department of Environment and Conservation, 2009). Optimum control period is considered mid-June to early July depending on the season, well before

flowering in July/August (Department of Environment and Conservation, 2009). Fire triggers

germination, flowering and seed set, so it requires intensive management after fire (Florabase). Geophytes are also slightly increasing since 2017 and could be targeted with an integrated management approach along with *Lachenalia reflexa*.

Figure 39 Lachenalia Distribution between 2017-2022

A focus has been on management of perennial clumping grasses for fuel load management. Perennial clumping grasses have decreased by 10% since 2017, so this is showing a positive trend.

Annual clumping grasses were present in 2016 but not detected in the grid-based survey because at the time of survey between 25 October and 22 November 2016 the density of standing annual clumping grass plants with flowering heads was below the level at which they could be readily located amongst any perennial clumping grasses present. There is therefore insufficient data to compare the trend in this category.

One species appears to have been eradicated form the park since 2008. One individual plant of *Cenchrus setaceus,* Fountain Grass was documented adjacent to Station Walk in 2012 during Grass Weed Surveys (Waters A. , 2012), and no plants were located in 2016 or 2022.

Several weed species are assumed to have been eradicated from the park since 2017 survey, including *Acacia longifolia*, *Acacia podalyriifolia*, *Agonis flexuosa, Lophostemon confertus*, *Leptospermum laevigatum* and *Ferraria crispa*. However ongoing monitoring for individuals should continue.

African Cornflag was one species recorded in 2022 that had not previously been recorded.

As a general rule, a site-based approach should be applied to prioritising woody weeds for removal with a focus on shrub and tree weeds in the vicinity of key assets, as well as removing shrub and tree weed species in low numbers. An example is *Asparagus asparagoides*, which

is in low enough numbers to be able to eliminate the plant quickly, and which is rated as highly invasive if unmanaged.

Annual weeds (e.g. *Brassica barrelieri subsp. oxyrrhina)* are deemed low priority, however should be managed where they occur or have the potential to impact on high value assets.

Native Species to be Managed as Weeds

Whilst detailed planting records are not available, the 1985 Management Plan appears to suggest a number of Swan Coastal Plain plants were introduced to the park. Introducing different forms of species, as well as non-local species, can also result in negative impacts in terms of hybridization and competition, especially for significant isolated populations of native species targeted for monitoring and management.

The species that naturally occur on the Swan Coastal Plain, but have possibly been introduced into Wireless Hill Park are listed in Table 25 and their previous distributions from 2016 mapping is shown in Figure 39 and Figure 40.

Table 25 Swan Coastal Plain Plants possibly introduced

Species	Comments
Melaleuca preissiana	• Not in/around the Booragoon area in 1978 (Bridgewater & Wheeler, 1980). • One 4 metre high tree observed on traffic island in 2016
	• Not recorded in Wireless Hill Park prior to 2016 • Grows predominately in winter-wet depressions (Powell, 2009)
Olearia axillaris	• One shrub observed in 2016 • Not recorded in Wireless Hill Park prior to 2016 • Widespread and common coastal species used in revegetation (Dixon, 2011) • Does not usually occur on Karrakatta or Bassendean soils (Powell & Emberson, 1996) • Scattered in Kings Park (Barrett & Pin Tay, 2005)
Rhagodia baccata	• One shrub observed in 2016 • Not recorded in Wireless Hill Park prior to 2016 • Widespread and common coastal species used in revegetation (Dixon, 2011) • Can occur on Karrakatta soils but does not usually occur on Bassendean soils (Powell & Emberson, 1996) • Does not occur naturally in Kings Park (Barrett & Pin Tay, 2005)
Agonis flexuosa	• Occurs around the periphery of Wireless Hill Park • Was not recorded in/around Booragoon in 1978 (Bridgewater & Wheeler, 1980) • Does not usually occur on Karrakatta or Bassendean soils (Powell & Emberson, 1996) • In the Perth Region has a natural distribution restricted to calcareous dunes (Dixon, 2011). • Naturally occurred along the Swan Estuary downstream from Freshwater Bay (Powell, 2009) with Blackwall Reach possibly being one of the most easterly occurrences (Government of Western Australia, 2000). • Has the ability to completely alter the structure of communities it invades, and it is currently being removed from Kings Park (Keighery, 2013).
Callitris preissii	• At one time this plant was fairly common around the Swan River (Main & Serventy, 1957). • A weed in tuart woodland in Kings Park, but native to river escarpment in Kings Park (Keighery, 2013). • The main population remaining on the Swan River is now at Peppermint Grove (Powell, 2009). • Does not usually occur on Karrakatta or Bassendean soils (Powell & Emberson, 1996) • It has germinated from mulch in other Melville reserves
Calothamnus quadrifidus	• Can occur on Karrakatta soils (Powell & Emberson, 1996) • Associated with limestone in Kings Park and Bold Park (Barrett & Pin Tay, 2005) • *Calothamnus* species have the capacity to completely alter the structure of communities that they invade and there is significant risk of hybridization between local and introduced forms of this species (Keighery, 2013).

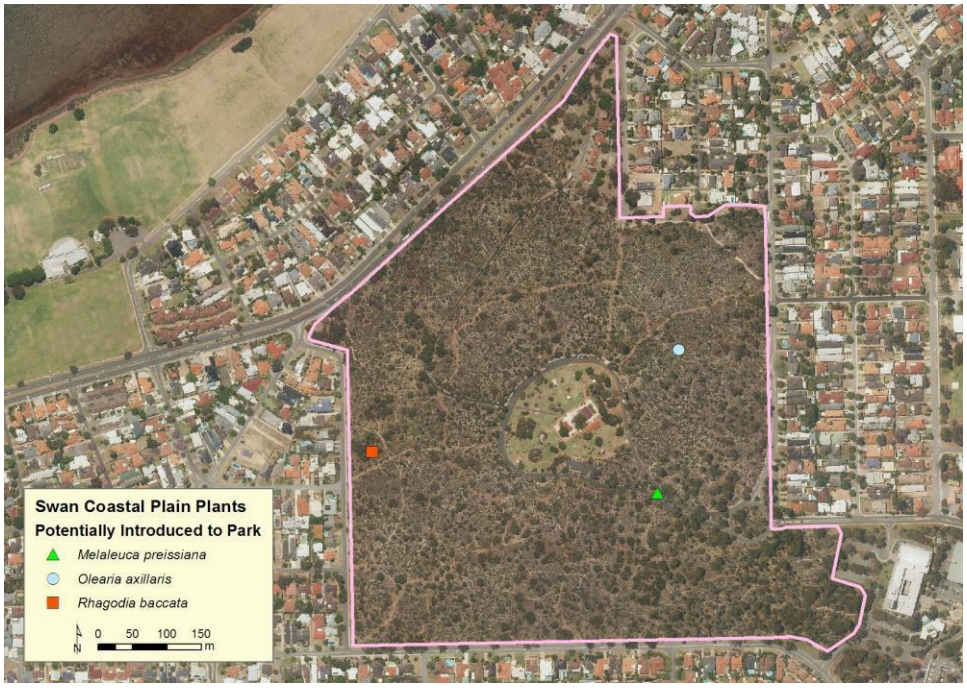

Figure 40 Native plants to be considered introduced to site

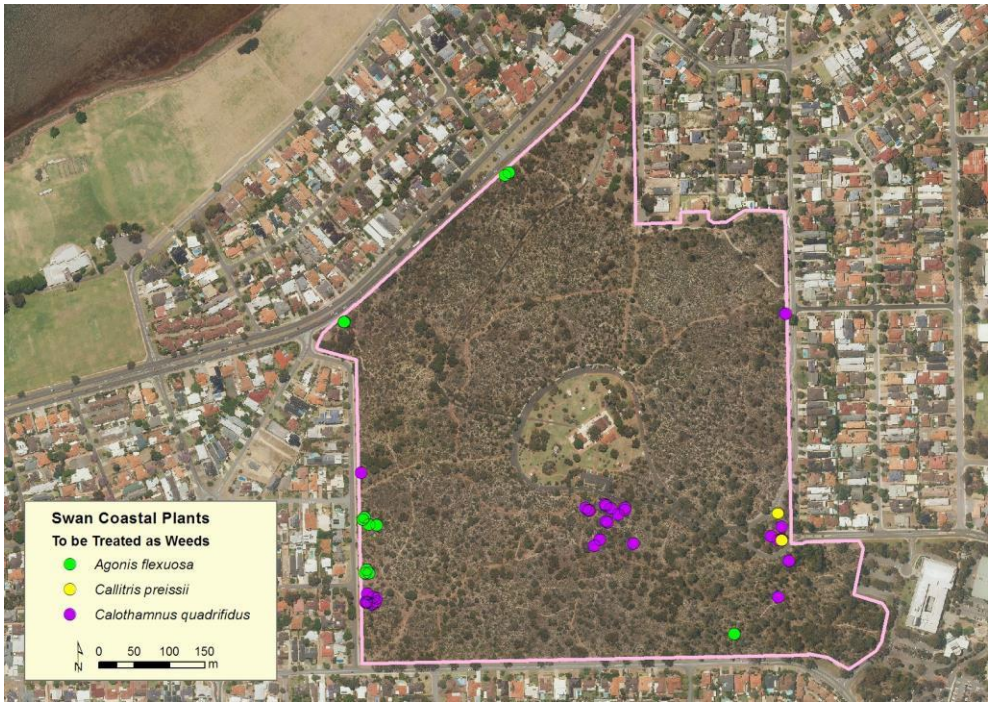

Figure 41 Native plants to be considered introduced to site

3.5 Habitat Loss

Habitat loss, measured by total weed coverage and bare ground, indicates the extent, quality or continuity of native vegetation areas. The distribution of weed cover and bare ground is shown in Figure 42 and Figure 43.

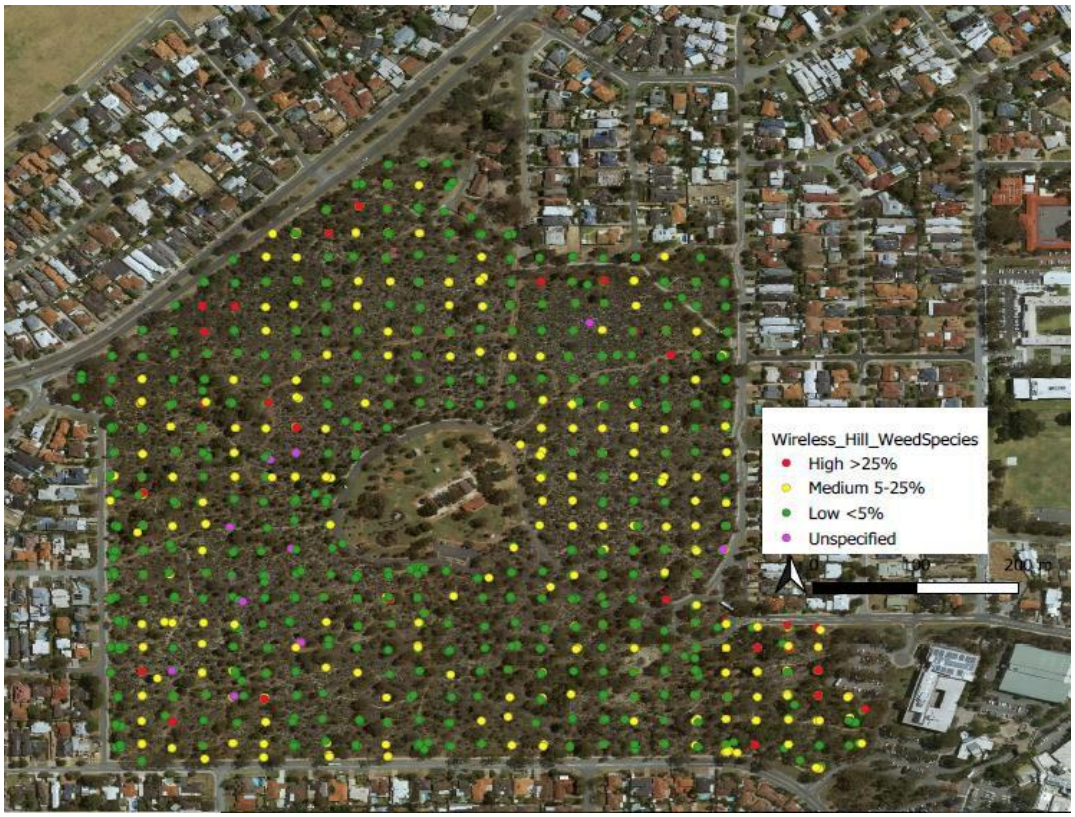

Figure 42 Cover of All Weeds Combined 2022

The extent of bushland in each category of weed cover is indicated in Table 26. Percentages of weed coverage have not changed drastically, except for an increase in the weeds at >25% coverage, and an increase in some weeds now at lower coverage (less than 5%). This mirrors the trends in weeds from Section 3.4 where many of the targeted weeds are reducing, whilst some other weeds are increasing in concentration.

Table 26 Cover of All Weeds Combined

Category	Percent of Monitoring Points 2017	Percent of Monitoring Points 2022
0%	0%	1%
1-5%	62%	64%
6-25%	16%	5%
26-100%	22%	30%
Total	100%	100%

Figure 43 Bare Ground Coverage 2022

The extent of bushland in each category of bare ground is indicated in Table 27. Bare ground has increased in along the outer edges of the reserve, particularly on the northern boundary. This corresponds with decreasing weed coverage in this area, and perhaps requires further revegetation effort through planting or direct seeding of native species. These areas have been identified in proposed revegetation areas in Figure *33*.

Table 27 Bare Ground Cover

Category	Percent of Monitoring Points 2017	Percent of Monitoring Points 2022
0%	17%	3.5%
1-5%	47%	43.4%
6-25%	30%	42.6%
26-100%	6%	10.5%
Total	100%	100%

The habitat loss indices are listed in Table 28.

Table 28 Habitat Loss Indices

Impact	Habitat Loss	% of Reserve 2016	% of Reserve 2022	Threat 2008-2017
Medium Process of moderate ecosystem function modification • Reduced natural regeneration • Increased fire or erosion risk	Weed Cover > 25%	22%	22%	Change Not Assessable
Low Process of low ecosystem function modification • Reduced natural regeneration • Increased fire or erosion risk	Bare Ground > 25%	6%	10.5%	Not Contained

3.6 Feral Animals

The feral animals recorded in Wireless Hill Park are listed in Table 47 in Appendix 4.

Four feral animals are indicator species. The indices for feral animals are only for those species for which some control is practical and effective.

Oryctolagus cuniculus, rabbits, were absent in 2017 (Bamford, Shepherd, Browne- Cooper, & Chuk, 2017). Rabbits would only be present as residents within the park as they have relatively well-defined and small home ranges in the order of 0.2-2 ha (DEPI, 2013). Most dispersal of rabbits is relatively short distances (DEPI, 2013) and Wireless Hill Park is not contiguous with other bushland. Rabbits appear to have been present in low numbers in 2008. The *Wireless Hill Reserve Management Plan 2008* (City of Melville, 2008) noted that 'At one stage in the early 1980's, the European rabbit (*Oryctolagus cuniculus*) was present in large numbers within Wireless Hill Park. Rabbits were almost completely eradicated as a direct result of a programme recommended in the 1985 management plan. It appears that rabbits have not returned to their former numbers since this time'.

Vulpes vulpes, foxes, are sighted and periodically removed from Wireless Hill Park. Wireless Hill Park could sustain foxes as their home ranges in urban areas can be in the order of 30 hectares (Lapidge, Braysher, & Sarre, 2013).

Felis catus, cats, are assumed present. Domestic cats in suburban Canberra catch an average of 10 prey animals per year (with 6% of cats catching five times this) (Grayson & Calver, 2004); and male feral cats may occupy a home range of 10 square kilometres, or larger if food is scarce (DEWHA , 2008).

Apis mellifera, feral honeybee, beehives were absent in 2017 (Bamford, Shepherd, Browne-Cooper, & Chuk, 2017).

The indices are listed in Table 29, with an occurrence defined as specific sightings of dens, warrens, hives or animals (and as control of feral animals is to be initiated within 10 working days from date of observation – the resighting of a den, warren, hive or animal is recorded as an additional occurrence at 10 working day intervals until the elimination of the occurrence).

Table 29 Feral Animal Indices

Impact	Feral Animal	Occurrences 2008-2017	Threat 2008-2017
Very High Key Threatening Process under the EPBC Act 1999	*Oryctolagus cuniculus* Rabbit	Absent 2017	Eliminated
	Vulpes vulpes Fox	Absent 2017 6 removed since 2011	Eliminated
	Felis catus Feral Cat	Assumed Present	Change Not Assessable
High Competition with native birds for hollows and food (impact level variable)	*Apis mellifera* Honeybee	Absent 2017	Assumed Prevented

3.7 Diseases and Pathogens

Phytophthora cinnamomi, Dieback, is a microscopic water mould that weakens or kills the plants by reducing or stopping the movement of water and nutrients within the plant (Dieback Working Group, 2000), and 'is one of the major threats to the biodiversity of Western Australia's ecosystems' (DEC, 2010). The related *Phytophthora nicotianae* has also been confirmed within the area infested by *Phytophthora cinnamomi* in Wireless Hill Park (Dieback Treatment Services, 2013).

Phosphite treatment has been applied regularly since 2004 by a combination of volunteers and contractors. The Phosphite was applied via stem injection and foliar spray to the entire infested section of the reserve inclusive of a 10-15 metre buffer into the uninfested section of the reserve.

The areas assessed as infested have not changed greatly between the 2020 and 2023 assessments (see Figure 43), and perhaps indicates the success of the stem injection treatments as plants to the west have been mapped as uninfested and the active disease edge slightly changed. Some expansion of the area to the east is evident. No new infestations have begun in other parts of the reserve; however it is recommended to close the informal tracks that are evident through this area to reduce the potential of pathogen spread to other areas of the park.

Recommendations from the 2023 mapping undertaken by Glevan Consulting indicate that stem injection and foliar spraying should be undertaken on a 3 yearly basis, due again in 2026, and amendment of the infested signage should be undertaken to align with the current disease edge.

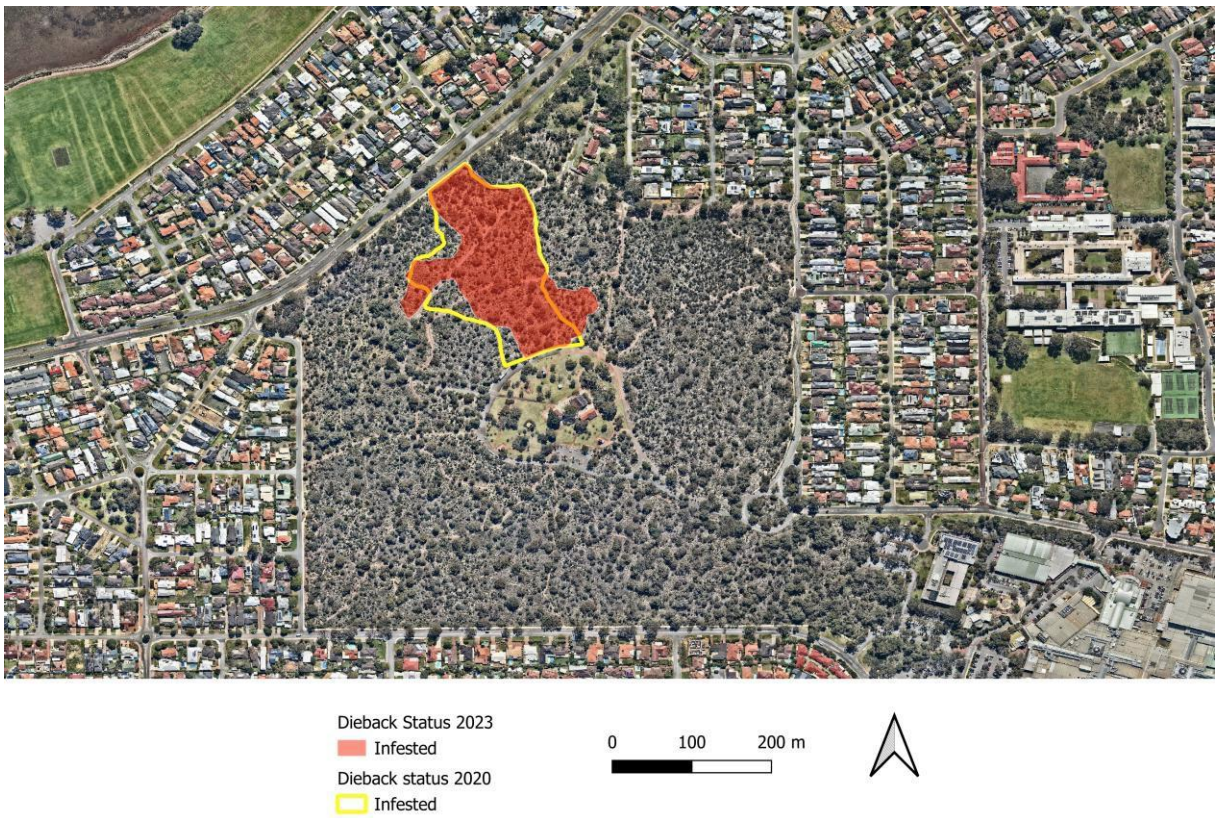

Figure 44 Change in Extent of Dieback Infestation 2020 – 2023

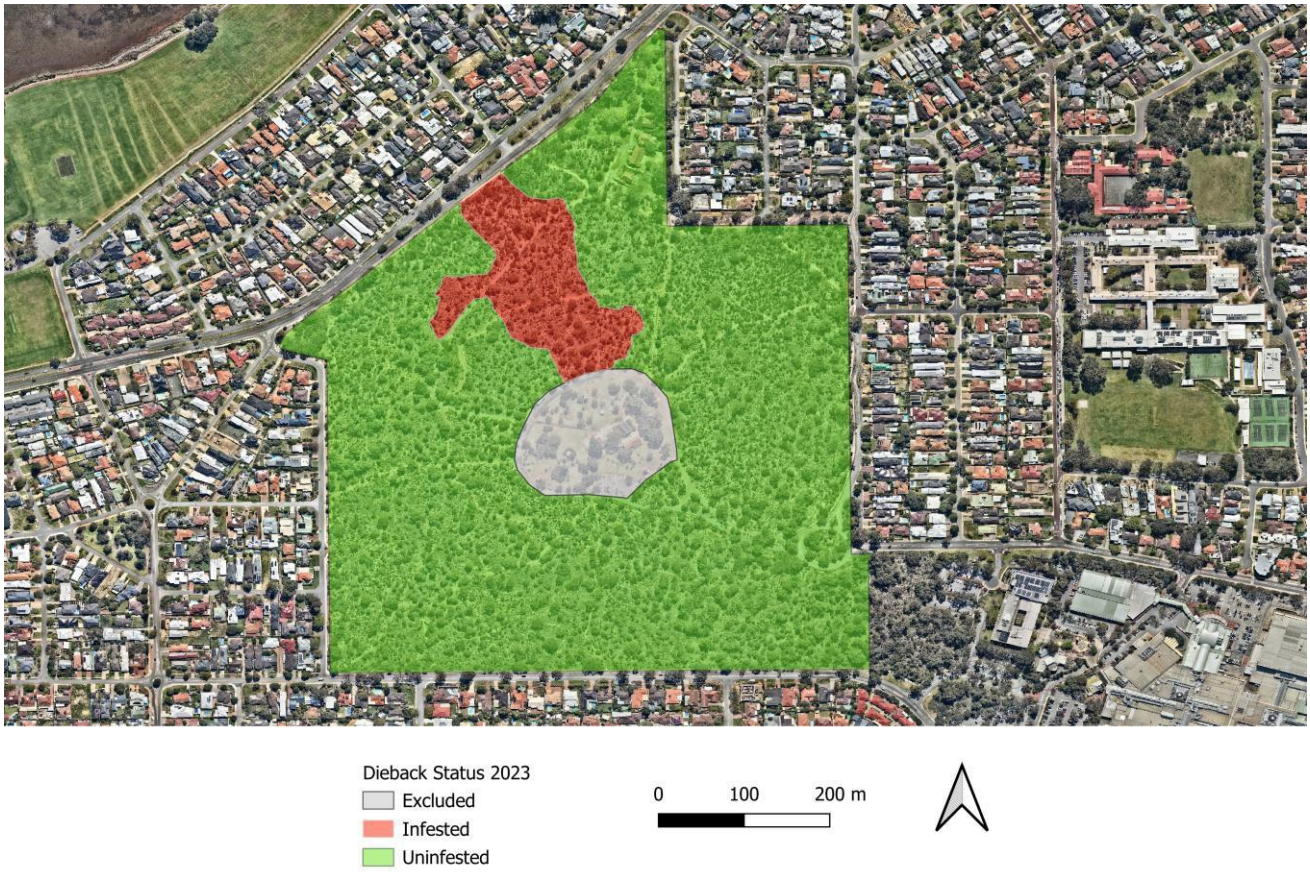

Figure 45 Dieback Status 2023

Armillaria luteobubalina, Honey Fungus, is an indigenous parasitic mushroom that is widespread in south west Western Australia that causes decay in roots and stems that can result in the death of the host plant (Shearer, 1994). Whilst no targeted surveys have been undertaken it is assumed to be absent from Wireless Hill Park:

- no occurrences of *Armillaria luteobubalina* have been documented in the City;
- there were also no opportunistic observations of patches of dead susceptible plants, or the parasitic mushroom itself; and
- it occurs most frequently in coastal dunes, and forests east of the Darling Scarp, and rarely occurs in the acidic sands of the Bassendean Dune system (Shearer, 1994).

The diseases and pathogens for which objectives apply are listed in Table 30.

Table 30 Disease and Pathogen Indices

Impact	Diseases and Pathogens	Extent 2013	Extent 2016	Extent 2023	Threat 2016-2023
Very High Key Threatening Process under the EPBC Act 1999	*Phytophthora cinnamomi* Dieback	7%	8%	8%	Contained
Medium Native species capable of moderate modification of structure and composition of flora by killing multiple species	*Armillaria luteobubalina* Honey Fungus	Not present	Not present	Not present	Assumed Prevented

3.8 Stormwater

There are stormwater discharge points into Wireless Hill Park.

There are no water quality paramters for which objectives apply in Wireless Hill Park as these only apply in bushland where stormwater discharges terminate in an open waterbody. Any erosion/sedimentation associated with the stormwater outlets is monitored as a physical disturbance and would be discussed in Section 3.2 if applicable.

3.9 Reticulation

There is reticulated lawn adjacent to bushland in Wireless Hill Park but there have been no ongoing instances of overspray into the bushland areas. The indices for reticulation are listed in Table 31, with an occurrence defined as specific sightings of excessive drift or leaking (and this is to be rectified within 5 working days from date of observation – the resighting of overspray or leakage is recorded as an additional occurrence at 5 working day intervals until the elimination of the occurrence).

Table 31 Reticulation Indices

Impact	Water Sources	Occurrences 2004-2017	Occurrences 2017-2023	Threat
Low Alteration of Surface Water Flows	Overspray / leakages from reticulation	No Data	Not present	Assumed Contained

3.10 Acid Sulfate Soils

Acid Sulfate Soil reactions can potentially occur where:

- excavations are dug below the minimum level of the watertable; and/or
- groundwater extraction results in oxidation of soils previously permanently saturated by lowering the minimum level of the watertable.

An occurrence of an acid sulfate soils threat is recorded when these activities are undertaken and the risks associated with acid sulphate soil reactions are not managed at the time.

There is no data on excavations or acid sulphate soil reactions previously occurring in Wireless Hill Park, as reflected in Table 32.

Table 32 Acid Sulfate Soil Indices

Impact	Potential Initiation of ASS Reactions	Occurrences 2004-2017	Occurrences 2017 - 2023	Threats
Very High An occurrence of which could result in the reserve being listed as a contaminated site under the Contaminated Sites Act 2003	Excavations below the minimum level of the watertable	No ASS recorded	No ASS recorded	Assumed Prevented
	Groundwater extraction resulting in lowering of minimum level watertable			

3.11 Climate Change

The regional climate is becoming hotter and drier (McHugh & Bourke, 2008):

- the annual rainfall in south-west WA has declined by about 10% since the mid- 1970s (Hope & Foster, 2005); and
- the mean annual temperatures across Western Australia have increased since 1910 by approximately 0.8ºC, with the strongest trend observed since the 1950s (Indian Ocean Climate Initiative, 2009).
- Perth has just experienced its driest 6 months and hottest summer on record (Fontaine, Matusick, Kala, Hawke, & Anderson, 2024)

4 Management

4.1 Review of Management 2017-2022

Comparisons can be made to the previous management plan to assess whether assets and threats are being adequately managed and whether management plans are being implemented.

Most threats have been contained since 2017, including Physical disturbances, large and repeat fires. Some weed species appear to have been eliminated or have been reduced to very low numbers so as not picked up in the 2022 surveys. In particular a focus on woody weed removal by the Friends Group and City of Melville has reduced the numbers of Geraldton Wax and weedy Acacia species.

Some threats not contained and require further focus on in this new management plan include:

- Trampling/informal track closure
- Weed control of Lachenalia, Moraea and clumping geophytes
- Bare ground

Many assets have been maintained, with some requiring more targeted surveying to determine if the species persists on site, as it was not found in 2022 surveys. Actions from the previous plan that were completed include:

- Increasing numbers of Banksia and Jacksonia sericea species planted
- Maintenance of bat boxes on site
- Establishment of reference sites

Lack of progress on re-establishment of *Conospermum triplinervium* was the main action that has been carried forward to this management plan. Track closures and monitoring of species to confirm presence has also been carried forward.

4.2 Management Objectives 2022-2026

4.2.1 Management Objectives for Threats

Management recommendations to address threats have been categorised based on the information summarised in Table 33 and applied in Table 34 and Table 35 (objectives for the life of this strategic management plan).

Table 33 Tiered Objectives for Threats

Objective	Leading Indicator	Applicable When
Prevent	• Prevent introduction to or occurrence of	• Threat absent from reserve • Unplanned Introduction Possible
Eliminate	• Reduce rate of density / abundance / extent (Eventual complete removal, but in short term may only be reduction of numbers or prevention of seed set onsite)	• Large discrepancy between current and potential impact • Potential impact high • Elimination feasible
Contain	• Stop, restrict, or reduce rate of spread or frequency of occurrence	• Moderate discrepancy between current and potential impact • Potential but not current impact high • Elimination not feasible
Manage	• Limit negative impacts on assets	• Small discrepancy between current and potential impact • Threat “naturalised” or near maximum extent • No information on density/abundance/extent

None	• Not Applicable	• Threat absent from reserve • Only Planned Introduction Possible

Table 34 Objectives for Weed Species

Objective	Impact	Weed Species / Group	2022 Extent	Comments
Prevent	Very High	Arum Lily Asparagus Fern Blackberry Golden Dodder Lantana Madeira Vine Narrowleaf Cottonbush Paterson's Curse Tamarisk Willows	0%	Not Present Onsite
	High	Giant Grasses		
Eliminate	Very High	One Leaf Cape Tulip	<1%	Eliminate 1 infestation
		Bridal Creeper	<1%	Eliminate 3 infestations
	High	Trees and Shrubs	15%	51 shrubs/trees (See Figure 55) and replace with revegetation of canopy species
		Brazillian Pepper		Eliminate small infestations
		African Cornflag		Newly recorded on site
		Clumping Geophytes	87%	Eliminate 4 *Watsonia meriana* infestations
Contain	Very High	Soldiers	25%	Reduce infestations in highest condition areas of the park
		Perennial Clumping Grasses	86%	Continue to decrease extent of infestation
	High	Annual Grasses	86%	Elimination not feasible in short to medium term
		Perennial Running Grass	>1%	
Manage	High	Clumping Geophytes	92%	Focus in terms of asset protection – Highest priorities are restoration sites and around flora species in low abundance
	Medium	All other perennial weeds	92%	
	Low	All other annual weeds	98%	

Control of weeds and methods should be undertaken in accordance with the City of Melville Weed Control guidelines.

Table 35 Objectives for all other Threats

Objective	Impact	Threat	Comments
Prevent	Very High	Acid Sulfate Soil	Monitoring required as groundwater extraction proposed
		Ferals (Foxes)	Absent - occasional incursion may occur and remove/eliminate with 10 working days of observations, before they permanently establish
		Ferals (Rabbits)	
		Ferals (Cats)	
	High	Fires (large)	Prevent fires that burn more than one third of bushland, in consultation with Department of Fire and Emergency Services. Continue fuel load management and focus on fuel loads close to assets/buildings.
	High	Ferals (Bees)	Absent – remove/eliminate with 10 working days of observations, before they permanently establish
	Medium	Diseases and Pathogens (Honey Fungus)	Assumed absent - never recorded in the City of Melville Apply appropriate hygiene standards for onground works to prevent introduction
Contain	Very High	Habitat Loss	Limit fragmentation of bushland (e.g. by paths) within reserves, close informal tracks. Investigate incorporating South East corner into the reserve through planning process/re-zoning to ensure habitat protection.
	High	Fire (repeat)	Limit fires burning same portion of bushland, in consultation with Department of Fire and Emergency Services
	Medium	Physical Disturbance	Public access adequately limited through provision of paths and use of soft barriers (such as plantings) and hard barriers (such as fences)

Manage	Very High	Diseases and Pathogens (Dieback)	Manage impacts directly through Phosphite applications. Use seed collected from dieback area of thriving plants for revegetation.
		Climate Change	Global-scale threat - cannot prevent, eliminate or contain by reserve scale actions. Manage through: • Prioritise weed removal and natural regeneration over planting of seedlings • limit the use of watering for revegetation • prioritisation of removal of high water use weeds (especially trees and shrubs) • investigate trialling species of more northern origin that might be more drought tolerant
	High	Ferals (Birds)	Regional-scale threat - cannot prevent, eliminate or contain by reserve scale actions. Advocate for state wide approach to feral bird management.
	Low	Ferals (Mice)	Likely ongoing presence due to adjacent urban areas - cannot prevent, eliminate or contain Manage indirectly through revegetation to offset seed predation
		Reticulation	Manage through maintenance and operation of reticulation to avoid drift or leaks into bushland

4.2.2 Management Goals for Assets

Management recommendations to address assets have been categorised based on the information summarised in Table 36 and applied in Table 38 and Table 37.

Table 36 Tiered Goals for Assets

Goal	Lagging Indicator	Applicable When
Enhance	Increase in either • extent • density • numbers or • occurrences	Asset can be enhanced and • occurs in only one reserve and/or • at risk of local extinction and/or • minimal cost (e.g. incorporated in revegetation program) and/or • reduces operational costs (e.g. reduces requirements for on-going for threat management)
Maintain	No decrease in either • extent • density • numbers or • occurrences	Asset can be maintained and • the asset occurs in a number of reserves and/or • not a risk of local extinction and/or • occurs in only one reserve but insufficient knowledge/resources to enhance
Confirm	Decrease in: • number of assets for which their presence is uncertain	Asset significant and • historic but no recent records in reserve and/or • potential to be in reserve based on habitat and/or proximity of other records
Monitor	No indices for management effectiveness	Assets that cannot be maintained by actions within City of Melville boundaries or for which no quantifiable indices exist and: • for which reserves are not critical component of habitat (e.g. highly mobile/wide roaming and/or infrequent/irregular visitors to the City of Melville) • there is a risk of local extinction from processes that cannot be mitigated by the City of Melville (e.g. climate change, some pathogens)

Table 37 Goals for Sites

Goal	Priority	Asset	Comments
Enhance	**Very High**	Habitat Trees	Increase canopy cover and long term replacement of habitat trees, focusing on good condition areas of bushland first. Non-native Eucalyptus species should be poisoned and retained as dead standing trees as part of the weed control program. FOWH have planted canopy species along Yagan's Genunny north and eastern side of Telefunken Dve circle. Collection of seed from trees surviving in the dieback area should be ongoing to help re-establish lost canopy, as well as increasing dieback resistant species such as Marri.
	High	Revegetation sites	Incorporate proposed FoWH planting areas into revegetation plan, along with informal tracks to close. Focus on canopy restoration as above and infill into areas of increasing bare ground.
		Habitat sites- bird watering station	Installation of a bird watering station in an area close to potable water and adjacent to bushland for Black Cockatoos

Maintain	**Very High**	Banksia woodland Threatened Ecological Community	Maintain condition rating of TEC area to ensure ongoing protection status- through weed control
		Heritage Site – Scar Tree	Assets that are expected to persist onsite if standard threat management procedures and guidelines are effective and implemented.
		Heritage Site – Heritage Trails	
	Medium	Revegetation Sites – existing plantings	Maintain establishment of plantings
		Revegetation Sites – bat boxes	Ensure large trees and boxes are regularly inspected and monitored. Where large trees are lost or appear aging, look to plant replacement trees.
		Habitat Sites – very large live native trees	

Table 38 Goals for Species

Goal	Priority	Asset	Comments
Enhance	**High**	*Conospermum triplinervium*	Re-establish a population within Wireless Hill
		Lechenaultia floribunda	Add to revegetation list to increase population
		Lobelia gibbosa	Add to revegetation list to increase population
		Hypocalymma angustifolium	Re-establish a population within Wireless Hill
		Regelia inops	Re-establish a population within Wireless Hill
	Low	*Banksia grandis*	Increase population across the park as it is susceptible to loss
		Banksia ilicifolia	Increase population across the park as it is susceptible to loss
Maintain	**Very High**	*Jacksonia sericea*	Abundant in park and can be increased through use as a ground cover along edges of paths
	High	*Smicrornis brevirostris*	Resident bird that does not require tree hollows for breeding onsite. Expected to persist onsite if standard threat management procedures and guidelines are effective and implemented.
	Low	*Tiliqua rugosa rugosa*	Reptiles expected to persist onsite if standard threat management procedures and guidelines are effective and implemented.
		Barnardius zonarius	Resident birds that require tree hollows for breeding onsite. Expected to persist onsite if standard threat management procedures and guidelines are effective and implemented.
		Pardalotus striatus	
		Phylidonyris novaehollandiae	
		Purpureicephalus spurius	
		Anthochaera lunulata	
Monitor	**Very High**	*Calyptorhynchus banksii naso*	Migratory bird species: maintain habitats only in form of existing overstorey trees onsite.
		Zanda latirostris	
		Merops ornatus	Migratory bird species: maintain habitats only in form of limiting disturbance of nests
	Low	*Chalinolobus gouldii*	Bat with large home range: maintain habitat in form of very large trees

Confirm	**Very High**	*Lerista lineata*	Reptile expected to persist onsite if standard threat management procedures and guidelines are effective and implemented.
	High	*Acanthiza apicalis*	Bird expected to persist onsite if standard threat management procedures and guidelines are effective and implemented especially that of habitat connectivity.
		Daphoenositta chrysoptera	Bird species locally extinct. Monitor to identify if it returns if standard threat management procedures and guidelines are effective and implemented.
		Acanthiza chrysorrhoa	
		Lucasium alboguttatum	Reptiles that are difficult to sample but expected to persist onsite if standard threat management procedures and guidelines are effective and implemented. Opportunity for community-based research project
		Astroloma ciliatum	Targeted survey or input from FoWH to determine presence on site
		Astroloma macrocalyx	
		Billardiera fraseri	
		Chordifex sinuosus	
		Cyanicula gemmata	
		Johnsonia pubescens	
		Juncus subsecundus	
		Lomandra integra	
		Melaleuca trichophylla	
		Olearia elaeophila	

		Pheladenia deformis	
		Pithocarpa cordata	
		Pterostylis barbata	
		Stylidium repens	
	Medium	*Pletholax gracilis*	Reptiles that are difficult to sample but expected to persist onsite if standard threat management procedures and guidelines are effective and implemented. Opportunity for community-based research project
		Ramphotyphlops australis	
		Varanus gouldii	
	Low	*Ctenotus australis*	Reptiles that are difficult to sample but expected to persist onsite if standard threat management procedures and guidelines are effective and implemented. Opportunity for community-based research project
		Ctenotus fallens	
		Pogona minor	
		Pseudonaja affinis	
		Myobatrachus gouldii	Frog capable of surviving independent of wetlands Eats termites and other small invertebrates - increase lying deadwood and coarse woody material (>10 cm diameter) on ground.
		Ninox novaeseelandiae	Nocturnal resident bird that requires tree hollows for breeding onsite. Expected to persist onsite if standard threat management procedures and guidelines are effective and implemented.

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Appendix 1 Native Flora

Map = Confirmed and Distribution Mapped in Report

Table 39 Native Flora Inventory

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
AMARANTHACEAE	*Ptilotus drummondii*	Scattered	1		1	1	1		
	Ptilotus polystachyus	Widespread	1		1	1	1		
ANARTHRIACEAE	*Lyginia barbata*	Scattered	1	1	1	1	1		
	Lyginia imberbis	Scattered				1			
APIACEAE	*Eryngium pinnatifidum subsp. pinnatifidum*	Widespread	1	1	1	1	1		
	Homalosciadium homalocarpum	-		1					
	Xanthosia huegelii	Scattered	1	1	1	1	1		
ARALIACEAE	*Trachymene pilosa*	Scattered		1	1	1	1		
ASPARAGACEAE	*Acanthocarpus preissii*	-	1		1				
	Chamaescilla corymbosa var. corymbosa	Scattered	1	1	1	1	1		
	Laxmannia squarrosa	Widespread	1		1	1	1		
	Lomandra caespitosa	Few		1	1	1			Map
	Lomandra hermaphrodita	Few			1	1	1		
	Lomandra integra	Few				1			Map
	Lomandra nigricans	Widespread	1		1	1	1		
	Lomandra odora	Scattered			1	1	1		
	Lomandra preissii	Widespread			1	1	1		
	Lomandra suaveolens	-			1				
	Sowerbaea laxiflora	Scattered	1	1	1	1	1		
	Thysanotus arenarius	Widespread		1	1	1	1		
	Thysanotus manglesianus	Occasional		1		1			
	Thysanotus multiflorus	-	1		1				
	Thysanotus patersonii	Scattered	1		1	1	1		
	Thysanotus sparteus	Widespread	1		1	1	1		
	Thysanotus thyrsoideus	Scattered			1	1	1		
	Thysanotus triandrus	Widespread			1	1	1		
ASTERACEAE	*Asteridea pulverulenta*	Widespread	1	1	1	1	1		
	Brachyscome iberidifolia	Scattered			1	1	1		
	Craspedia variabilis	Occasional				1			
	Lagenophora huegelii	Scattered		1	1	1	1		
	Olearia elaeophila	Few			1	1	1		

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
	Pithocarpa cordata	Few			1	1	1		
	Podotheca angustifolia	Scattered			1	1	1		
	Podotheca chrysantha	Scattered	1			1	1		
	Podotheca gnaphalioides	Scattered			1	1	1		
	Rhodanthe chlorocephala	Occasional				1			
	Senecio pinnatifolius	Scattered			1	1	1		
	Waitzia suaveolens	Widespread	1		1	1	1		
BRASSICACEAE	*Stenopetalum gracile*	Scattered				1			
	Stenopetalum robustum	Occasional	1		1	1	1		
CAMPANULACEAE	*Isotoma hypocrateriformis*	Occasional			1	1	1		
	Lobelia gibbosa	Few	1		1	1	1		Map
	Lobelia tenuior	Scattered			1	1	1		
	Wahlenbergia preissii	Scattered		1	1	1	1		
CASUARINACEAE	*Allocasuarina fraseriana*	Widespread	1		1	1	1		Map
	Allocasuarina humilis	Widespread	1		1	1	1		
CELASTRACEAE	*Tripterococcus brunonis*	Scattered	1		1	1	1		
CENTROLEPIDACEAE	*Centrolepis drummondiana*	-		1					
COLCHICACEAE	*Burchardia congesta*	Widespread	1	1	1	1	1		
CRASSULACEAE	*Crassula colorata var. acuminata*	Scattered				1	1		
CYPERACEAE	*Lepidosperma aff. squamatum*	Occasional				1			
	Lepidosperma angustatum	Scattered	1		1	1	1		
	Lepidosperma scabrum	Scattered	1		1	1	1		
	Lepidosperma sp. (Coastal terete)	-		1					
	Lepidosperma squamatum	-		1					
	Mesomelaena pseudostygia	Widespread	1	1	1	1	1		
	Schoenus clandestinus	-		1					
	Schoenus curvifolius	Scattered			1	1	1		
	Tetraria octandra	Scattered	1	1	1	1	1		
DASYPOGONACEAE	*Calectasia narragara*	Widespread	1		1	1	1		
	Dasypogon bromeliifolius	Scattered	1	1	1	1	1		
DILLENIACEAE	*Hibbertia huegelii*	Widespread	1		1	1	1		
	Hibbertia hypericoides	Widespread	1	1	1	1	1		
	Hibbertia racemosa	Scattered	1		1	1	1		
	Hibbertia subvaginata	-			1				

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
	Drosera erythrorhiza	Widespread	1		1	1	1		
	Drosera macrantha	Widespread			1	1	1		
	Drosera menziesii subsp.penicillaris	Widespread	1		1	1	1		
DROSERACEAE	*Drosera paleacea subsp.paleacea*	Scattered			1	1	1		
	Drosera pallida	Widespread		1		1			
	Drosera porrecta	-			1				
	Drosera stolonifera subsp.stolonifera	Widespread	1	1	1	1	1		
	Astroloma ciliatum	Few			1	1	1		Map
	Astroloma macrocalyx	Few			1	1	1		
	Astroloma pallidum	Scattered	1		1	1	1		
EPACRIDACEAE	*Conostephium pendulum*	Widespread	1	1	1	1	1		
	Conostephium preissii	Scattered	1		1	1	1		
	Leucopogon propinquus	Widespread	1		1	1	1		
	Leucopogon racemulosus	-	1		1				
EUPHORBIACEAE	*Monotaxis grandiflora*	Scattered	1	1	1	1	1		
	Acacia applanata	Few				1			Map
	Acacia huegelii	Scattered	1		1	1	1		Map
	Acacia pulchella	Scattered	1		1	1	1		Map
	Acacia saligna	Scattered	1		1	1	1		
	Acacia sessilis	Occasional			1	1	1		
	Acacia stenoptera	Widespread	1	1	1	1	1		
	Acacia willdenowiana	Scattered	1	1	1	1	1		
	Bossiaea eriocarpa	Widespread	1		1	1	1		
	Daviesia decurrens	Occasional	1		1	1	1		
	Daviesia divaricata subsp. divaricata	Scattered	1	1	1	1	1		
FABACEAE	*Daviesia nudiflora subsp. nudiflora*	Scattered	1	1	1	1	1		
	Daviesia physodes	Scattered	1		1	1	1		
	Daviesia trifloral	Widespread		1	1	1	1		
	Gastrolobium capitatum	Widespread	1	1	1	1	1		
	Gastrolobium ebracteolatum	-	1		1				
	Gompholobium tomentosum	Widespread	1	1	1	1	1		
	Hardenbergia comptoniana	Widespread	1	1	1	1	1		
	Hovea trisperma var. *trisperma*	Scattered	1	1	1	1	1		
	Isotropis cuneifolia subsp. cuneifolia	Widespread	1	1	1	1	1		
	Jacksonia alata	-	1		1				
	Jacksonia furcellata	Scattered	1		1	1	1		

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
FABACEAE	*Jacksonia sericea*	Widespread	1		1	1	1		
	Jacksonia sternbergiana	Widespread	1		1	1	1		
	Kennedia prostrata	Widespread	1	1	1	1	1		
GOODENIACEAE	*Dampiera linearis*	Widespread	1	1	1	1	1		
	Lechenaultia floribunda	Few	1		1	1	1		
	Scaevola canescens	Widespread	1	1	1	1	1		
	Scaevola repens var. *repens*	Scattered	1	1	1	1	1		
HAEMODORACEAE	*Anigozanthos humilis subsp. humilis*	Widespread	1		1	1	1		
	Anigozanthos manglesii subsp. manglesii	Widespread	1	1	1	1	1		
	Conostylis aculeata	Widespread	1	1	1	1	1		
	Conostylis aurea	Widespread			1	1	1		
	Conostylis juncea	Few	1		1	1			Map
	Conostylis setigera subsp. setigera	Widespread	1	1	1	1	1		
	Haemodorum laxum	-			1	1	1		
	Haemodorum spicatum	Scattered	1		1	1	1		
	Phlebocarya ciliata	Scattered	1		1	1	1		
	Phlebocarya filifolia	Scattered			1	1	1		
HALORAGACEAE	*Gonocarpus sp.*	-	1		1				
HEMEROCALLIDACEAE	*Arnocrinum preissii*	Widespread	1		1	1	1		
	Caesia micrantha	Scattered			1	1			
	Corynotheca micrantha	Scattered	1		1	1	1		
	Dianella revoluta var. *divaricata*	Scattered	1	1	1	1	1		
	Johnsonia pubescens	Few			1	1	1		
	Tricoryne elatior	Scattered	1		1	1	1		
IRIDACEAE	*Patersonia occidentalis*	Widespread	1	1	1	1	1		
JUNCACEAE	*Juncus subsecundus*	Few				1			
	Luzula meridionalis	Occasional			1	1	1		
LAMIACEAE	*Hemiandra pungens*	Scattered	1		1	1	1		
LORANTHACEAE	*Nuytsia floribunda*	Few	1		1	1	1		Map
MOLLUGINACEAE	*Macarthuria australis*	Widespread	1		1	1	1		
MYRTACEAE	*Babingtonia camphorosmae*	Scattered	1		1	1	1		Map
	Calytrix flavescens	Occasional	1		1	1	1		
	Calytrix fraseri	Scattered			1	1	1		
	Corymbia calophylla	Widespread	1	1	1	1	1		Map
	Eremaea pauciflora	Scattered	1		1	1	1		
	Eucalyptus gomphocephala	Few							Map

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
	Eucalyptus marginata subsp. Marginata	Widespread	1	1	1	1	1		Map
	Hypocalymma angustifolium	Few				1			
	Hypocalymma robustum	Widespread	1		1	1	1		
	Kunzea glabrescens	Scattered				1			
MYRTACEAE	*Melaleuca systena*	Scattered				1			Map
	Melaleuca trichophylla	Few				1			Map
	Regelia inops	Few			1	1	1		Map
	Scholtzia involucrata	Few			1	1	1		Map
	Verticordia densiflora var. densiflora	Few	1		1	1	1		Map
	Caladenia arenicola	Scattered			1	1		Map	
	Caladenia discoidea	Scattered	1		1	1	1	Map	
	Caladenia falcata	Occasional						Map	
	Caladenia flava subsp. flava	Widespread	1		1	1	1	Map	
	Caladenia georgei	Scattered	1	1	1	1	1		
	Caladenia latifolia	Occasional			1	1	1	Map	
	Caladenia longicauda	Scattered	1		1	1	1	Map	
	Cyanicula gemmata	Few			1	1	1		
	Diuris corymbosa / magnifica	Widespread				1		Map	
	Diuris longifolia	Widespread	1	1	1	1	1		
	Eriochilus dilatatus	Occasional	1		1	1	1		
	Lyperanthus serratus	Scattered	1	1	1	1	1	Map	
ORCHIDACEAE	*Microtis media* subsp. *densiflora*	Scattered			1	1	1	Map	
	Pheladenia deformis	Few	1		1	1	1	Map	
	Prasophyllum hians	Scattered	1		1	1	1		
	Prasophyllum parvifolium	Few			1	1	1	Map	
	Prasophyllum plumiforme	Scattered				1		Map	
	Pterostylis aff. nana	Scattered				1			
	Pterostylis barbata	Few						Map	
	Pterostylis recurva	Few			1	1	1	Map	
	Pterostylis sanguinea / vittata	Widespread	1		2	1	1	Map	
	Pyrorchis nigricans	Scattered			1			Map	
	Thelymitra campanulata	-						Map	
	Thelymitra crinita	-						Map	
	Thelymitra macrophylla	Occasional				1		Map	
PHYLLANTHACEAE	*Phyllanthus calycinus*	Scattered	1		1	1	1		Map
PITTOSPORACEAE	*Billardiera fraseri*	Few				1			Map

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
POACEAE	*Amphipogon turbinatus*	Widespread		1	1	1	1		
	Austrostipa compressa	Widespread		1	1	1	1		
	Neurachne alopecuroidea	Occasional			1	1	1		
	Poa drummondiana	-		1					
POLYGALACEAE	*Comesperma calymega*	Scattered	1		1	1	1		
PORTULACACEAE	*Calandrinia corrigioloides*	Widespread			1	1	1		
	Calandrinia liniflora	Scattered			1	1	1		
PROTEACEAE	*Banksia attenuata*	Widespread	1	1	1	1	1		
	Banksia grandis	Few	1		1	1	1		Map
	Banksia ilicifolia	Few	1		1	1	1		Map
	Banksia lindleyana	Scattered	1		1	1	1		
	Banksia menziesii	Widespread	1	1	1	1	1		Map
	Banksia sessilis var. *cygnorum*	Scattered	1		1	1	1		Map
	Conospermum triplinervium	Extinct	1		1	1	1		Map
	Dryandra lindleyana	Widespread		1					
	Grevillea vestita	Scattered	1		1	1	1		Map
	Hakea prostrata	Scattered	1		1	1	1		
	Persoonia saccata	Scattered	1		1	1	1		Map
	Petrophile linearis	Widespread	1	1	1	1	1		
	Petrophile macrostachya	Widespread	1		1	1	1		
	Stirlingia latifolia	Widespread	1	1	1	1	1		
	Synaphea spinulosa	Scattered	1		1	1	1		Map
RESTIONACEAE	*Chordifex sinuosus*	Few				1			
	Desmocladus fasciculatus	Scattered		1	1	1	1		
	Desmocladus flexuosus	Scattered	1	1	1	1	1		
	Hypolaena exsulca	Widespread		1	1	1	1		
	Lepidobolus chaetocephalus	-			1				
	Lepidobolus preissianus	Scattered		1		1	1		
RUBIACEAE	*Opercularia vaginata*	Widespread	1		1	1	1		
RUTACEAE	*Boronia ramosa*	Occasional			1	1	1		
	Philotheca spicata	Occasional	1	1	1	1			
STYLIDIACEAE	*Levenhookia pusilla*	-	1		1				
	Levenhookia stipitata	Scattered			1	1	1		
	Stylidium amoenum	-	1		1				
	Stylidium brunonianum	Widespread	1		1	1	1		
	Stylidium carnosum	Scattered	1		1	1	1		

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
	Stylidium piliferum	Widespread	1		1	1	1		
	Stylidium repens	Few				1			Map
	Stylidium schoenoides	Scattered	1		1	1	1		
THYMELAEACEAE	*Pimelea rosea*	Scattered	1		1	1	1		Map
	Pimelea sulphurea	Widespread	1		1	1	1		
VIOLACEAE	*Hybanthus calycinus*	Widespread	1		1	1	1		
XANTHORRHOEACEAE	*Xanthorrhoea brunonis*	Widespread	1		1	1	1		
	Xanthorrhoea preissii	Widespread	1	1	1	1	1		
ZAMIACEAE	*Macrozamia fraseri*	Widespread	1	1	1	1	1		
	Total	**219**	**130**	**65**	**184**	**194**	**168**	**19**	**33**

FAMILY	Taxa	Distribution/ Abundance (Creed, 2012) (McGrath, 1999)	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Wireless Hill Park 2012	Orchid Survey 2010-2011	Flora Survey 2016
ASTERACEAE	*Olearia axillaris*	Few							Map
CHENOPODIACEAE	*Rhagodia baccata*	Few							Map
MYRTACEAE	*Melaleuca preissiana*	Few							Map

Very High and High Value Native Flora Species

Orchid species

Figure 46 Orchid Distribution 2022

Styphelia macrocalyx, Swan Berry

Figure 47 Styphelia macrocalyx Photo

Figure 48 Styphelia macrocalyx Distribution 2016

Styphelia macrocalyx, Swan Berry

- Occurs from Regans Ford to Williams (Barrett & Pin Tay, 2005)
- Occurs on grey or yellow sand (Barrett & Pin Tay, 2005)
- Occurs on Karrakatta and Bassendean soils (Powell & Emberson, 1996)
- Scattered in Kings Park (Barrett & Pin Tay, 2005)
- 'poorly reserved' in the region (Government of Western Australia, 2000)
- One plant recorded in Wireless Hill Park at a different location in 1999, just north of ring road (McGrath, 1999)

Banksia Tree Species

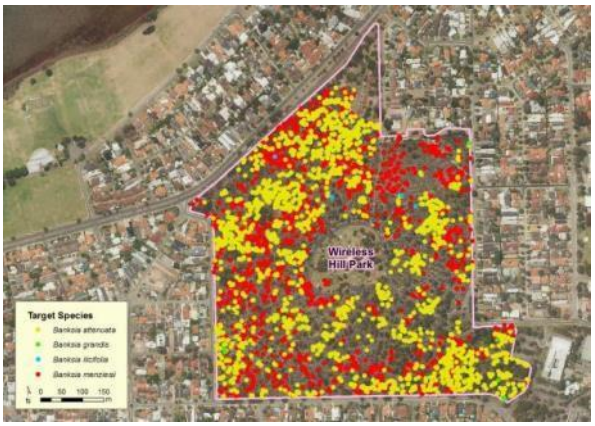

Figure 49 Banksia tree Distribution 2016

Banksia littoralis, Swamp Banksia

- Resprouts after fire (George, 1996)
- Occurs in low-lying winter damp areas, often in association with Melaleuca preissiana
- (George, 1996)
- Slow-growing, flowers 5-7 years after germinating from seed (Collins, Collins, & George, 2009)
- 85% of all known occurrences in Western Australia consist of less than 100 plants (Taylor & Hopper, 1991)

Banksia ilicifolia, Holly-leaved Banksia

- Is at significant risk of local extinction in Kings Park due to low abundance (Crosti, Dixon, Ladd, & Yates, 2007)

Banksia attenuata, Slender Banksia and *Banksia menziesii,* Firewood Banksia:

- Are both susceptible to dieback;
- Appear to be increasing in Ron Carroll Reserve as they recover from fire;
- Appear to be in decline in Heathcote Reserve, and the North-West and the Estuarine Reserves;
- Have both declined in Kings Park over a 60 year period due to post dispersal seed predation and seasonal deaths (Crosti, Dixon, Ladd, & Yates, 2007).
- Are both in lower densities in long isolated small urban bushland remnants (within 30 km of the Perth CBD on Bassendean or Spearwood soils), with high fire frequencies and declining water tables possibly amongst the contributing factors (Ramalho, 2012).

Banksia grandis, Bull Banksia

- Is at significant risk of local extinction in Kings Park due to its low abundance, where there was an average of 2.11 plants/ha over 267 hectare of bushland, or approximately

560 plants (Crosti, Dixon, Ladd, & Yates, 2007);

- The natural replacement rate is slow given it doesn't set seed until more than ten years old (George, 1996); and
    - Seeds are generally deposited within 15 metres of the parent plant (Powell, 2009).

Conospermum triplinervium, Tree Smokebush

Figure 50 Conospermum triplinervium Photo

Table 41 Abundance of *Conospermum triplinervium* Trees in the City of Melville

Species	South-Eastern (uninfested) Reserves (2 reserves)	South-Eastern (infested) Reserves (8 reserves)#	Eastern Reserves (3 reserves)	Bullcreek Reserves (7 reserves)	North-West Reserves (3 reserves)	Estuarine Reserves+ (4 reserves)	Heathcote Reserve (1 reserve)	Wireless Reserve (1 reserve)	Piney Lakes Reserve (1 reserve)	Quenda (1 reserve)	Central (modified) (2 reserves)	Central (2 reserves)	Total (35 reserves)
Conospermum triplinervium	0	0	0 (extinct)	0	1	0	0 (extinct)	0 (extinct)	3^	0	3	0	**7**

^assumed planted

Conospermum triplinervium, Tree Smokebush:

- Previously recorded, but now extinct in Wireless Hill Park
- Limited to a small area in the southern part of Wireless Hill Park, just east of the slab path in 1999 (McGrath, 1999)
- Also previously recorded, but now extinct at Point Walter and Heathcote
- Ambiguous whether planted in Ken Ingram Park and Piney Lakes Reserve
- On the Swan Coastal Plain it usually grows in sand over limestone (Powell, 2009) and is present, but with a restricted habitat, in Kings Park (Main & Serventy, 1957)
- Some individuals and populations are fire sensitive as most plants lack a lignotuber, although a few plants in Kings Park have regenerated from lignotubers (Bennett, 2013) and plants resprouted after a fire in 1992 at Point Walter (Greening Western Australia Point Walter Group, 1994)
- Easy to propagate and rapidly establishes (can reach 3 metres and flowers in 3 years) (Sainsbury, 1991)
- Different forms of species exist (Sainsbury, 1991) so source of propagation material important

Jacksonia sericea

Figure 51 Jacksonia sericea Photo Jacksonia sericea:

- Occurs from Neerabup National Park, through suburban Perth, to the Mandurah- Pinjarra area (Kelly, Taylor, Langley, Spooner, & Coates, 1993)
- Typically occurs on Cottesloe soils (Powell & Emberson, 1996)
- Previously estimated >1300 plants in Wireless Hill Park (Kelly, Taylor, Langley, Spooner, & Coates, 1993)
- Grows on sandy or calcareous soils, often overlying limestone, in *Banksia menziesii-Banksia attenuata* open woodland or low heath, sometimes in association with *Eucalyptus marginata* and *Eucalyptus gomphocephala* (Kelly, Taylor, Langley, Spooner, & Coates, 1993)
- More abundant in open areas and can be favoured by disturbance (Kelly, Taylor, Langley, Spooner, & Coates, 1993)
- Is listed as Priority 4 species by DPaW, which means it is considered either Rare, Near Threatened or in need of monitoring
    a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
    b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.
    c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Melaleuca systena, Coastal Honeymyrtle

Figure 52 Melaleuca systena Photo

Figure 53 Melaleuca systena

Distribution 2016 Table 42 Abundance of *Melaleuca systena* Shrubs in the City of Melville

Species	South-Eastern (uninfested) Reserves (2 reserves)	South-Eastern (infested) Reserves (8 reserves)#	Eastern Reserves (3 reserves)	Bullcreek Reserves (7 reserves)	North-West Reserves (3 reserves)	Estuarine Reserves+ (4 reserves)	Heathcote Reserve (1 reserve)	Wireless Reserve (1 reserve)	Piney Lakes Reserve (1 reserve)	Quenda (1 reserve)	Central (modified) (2 reserves)	Central (2 reserves)	Total (35 reserves)
Melaleuca systena	0	0	0	0	0	142	Extinct	10	0	0	0	0	152

@present but not counted
^assumed planted

Melaleuca systena:

- Common on limestone and dune areas, particularly heathland in secondary dunes (Dixon, 2011).
- Potential establishment sites on limestone outcrops in Point Walter and Heathcote Reserves.
- Readily propagated from seed (Dixon, 2011).
- Exceptional species for costal restoration with rapid growth, long life expectancy and abundant flowering within two years of planting. Must be planted with species of similar growth forms such as *Olearia axillaris* and *Phyllanthus calycinus*. Avoid exposed sites as the species is particularly susceptible to wind and salt damage (Dixon, 2011)
- Potential to be confused with superficially similar small *Kunzea glabrescens*, Spearwood.
- Now part of a Threatened Ecological Community Honeymyrtle Shrubland

Appendix 2 Weeds

Table 43 Weed Inventory

Species	Common Name	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Park 2012	Flora Survey 2016	Flora Survey 2022
Acacia iteaphylla	Flinders Range Wattle						1	1
Acacia longifolia	Sydney Golden Wattle						1	
Acacia podalyriifolia	Queensland Silver Wattle						1	
Aira caryophyllea	Silvery Hairgrass		1					1
Aira cupaniana								1
Allocasuarina species	Sheoak						1	
Arctotheca calendula	Cape Weed		1	1	1	1		1
Asparagus asparagoides	Bridal Creeper						1	1
Avena barbata	Bearded Oat	1		1			1	1
Avena fatua	Wild Oat		1			1	1	
Brachychiton populneus	Kurrajong						1	1
Brassica barrelieri subsp. oxyrrhina	Smooth-stem Turnip					1		
Brassica tournefortii								1
Briza maxima	Blowfly Grass	1	1	1	1	1		1
Briza minor	Shivery Grass		1	1				
Bromus diandrus	Great Brome			1		1	1	1
Bromus hordeaceus								1
Callitris preissii	Rottnest Island Pine, Maro						1	
Callistemon citrinus								1
Carpobrotus edulis	Hottentot Fig	1		1	1			
Cenchrus echinatus	Burrgrass			1				
Cenchrus longisetus	Feathertop	1		1			1	
Cenchrus setaceus	Fountain Grass			1		1		
Chamaecytisus palmensis	Tagasaste			1			1	
Chamelaucium uncinatum	Geraldton Wax	1		1	1	1	1	1
Chasmanthe floribunda	African Cornflag							1
Crassula glomerata								1
Cynodon dactylon	Couch Grass							1
Conyza bonariensis	Flaxleaf Fleabane			1				
Conyza sumatrensis						1		
Corymbia citriodora	Lemon Scented Gum			1			1	
Corymbia maculata								1

Daviesia aphylla		1		1			1	
Daviesia gracilis		1		1			1	
Daviesia gracilis		1		1				

Species	Common Name	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Park 2012	Flora Survey 2016	Flora Survey 2022
Dischisma capitatum	Woolly-headed Dischisma			1	1	1		1
Disa bracteata								1
Ehrharta calycina	Perennial Veldt Grass	1	1	1		1	1	1
Ehrharta longiflora	Annual Veldt Grass					1	1	1
Eragrostis curvula	African Lovegrass			1		1	1	
Erigeron bonariensis								1
Erigeron sumatrensis								1
Erodium botrys	Long Storksbill			1		1		
Erodium moschatum	Musky Crowfoot					1		
Eucalyptus caesia	Caesia			1			1	1
Eucalyptus cladocalyx	Sugar Gum			1			1	
Eucalyptus erythrocorys	Illyarrie			1	1		1	1
Eucalyptus leucoxylon								1
Eucalyptus pleurocarpa								1
Eucalyptus species	Gum Tree						1	1
Euphorbia peplus	Petty Spurge					1		
Ferraria crispa	Black Flag						1	
Freesia alba x leichtlinii	Freesia	1		1		1	1	
Fumaria capreolata	Whiteflower Fumitory					1		
Gazania linearis	Gazania			1				
Gladiolus caryophyllaceus	Wild Gladiolus	1	1	1	1	1	1	
Heliophila pusilla				1		1		
Hypochaeris glabra	Smooth Catsear	1	1	1				
Isolepis marginata	Coarse Club-rush			1	1			
Lachenalia reflexa	Soldiers		1	1	1	1	1	
Lagurus ovatus	Hare's Tail Grass	1		1			1	
Leptospermum laevigatum	Coast Teatree						1	
Lolium perenne	Perennial Ryegrass					1	1	
Lophostemon confertus	Queensland Box Tree						1	
Lupinus cosentinii	Sandplain Lupin			1				
Lysimachia arvensis	Pimpernel			1		1		
Medicago polymorpha	Burr Medic					1		

Melaleuca nesophila	Mindiyed						1	
Melaleuca scabra	Rough Honeymyrtle	1		1	1		1	
Melia azedarach	White Cedar			1			1	

Species	Common Name	Management Plan 1984	CALM Quadrats 1994	Management Plan 1999	Plants at Wireless Hill 1999	Wildflowers in Park 2012	Flora Survey 2016	Flora Survey 2022
Monoculus monstrosus	Stinking Roger		1	1	1	1		
Moraea miniata	Two-leaf Cape Tulip						1	
Nerium oleander	Oleander			1			1	
Olea europaea	Olive						1	
Orobanche minor	Lesser Broomrape			1		1		
Oxalis glabra	Fingerleaf Oxalis			1	1	1	1	
Oxalis pes-caprae	Soursob			1	1	1	1	
Pelargonium capitatum	Rose Pelargonium	1	1	1	1	1	1	
Petrorhagia dubia			1					
Petrorhagia velutina	Velvet Pink			1	1	1		
Romulea flava						1	1	
Romulea rosea	Guildford Grass			1	1	1	1	
Schinus terebinthifolius	Brazilian Pepper			1			1	
Silene gallica	French Catchfly	1	1	1	1	1		
Solanum nigrum	Black Berry Nightshade					1		
Sonchus oleraceus	Common Sowthistle		1					
Trachyandra divaricata		1		1				
Trifolium angustifolium	Narrowleaf Clover				1	1		
Trifolium arvense	Hare's Foot Clover	1		1		1		
Trifolium campestre	Hop Clover					1		
Trifolium hirtum	Rose Clover					1		
Ursinia anthemoides	Ursinia	1	1	1	1	1		
Wahlenbergia capensis	Cape Bluebell	1	1	1	1	1		
Watsonia meriana var. bulbillifera	Bugle Lily			1		1	1	

Weed Distributions

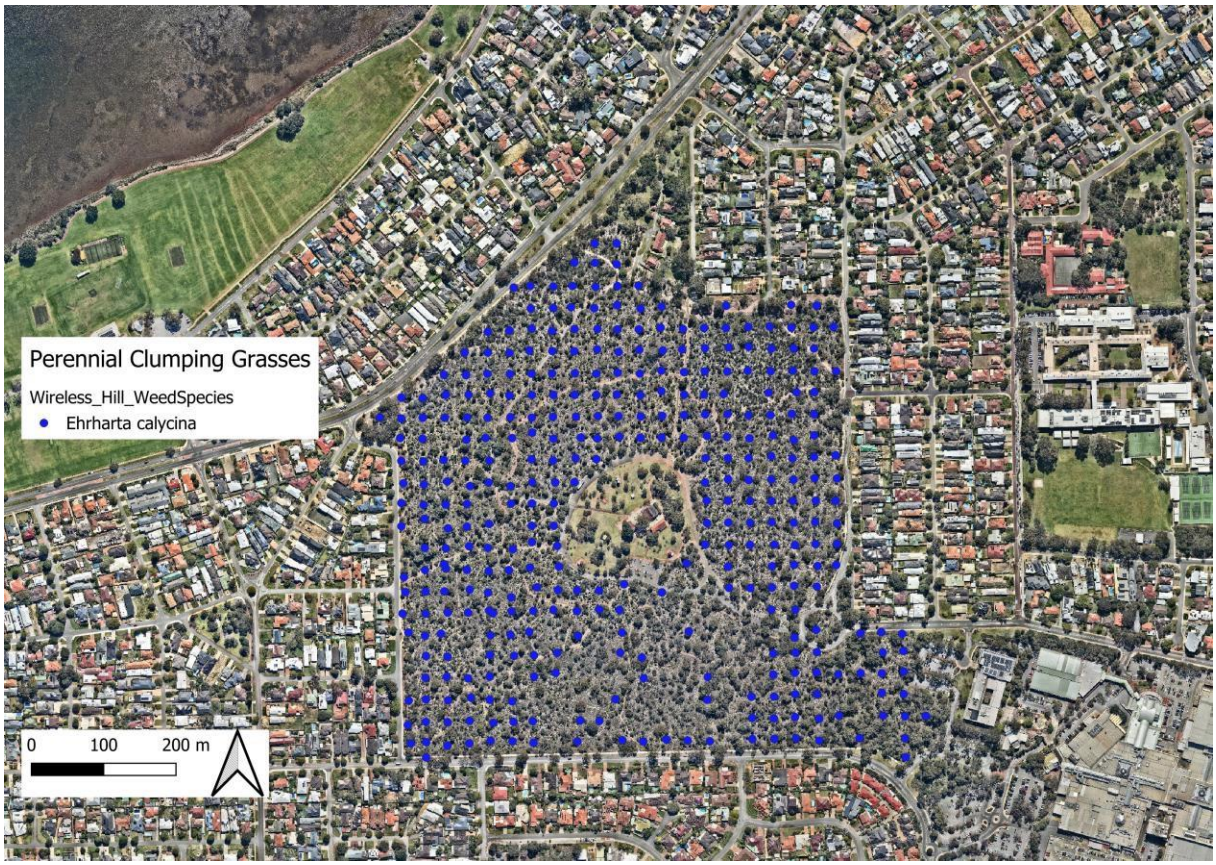

Figure 54 Perennial Clumping Grasses 2022

Figure 55 Annual Grasses distribution 2022

Figure 56 Perennial Running Grasses 2022

Figure 57 Geophytes 2022

Figure 58 Geraldton Wax distribution change between 2017- 2022

Figure 59 Weed Acacias distribution change between 2017- 2022

Appendix 3 Native Fauna

Locally extinct species excluded from list

“At Risk” categories
(species of particular sensitivity in urban areas):
X = listed as “at risk” by City of Melville # = additionally identified by BCE
“D“ = deleted/removed by BCE

Status categories:
CS 1 = listed under legislation
CS2 = listed as Priority by DPaW.

Survey categories:
Shading = not surveyed at that time
No shading = surveyed at that time

Population categories:
R = Resident
Mb. = Regular breeding migrant
Mnb = Regular non-breeding migrant
Vis = Visitor
Vag = Vagrant

Table 44 Native Mammal Inventory

Family	Species	At risk category	Conservation Status	City of Melville Population	Wireless Hill Park Population	Confirmed 1983	Confirmed 1998	Confirmed 2003	Confirmed 2001-2005	Confirmed 2016	Confirmed 2022
Vespertilionidae (vesper bats)	Gould’s Wattled Bat *Chalinolobus gouldii*	X		R	R					1	1

Table 45 Native Reptile and Amphibian Inventory

Family	Species	At risk category	Conservation Status	City of Melville Population	Wireless Hill Park Population	Confirmed 1983	Confirmed 1998	Confirmed 2003	Confirmed 2001-2005	Confirmed 2016	Confirmed 2020	Confirmed 2022
Myobatrachidae (ground frogs)	Turtle Frog *Myobatrachus gouldii*	#		R	R		1				1	
Gekkonidae (geckoes)	White-spotted Ground Gecko *Lucasium alboguttatum*					1						
Pygopodidae (legless lizards)	Keeled Legless Lizard *Pletholax gracilis*	X		R	R	1					1	
	Fraser’s Delma *Delma fraseri*											1
	Burton’s Legless Lizard *Lialis burtonis*										1	1
Agamidae (dragon lizards)	Western Bearded Dragon *Pogona minor*	#		R	R	1	1				1	
Varanidae (monitors or goannas)	Gould’s Sand Goanna *Varanus gouldii*	X		R	R	1	1				1	
Scincidae (skink lizards)	Western Three Lined Skink *Acritoscincus trilineatus*											1
	Fence Skink *Cryptoblepharus buchananii*			R	R		1			1	1	
	Fence Skink *Cryptoblepharus virgatus*											1
	West Coast Ctenotus *Ctenotus fallens*	#		R	R	1					1	
	Western Limestone Ctenotus *Ctenotus australis*	#		R	R	1	1				1	
	Two-toed Earless Skink *Hemiergis quadrilineata*			R	R		1				1	1
	Perth Lined Lerista *Lerista lineata*	X	CS2	R	R		1				1	1
	Dwarf Skink *Menetia greyii*			R	R	1	1				1	
	Bobtail Skink *Tiliqua rugosa*	#		R	R	1	1			1	1	1
Typhlopidae (blind snakes)	Southern Blind Snake *Anilios (previously Ramphotyphlops) australis*	X		R	R	1					1	
Elapidae (front-fanged snakes)	Dugite *Pseudonaja affinis*	#		R	R		1				1	

Table 46 Native Bird Inventory

Family	Species	At risk category	Conservation Status	City of Melville Population	Wireless Hill Park Population	Confirmed 1983	Confirmed 1998	Confirmed 2003	Confirmed 2001-2005	Confirmed 2016	Confirmed 2022
Columbidae (pigeons and doves)	Common Bronzewing *Phaps chalcoptera*	X		Vis	Vag			1			
Ardeidae (herons and egrets)	Australian White Ibis *Threskiornis molucca*			Vis	Vis					1	
Accipitridae (kites, hawks and eagles)	Collared Sparrowhawk *Accipiter cirrhocephalus*			R	R			1		1	
Falconidae (falcons)	Nankeen Kestrel *Falco cenchroides*			R	Vis	1					
Turnicidae (button-quails)	Painted Button-quail *Turnix varia*	X		R	Vis			1		1	
Cacatuidae (cockatoos)	Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso*	X	CS1	R	Vis					1	
	Carnaby's Black-Cockatoo *Zanda latirostris*	X	CS1	M?b	Vis	1		1		1	
	Galah *Cacatua roseicapilla*	D		R	Vis			1			
Psittacidae (lorikeets and parrots)	Australian Ringneck *Barnardius zonarius*	X		R	R	1		?b		1	
	Red-capped Parrot *Purpureicephalus spurious*	X		R	R	1		?b		1	
Cuculidae (cuckoos)	Fan-tailed Cuckoo *Cuculus pyrrhophanus*	#		Mb	Vag	1					
Strigidae (hawk-owls)	Southern Boobook Owl *Ninox novaeseelandiae*	#		R	R	1					
Podargidae	Tawny Frogmouth *Podargus strigoides*										1
Halcyonidae (forest kingfishers)	Sacred Kingfisher *Todiramphus sanctus*	X		Mb	Mb	1					
Meropidae (bee-eaters)	Rainbow Bee-eater *Merops ornatus*	X	CS1	Mb	Mb	1		b			
Acanthizidae (thornbills and allies)	Weebill *Smicrornis brevirostris*	X		R	R					1	
	Western Gerygone *Gerygone fusca*			R	R	1		1		1	
	Inland Thornbill *Acanthiza apicalis*	X		R	R	1		1			
	Yellow-rumped Thornbill *Acanthiza chrysorrhoa*	X		R	E	1					
Pardalotidae (pardalotes)	Striated Pardalote *Pardalotus striatus*	X		R	R	1		b		1	
Meliphagidae (honeyeaters)	Western Spinebill *Acanthorhynchus superciliosus*	X		R	Vag			1			
	Singing Honeyeater *Gavicalis virescens*			R	R	1		1		1	1
	Western Wattlebird *Anthochaera lunullata*	X		R	R					1	
	Red Wattlebird *Anthochaera carunculata*			R	R	1		?b		1	
	Tawny-crowned Honeyeater *Glyciphila melanops*	#		Vis	Vag			1			
	Brown Honeyeater *Lichmera indistincta*			R	R	1		1		1	
	New Holland Honeyeater *Phylidonyris novaehollandiae*	X		R	R			1		1	1
	White-cheeked Honeyeater *Phylidonyris nigra*			R	R			?b		1	
Neosittidae (sittellas)	Varied Sittella Daphoenositta chrysoptera	#		E	E			1			
Campephagidae (cuckoo-shrikes)	Black-faced Cuckoo-shrike *Coracina novaehollandiae*			R	R	1		1		1	
Pachycephalidae (whistlers)	Rufous Whistler *Pachycephala rufiventris*	#		R	Vis	1		1			
Artamidae (woodswallows)	Grey Butcherbird *Cracticus torquatus*			R	R	1		1		1	
	Australian Magpie *Gymnorhina tibicen*			R	R	1		1		1	1
Rhipiduridae (fantails, willie wagtail)	Grey Fantail *Rhipidura fuliginosa*	#		R	R	1				1	
	Willie Wagtail *Rhipidura leucophrys*			R	R			1		1	
Corvidae (ravens and crows)	Australian Raven *Corvus coronoides*			R	R	1		1		1	
Monarchidae (flycatchers)	Magpie-lark *Grallina cyanoleuca*			R	R	1		1			
Timaliidae (white-eyes)	Silvereye *Zosterops lateralis*			R	R	1		1		1	
Hirundinidae (swallows)	Welcome Swallow *Hirundo neoxena*			R	Vis	1		1		1	
	Tree Martin *Hirundo nigricans*	X		R	Vis	1		1		1	

Table 47 Invertebrate Inventory

Family	Species	At risk category	Conservation Status	City of Melville Population	Wireless Hill Park Population	Confirmed 1983	Confirmed 1998	Confirmed 2003	Confirmed 2001-2005	Confirmed 2016	Confirmed 2020	Confirmed 2022
Castniidae (Moths)	*Synemon* sp. (Perth)	X			R				1			
Lycaenidae (Butterflies)	Fringed Blue *Neolucia agricola*	X			R				1			
	Grass-blue Butterfly *Zinia otis labrudus*				R				1			
	Long-tailed Pea-blue *Lampides boeticus*				Vis				1			
Nymphalidae (Butterflies)	Klug's Xenica *Geitoneura klugii*				R				1			
Achilidae	*Bunduica rubrovenosa*										1	
Acrididae	Common Peakesia Grasshopper *Peakesia hospita*											1
	Bandeye Grasshopper *Cedarinia fuscotibialis*											1
Alydidae	*Melanacanthus margineguttatus*										1	
Anisolabidae	Wingless Anisowig *Carcinophora occidentalis*										1	1
Anisopodidae	*Sylvicola dubius*										1	
Aphrophoridae	Spittle Bug *Bathyllus albicinctus*										1	
Apidae	European Domestic Apibee *Apis melifera*											1
Araneidae	Orb Weaver *Araneus sp.*										1	1
	Socca senicaudata										1	
	Argiope protensa										1	
	Backobourkia heroine										1	
	Gea theridioides										1	
	Larinia montagui										1	
	Phonognatha melania										1	
	Plebs cyphoxis										1	
	Nephila edulis										1	
Armadillidae	*Buddelundia sp.*										1	
Barychelid	Brush-footed Trapdoor Idiommata species											1
Belidae	*Rhinotia acaciae*										1	
Blaberidae (cockroaches)	*Calolampra marginalis*										1	
	Drymaplaneta semivitta										1	
	Drymaplaneta shelfordi										1	
	Drymaplaneta variegata										1	
	Melanozosteria occidentalis										1	
	Zonioploca pallida										1	
Blattidae	Whiterim Glossback Wingless Blatroach *Drymaplaneta semivatta*											1
	Charcoal Resinthigh Blatroach *Melanozosteria occidentalis*											1
Bombylliidae	Bee Fly *Aleucosia tridentata*										1	
Buthidae	Marbled Scorpion *Lychas sp.*										1	1
Calliphoridae	*Calliphora albifrontalis*										1	
Carabidae	Brownshin Carabeetle *Promecoderus sp.*											1
	Anomotarus crudelis										1	
	Calosoma schayeri										1	
	Notagonum submetallicum										1	
Cecidomyiidae	Gall Midge *Dasineura banksiae*										1	
Cerambycidae	*Scolecobrotus westwoodii*										1	
	Uracanthus bivitta										1	
Chilenophilidae	Soil Centipede *Gen sp. TBC*											1
Chironomidae	*Chironomus cloacalis*										1	
Cicadellidae	*Brunotartessus fulvus*										1	
	Rubria brevifrons										1	
Chrysomelidae	*Ditropidus fugitivus*										1	
	Paropsisterna crocata										1	
Cleridae	*Blackburniella intricata*										1	
Clubionidae	*Clubiona robusta*										1	
Coccinellidae	*Cryptolaemus montrouzieri*										1	
Culicidae (mosquitoes)	*Aedes vigilax*										1	
Curculionidae (weevils)	*Ancyttalia acaciae*										1	
	Catasarcus pallidiventris										1	
	Catasarcus spinipennis										1	
	Meriphus longirostris										1	
	Polyphrades pusillus										1	
	Siraton roei										1	
	Elephant weevil *Tranes vigorsii*										1	
Deinopidae	*Deinopis subrufa*										1	
Derbidae	*Cedusa spinosa*										1	

Desidae	*Badumna insignis*										1	
	Corasoides occidentalis										1	
	Phryganoporus candidus										1	
Ectobiidae	Beige Blatroach Zonioploca bicolor											1
	Johnrehnia rentzi										1	
	Ellipsidion humerale										1	
Elateridae	*Crepidomenus occidualis*										1	
Entomobryidae	Seira sp.										1	
Flatidae	*Siphanta roseicincta*										1	
Fulgoridae	Lantern Fly *Rentinus dilatatus*										1	
Gnaphosidae	Anzacia sp.										1	
	Encoptarthria echemophthalmum										1	
Gryllacrididae	Raspy Cricket *Arrolla sp.*											1
Hersiliidae	Tamopsis											
Heteroceridae	Heterocerus scabriusculus westralicus										1	
Hydrophilidaea	Common Black Linedimple Hydrobeetle **Limnoxenus zealandicus*										1	1
	Shortwing Dot Edge Swellnose Hyobug *Maevius luridus*											1
	*Paracymus pygmaeus										1	
Hyocephalidae	*Maevius luridus*										1	
Ixodidae	Brown Tick *Amblyomma albolimbatum*									1	1	1
Julidae	Portugese Thorntail Julidiplopede *Ommatoiulus moreletii*											1
Lepismatidae	Ground Lepisilverfish *Acrotelsella sp.*											1
Lycosidae	Wolf Spider *Gen (Ariadnae group) sp.*										1	1
	Artoria cingulipes										1	
	Venator immansueta										1	
Miturgidae	Mitspider *Argoctenus sp.*											1
	Strpehead Scruffy Greyback mitspider *Argoctentus sp.*										1	1
	Greybrown Mitspider *Argoctenus sp.*											1
	Brownmottle Linedot Mitspider *Mituliodon tarantulus*										1	1
	Longbody Mitspider *Thasyraea sp.*										1	1
	Odo sp.										1	
Noctuidae	Brightknotch Nocmoth *Proteuxoa tibiata*											1
Notodontidae	Blacktoe Snow Notomoth catepillar *Trichiocerus sparshalli*											1
Nymphalidae	Australian Orange Painted Nymwing *Vanessa Kershawi*				Vis				1			1
Oxyopidae	Oxyopes amoenus										1	
	Oxyopes variabilis										1	
Paradoxosommatidae	Paletint Brown Thorntail Paradiplopede *Antichiropus variabilis*										1	1
Pentatomidae (Stink bugs)	Dictyotus inconspicuus										1	
	Poecilometis apicalis apicalis										1	
	Poecilotoma grandicornis										1	
Platystomatidae	Signal Fly *Duomyia apicalis*										1	
Reduviidae	*Peirates flavopictus*										1	
Rhinotermitidae	*Coptotermes acinaciformis raffrayi*										1	
	Heterotermes occiduus										1	
Rhyparochromidae	*Dieuches notatus*										1	
Salticidae	Maratus chrysomelas										1	
	Maratus flavus										1	
	Maratus pavonis										1	
	Opisthoncus nigrofemoratus										1	
	Servaea sp.										1	
	Simaethula sp.										1	
	Thyene concinna										1	
Scarabaeidae	*Colpochila antennalis*										1	
	Colpochila ruficeps										1	
	Neophyllotocus legnotus										1	
	Phyllococerus purpurascens										1	
Scolopendridae	Blackhead Scholopendridae *Ethmostignus sp. TBC*										1	1
	Giant Centipede *Ethmostigmus rubripes*										1	
	Giant Striped Centipede *Scolopendra laeta*										1	
Sparassidae	Western Grey Huntsman Spider *Isopedella leishmanni*										1	
	Beautiful Badge Huntsman *Neosparassus calligaster*										1	
Syrphidae	Common Banded Yellowscute Syrfly *Simosyrphus grandicornis*										1	1
Tachinidae	*Chrysopasta elegans*										1	
Tenebrionidae	Pterohelaeus parallelus										1	
	Sympetes bremei										1	
Tetragnathidae	Long-jawed spider *Tetragnatha demissa*										1	
Tettigoniidae	Tettihopper *Metaballus sp. (Nymph)*											1
Theridiidae	Diamond comb-footed Spider *Cryptachaea veruculata*										1	
	Six knobbed Phoroncidia Phoroncidia sextuberculata										1	

Thomisidae	Lozenge-shaped Crab Spider *Australomisidia pilula*										1	
	Trapezoid Crab Spider *Sidymella trapezia*										1	
	Bark Crab Spider *Stephanopis cambridgei*										1	
	Marbled Crab Spider *Tmarus marmoreus*										1	
Uloboridae	Miagrammopes sp.										1	
	Uloborus barbipes										1	
Urodacidae	Sand Scorpion *Urodacus novaehollandiae*											1
Zodariidae	Zodaspider *Gen. Sp. TBC*										1	1
	Masasteron complector										1	

Appendix 4 Non-native Fauna

Survey categories:
Shading = not surveyed at that time
No shading = surveyed at that time

?b = potential to breed onsite but not confirmed

Table 47 Feral Animal Inventory

	Family	Species	Confirmed 1983	Confirmed 2003	Confirmed 2001-2005	Confirmed 2017	Confirmed 2022
Mammals	**Muridae** (rats and mice)	House Mouse *Mus musculus*	1				
		Brown Rat *Rattus norvegicus*				1	
		Black Rat *Rattus rattus*				1	1
	Leporidae (rabbits and hares)	Rabbit *Oryctolagus cuniculus*					
	Canidae (foxes and dogs)	European Red Fox *Vulpes vulpes*				1	
	Felidae (cats)	Feral Cat *Felis catus*					1
Birds	**Columbidae** (pigeons and doves)	Rock Dove *Columba livia*		1			
		Spotted Dove *Streptopelia chinensis*	1	1			
		Laughing Dove *Streptopelia senegalensis*	1	?b			
	Cacatuidae (cockatoos)	Eastern Long-billed Corella *Cacatua tenuirostris*				1	
	Psittacidae (lorikeets and parrots)	Rainbow Lorikeet *Trichoglossus moluccanus*		1			
	Halcyonidae (forest kingfishers)	Laughing Kookaburra *Dacelo novaeguineae*	1	1			
Invertebrates	**Nymphalidae** (Butterflies)	Monarch *Danaus plexippus*			1		
	Pieridae (Butterflies)	Cabbage White Butterfly *Pieris rapae*			1		

Appendix 5 Historical Reference Sites

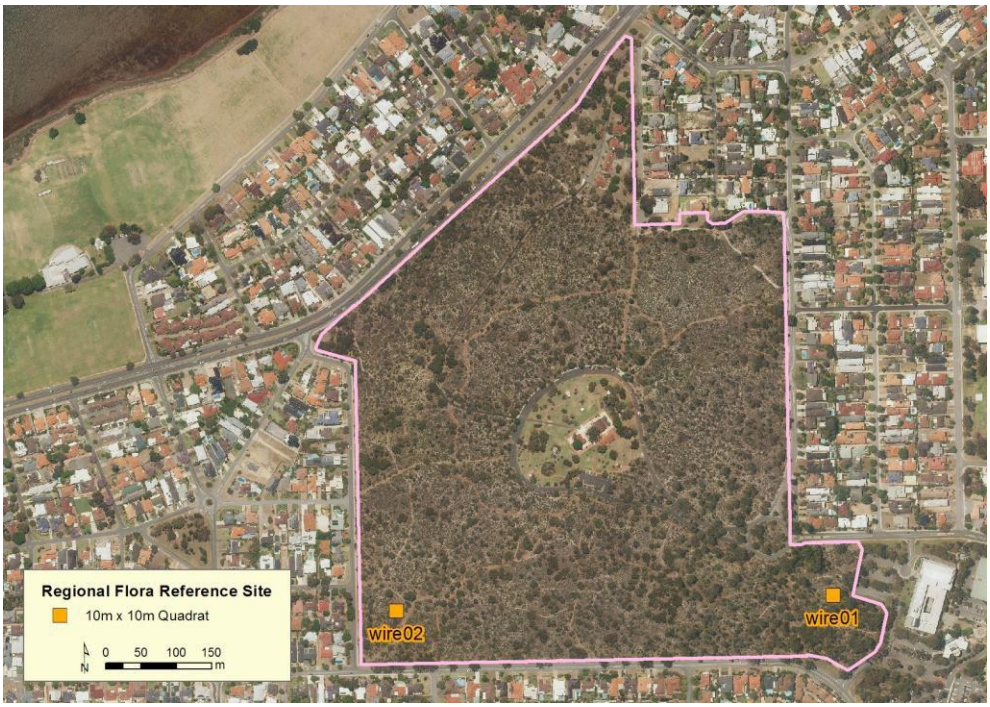

Figure 60 Historical Reference Sites

The WA Department of Conservation and Land Management (CALM) established two quadrats in Wireless Hill Park (‘‘wire01’, in the south east of the park, and ‘wire02’, in the south west of the park) as part of the data gathering for the regional classification of vegetation types in *A Floristic Survey of the Southern Swan Coastal Plain* (Gibson, Keighery, Keighery, Burbridge, & Lyons, 1995). Attempts to relocate the quadrats were made in 2017 by Murdoch University pHd student William Fowler, however errors in GPS have meant that locations are unlikely to be comparable. Two quadrats were established as below:

Melville WIRE WIRE02 Melville WIRE WIRE04 32.0326 115.8272 32.0326 115.8288
DPaW's Bush Forever records (TEB-BF-148-01) include a photo labelled 'wire01' (Figure 62) that can be used in relocating starpickets
that are associated with this site.

Figure 61 Quadrat 'wire01'