City of Melville

City of Melville

Quenda Wetland Reserve

Strategic Management Plan

08 August 2016

Executive Summary

Quenda Wetland Reserve is a wetland reserve located within the City of Melville, in the suburb of Murdoch. The wetland is a conservation category sumpland with a man-made lake to collect extra stormwater runoff from surrounding development areas. Quenda Wetland Reserve is part of a regionally significant wetland and bushland ecological linkage that connects to other reserves throughout the Swan Coastal Plain region. These conservation values justify the need for a site-specific strategic management plan prepared in accordance with the Natural Areas Asset Management Plan (Waters A., 2011).

The reserve consists of dryland and wetland vegetation that has intact vegetation structure, with minor disturbances present and floristic community types are considered well reserved and at low risk (Government of Western Australia, 2000). In addition to the open water body, the reserve has four distinct vegetation types as determined by Ecoscape (2015), namely:

- Dry Shrubland
- Melaleuca preissiana Woodland
- Sedgeland
- Wet Shrubland.

Two species listed as at-risk by the City were recorded on site by Ecoscape (2015), including:

- Low priority species – Hibbertia cuneiformis, which is considered to be dubious and not naturally occurring in the site
- Very High priority species – Grevillea obtusifolia, which is at risk of being lost form this reserve and is poorly represented on the Swan Coastal Plain.

Quenda Wetland Reserve provides habitat for several threatened or priority fauna species in decline on the Swan Coastal Plain, including:

- Forest Red-tailed Cockatoos (*Calyptorhynchus banksii naso*),
- Southern Brown Bandicoot or Quenda (*Isoodon obesulus fusciventer*)
- Perth Lined Lerista (*Lerista lineata*)
- migratory waders.

The very high impact threats within the reserve are:

- two weeds and two weed groups (Bridal Creeper (*Asparagus asparagoides*), Japanese Pepper (*Schinus terebinthifolius*), Geophytes and Perennial Grasses)
- one feral animal (European Red Fox (*Vulpes vulpes*))
- climate change (increasing temperatures and reduced rainfall).

Of the 25 threats present a matrix was undertaken showing:

- 9 threats prevented (weeds)
- 16 threats not assessable.

The major priorities for management of the bushland in the Quenda Wetland Reserves should be:

- Preventing the onsite extinction of 1 plant populations the *Grevillea obtusifolia*, which is not regionally significant by increasing numbers through propagation and revegetation.

- Increasing the extent/density of low shrubs and over storey species to enhance fauna habitat for bird species.
- Confirming the presence of Oblong Turtle.
- Eliminating the very high impact weeds in low numbers (*Schinus terebinthifolius*, *Asparagus asparagoides* and large woody weeds).
- Reducing occurrences of stormwater outside acceptable ranges for aluminium, chromium, copper, iron, nickel, lead, zinc.
- Upgrading the stormwater drainage to control erosion through increased filtration and reduced flow into the wetland, via vegetated swales/biofilters.

Acknowledgements

Natural Area Consulting Management Services would like to acknowledge the contribution of the following people during preparation of this strategic management plan:

- Kellie Motteram, Blair Bloomfield, Deanne Wynn, Brian Walker and Nathan Lissiman from the City of Melville
- personnel from Ecoscape, who undertook the 2015 flora surveys that contributed to this Management Plan.

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1 Introduction

Natural Area Consulting Management Services (Natural Area) was contracted to prepare a strategic management plan for Quenda Wetland Reserve to identify site specific management issues and to develop a five-year strategic plan for the site. The City of Melville has developed the Natural Areas Asset Management Plan (NAAMP) (Waters A., 2011) to enable holistic management of reserves across the City, and includes information that is common to all bushland and wetland reserves within the City, such a climate, broad vegetation types, and soils. However, it is recognised that individual management plans are required for nominated locations, such as Quenda Wetland Reserve, because of conservation and environmental significance. This management plan will address site specific issues in greater detail than in the NAAMP, and identifying issues not specifically addressed in the NAAMP.

This plan will provide:

- the management objective for the site
- the scope of works associated with preparation of the management plan
- the methodology and outcomes of the site assessment process
- information about the current site characteristics
- threats identified within the NAAMP
- management strategies
- recommendations for further action.

1.1 Background

Quenda Wetland Reserve is located approximately 12 km south of the Perth Central Business District in the suburb of Murdoch, within the City of Melville. It is bounded by South Street to the north, Murdoch Drive to the west, and the St John of God Hospital and associated infrastructure to the south and east (Figure 1). Quenda Wetland Reserve occupies 4.2 ha, of which 2.9 ha is wetland vegetation and the remainder is degraded parkland areas and cleared areas for tracks and road verges. This Quenda Wetland Strategic Management Plan updates the Quenda Wetland Management Plan (City of Melville, 2004).

Quenda Wetland was previously surrounded by pine plantations until the late 1980's, with the wetland itself considered too wet for pines. The wetland provides important fauna habitat for local native species including significant species. It is also forms an important part of the Bull Creek Catchment. The reserve provides community interest and educational opportunities especially for tertiary education institutions.

1.2 Objectives

The major aim of the Quenda Wetland Reserve Strategic Management Plan is to maintain and enhance the various ecological functions and values associated with the presence of the wetland and vegetation within the reserve, this can be achieved through:

- the identification of threatening processes outlined within the NAAMP that occur within the wetland and bushland areas
- identification of site specific threatening processes

- identification in the changes of assets or threatening processes over time
- providing clear reserve specific management guidelines to reduce negative impacts associated with the various threatening processes
- providing a plan to improve degraded areas within the reserve and maintain areas that are deemed to have high levels of vegetation condition.

1.3 Scope

In the context of the strategic management plan objective, Natural Area carried out the following works:

- review flora and vegetation survey including weed mapping and recommended revegetation areas undertaken by Ecoscape (2015)
- fauna trapping over a 5-day period as well as opportunistic fauna surveys to determine fauna occurrence throughout the reserve
- assess key threatening processes within the reserve
- make recommendations for management strategies.

Figure 1:
Site Location
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2015
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

2 Assets

Assets within the City of Melville have been identified via a range of methods including through existing management plans for reserves within the City, searches of State and Federal databases, and expert knowledge from City staff (Waters A., 2011). Assets within Melville are categorised and managed at three scales, these are:

1. Reserves – administrative boundaries usually defined by cadastral boundaries
2. Sites – management units (such as vegetation types) within reserves, that may cover part or all of a reserve
3. Species – which are defined as 'a group of organisms capable of interbreeding freely with each other but not with members of other species' by the EPA (2000).

The process for assessment of assets in natural areas within the City of Melville is shown in Figure 2.

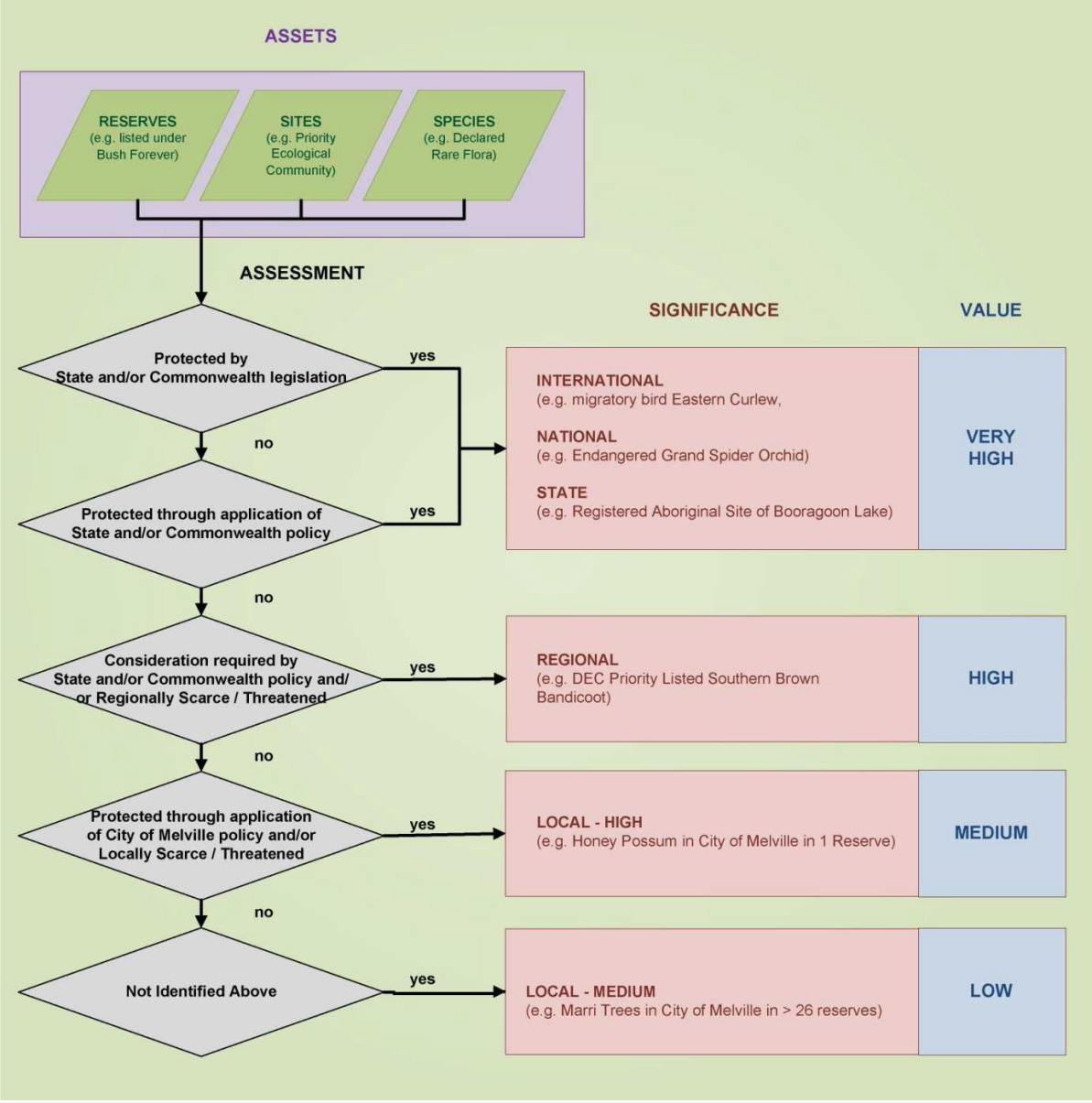

Figure 2: Assessment of assets in Natural Areas (Waters A., 2011)

2.1 Reserve Assets

2.1.1 Bush Forever

Bush Forever sites were identified throughout the Swan Coastal Plain within the Perth Metropolitan Region to protect areas of regional environmental significance, including bushland and wetland areas for the Perth's Bushland Project (Government of Western Australia, 2000). Quenda Wetland Reserve is not listed as a Bush Forever site.

2.1.2 Ecological Linkages

Ecological linkages facilitate the movement of organisms between separate habitat areas across a landscape and provide important habitat and ecological processes. Quenda Wetland Reserve is part of the regional ecological linkages throughout the Swan Coastal Plain (Figure 3), and links to adjacent wetlands such as the Piney Lakes Reserve to the north, and North Lake and Bibra Lake to the south (Figure 4) (WALGA, 2016).

The management of linkages outside of the scope of this Plan is dealt with through processes such as:

- land use planning processes
- the City of Melville Green Plan (Alan Tingay and Associates, 1998)
- the City of Melville Streetscape Strategy
- the City of Melville Public Open Space Strategy.

Under the NAAMP, linkages are considered in terms of:

- prioritising management resources between reserves
- determining whether species can persist onsite in the long term.

Figure 3:
Regional ecological linkages
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: WALGA, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 2
Kilometers

Figure 4:
Ecological linkages
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: City of Melville, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 250
Metres

2.2 Site Assets

2.2.1 Ecological Communities

2.2.1.1 Vegetation Complexes

Quenda Wetland Reserve is situated within the Bassendean Complex – Central and South vegetation complex. The Bassendean Complex – Central and South is described as ranging from woodlands of Jarrah, Sheoak and Banksia on higher sand dunes to lower woodlands of Melaleuca and sedgelands in low lying depressions. The remaining pre-European extent of this vegetation complex is:

- 27.70% within the Swan Coastal Plain (WALGA, 2013)
- 8.29% within the City of Melville for the Perth and Peel region (WALGA, 2010).

2.2.1.2 Floristic Community Types

No floristic community types have been previously recorded for this area.

2.2.1.3 Vegetation types

Four vegetation types were identified by Ecoscape (2015) within Quenda Wetland Reserve, these include:

- Dry Shrubland
- Melaleuca preissiana Woodland
- Sedgeland
- Wet Shrubland.

Species lists per vegetation types are provided in Appendix 2.

Figure 5:
Vegetation types
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2015
Data Source: Ecoscape, 2015
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

2.2.2 Fauna Habitat

Quenda Wetland Reserve provides important habitat for the Priority 5 Quenda (*Isoodon obesulus fusciventer*) and the Oblong Turtle (*Chelodina oblonga*) which is present within the lake. Both of these species are known to occur on site, with the Quenda being captured during the 2015 fauna surveys.

Large trees provide suitable nesting and roosting habitat for a range of native fauna, such as birds, bats, possums and invertebrate. Habitat trees with a diameter at breast height (DBH) greater than 50 cm were recorded by Ecoscape during 2015 flora surveys, as larger trees are more likely to have hollow formation. Trees recorded included:

- nine trees were recorded with a DBH greater than 60 cm
- nine native species
- eight dryland and one wetland species
- Quenda Wetland had a low number of habitat trees (Table 1) and a low diversity of species, which is consistent with results from other reserves of a similar size within the City of Melville (Table 2), and the number of trees/ha is higher than larger reserves.

Table 1: Habitat tree assets over time

Values	Habitat Sites	Tree/ha (2004)	Trees/ha (2016)	Assets 2004-2016
Medium Very large trees	Live native tree	No data	2.1	Maintained (assumed unchanged)
	Dead Tree		0	

Table 2: Comparison of numbers of habitat trees with other City of Melville reserves

Species		Quenda Wetland	Piney Lakes	Bateman	Bull Creek	Curedale Mews	Debries Place	Reg Bourke	Richard Lewis	Trevor Gribble	Adjacent	Total
Wetland Trees	*Banksia littoralis*	2	3									**5**
	Eucalyptus rudis	5	2	36	59			23	19		3	**147**
	Melaleuca lanceolata		1									**1**
	Melaleuca preissiana	1	12		14	3	6	5	12			**53**
	Melaleuca rhaphiophylla		1	35	4				1			**41**
	Total Wetland Trees	8	19	71	77	3	6	28	32	0	3	**247**
Dryland Trees	*Allocasuarina fraseriana*		2		17	1	2				3	**25**
	**Corymbia citriodora*		3									**3**
	Corymbia calophylla		20						1			**21**
	Eucalyptus gomphocephala		2									**2**
	Eucalyptus marginata		3		1		3			1	1	**9**
	Eucalyptus sp.		1									**1**
	Nuytsia floribunda	1			1							**2**
	**Pinus* sp.		4									**4**
	**Quercus suber*		5									**5**
	Total Dryland Trees	1	40	0	19	1	5	0	1	1	4	**72**
Total number Trees		**9**	**59**	**71**	**96**	**4**	**11**	**28**	**33**	**1**	**7**	**319**

* Denotes introduced species

Figure 6:
Habitat tree locations
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

2.2.3 Wetlands

Quenda Wetland Reserve is situated within the Beeliar Wetland chain that forms a series of lakes running parallel to the coast including Piney Lakes, Booragoon Lake and Blue Gum Lake, which form part of Beeliar Regional Park, although Quenda Wetland is not considered part of this Regional Park. The site is listed by the Department of Parks and Wildlife as conservation category sumpland 6512 (Figure 7). It was traditionally a seasonal wetland that became inundated during the winter months. However, due to increased land use with the installation of pine plantations in surrounding areas the wetland was deepened to form a more substantial lake. A recent increase in urban construction in surrounding areas has increased stormwater runoff into the wetland, and it contains water for the majority of the year. A conservation category wetland with the unique identifier code 0511, occurs adjacent to Quenda Wetland to the north west of the Murdoch Drive and South Street intersection.

2.2.4 Heritage

There are no European Heritage or Aboriginal heritage sites within the site (Heritage Council WA, 2016), although Aboriginal Heritage Site 3630 occurs across the road within Murdoch University adjacent to South Street, and it is likely Aboriginal groups within the area would have utilised the wetland for hunting (Department of Aboriginal Affairs, 2016).

2.2.5 Community Interest

The Friends of Quenda Wetland is a local volunteer group made up of students from the Murdoch University Environmental Science Association (MUEnSA) that undertake planting, weeding and monitoring of the Long Necked Turtle (*Chelodina oblonga*) and the Southern Brown Bandicoot or Quenda (*Isoodon obesulus fusciventer*) populations. This group also had input into the protection of the wetland during the construction of Fiona Stanley Hospital and associated infrastructure adjacent to the site.

There are three main areas within the reserve where the volunteer group undertakes works (Figure 8), these are:

- two revegetation areas along the eastern side of the bushland
- a larger area encompassing the lake where restoration and monitoring of the Oblong Turtle and Quenda populations occur.

2.2.6 Reference Sites

There are no permanent reference sites currently within the wetland. Although the artificial lake is a point of interest for the monitoring of the Oblong Turtle populations. Reference sites are particularly important for vegetation assessments, particularly revegetation areas to monitoring growth and health of plantings and weed abundance over time.

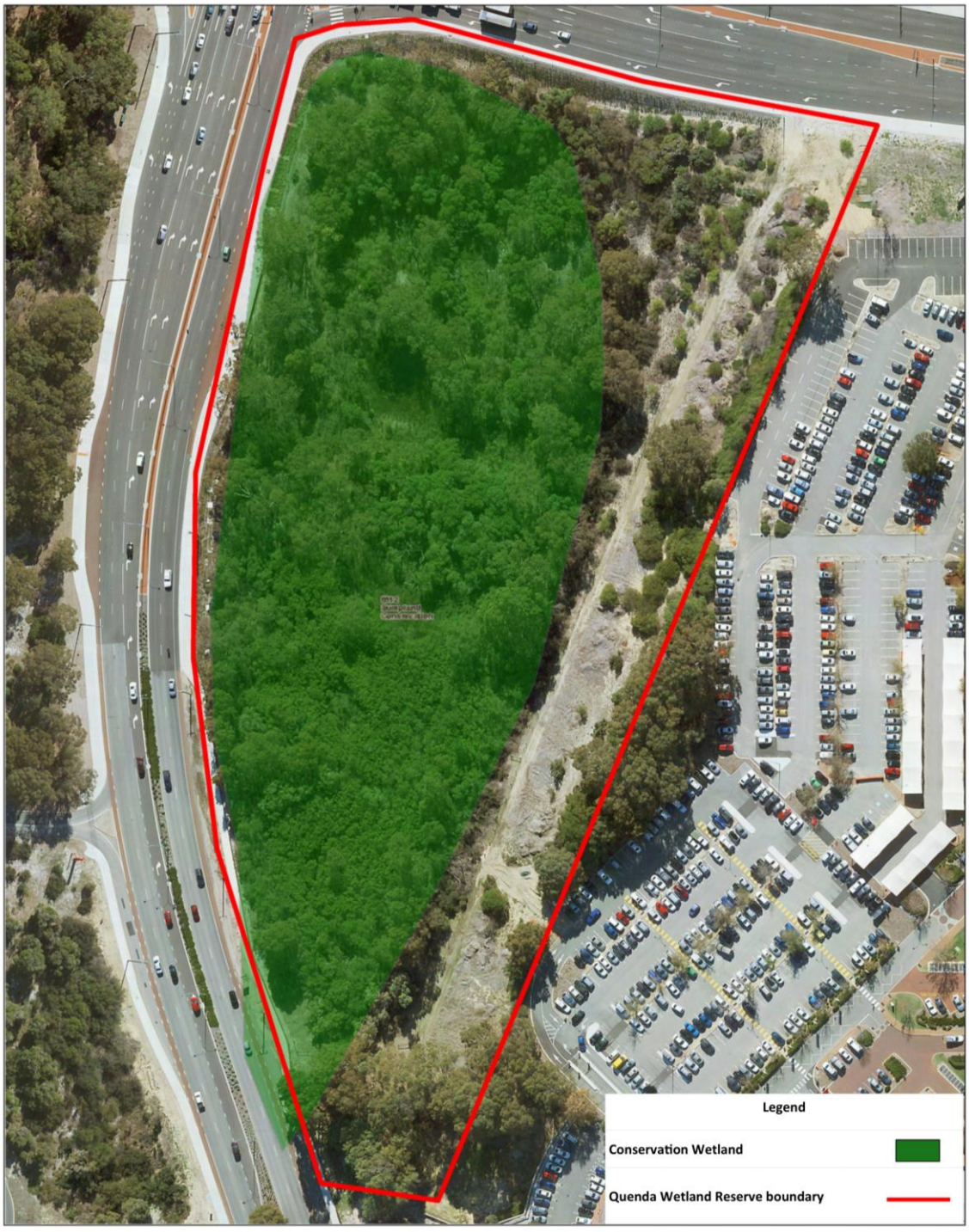

Figure 7:
Geomorphic wetland,
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Department of Parks and Wildlife, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

Figure 8:
Community interest areas
Quenda Wetland Reserve, Murdoch

N

Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Department of Parks and Wildlife, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

2.3 Species

2.3.1 Native Flora

A total of 147 flora species from 48 families were recorded by Ecoscape during the 2015 survey, of which 59 were weeds and six were considered dubious (native to the area but not native to the reserve) (Ecoscape, 2015). Complete flora lists for native and weed species are provided in Appendix 2.

2.3.1.1 Significant and At-risk Species

The City has created a list of at-risk species within local reserves to be targeted along with significant species during flora surveys, with outcomes of surveys assisting in the management and protection of these species. Two at-risk species were recorded by Ecoscape during the 2015 surveys, including:

- **Low priority** – *Hibbertia cuneiformis* (Cutleaf Hibbertia):
  - this species was widespread throughout the reserve with 285 individual plants recorded, and has been recorded in nearby wetland reserves such as Piney Lakes Reserve. It grows readily in wetland areas and is unlikely to be at risk of being lost from this individual reserve. It is also found in 10 local government areas on the Swan Coastal Plain. This species is pollinated by bees, and it is possible for genetic movement of this species between reserve via these pollinators (Department of Parks and Wildlife, 2016b).
  - Note: this species has been known to grow readily and spread prolifically in wetland areas of the Perth region, and almost behave like an invasive species in particular areas.
- **High priority** – *Grevillea obtusifolia* (Obtuse Leaved Grevillea):
  - only seven individual plants of this species was found within Quenda Wetland Reserve. This species is pollinated by birds and due to the highly mobile nature of these birds there is potential for genetic movement between nearby reserves. This species is at risk of being lost from this individual reserve, and it is only found in approximately four local government areas within the Swan Coastal Plain (Department of Parks and Wildlife, 2016b).

2.3.1.2 Banksia Tree Count

A Banksia tree count was undertaken by Ecoscape (2015), to determine a population count for the reserve (Table 3).

Table 3: Banksia tree count

Banksia Species	Common Name	Count
Banksia attenuata	Candlestick Banksia	10
Banksia grandis	Bull Banksia	3
Banksia littoralis	Swamp Banksia	140
Banksia menziesii	Firewood Banksia	20
	Grand Total	**173**

2.3.2 Native Fauna

Quenda Wetland Reserve contains significant habitat for terrestrial and aquatic fauna species, and provides ecological linkages for species such as birds to other areas, including Piney Lakes Reserve, Booragoon Lake and Blue Gum Lake within the City of Melville. The major habitats in the area include:

- upland dry shrubland and woodland
- dampland vegetation including shrubland and sedgeland
- the constructed lake.

Fauna survey activities undertaken in 2015 by Natural Area included trapping and opportunistic observation methods, the use of trail cameras and Anabat recording devices to record bats in the area. Species listed as at-risk by the City were targeted during these surveys.

2.3.1.1 Mammals

One native mammal the Quenda (*Isoodon obesulus fusciventer*) was recorded during 2015 fauna trapping activities, and scats of one introduced species the European Red Fox (*Vulpes vulpes*) was recorded; it was captured during the City's feral animal management program in 2016. The Quenda is listed as Priority 5 species under the *Wildlife Conservation Act 1950* (WA) (Figure 9). The captured Quenda included a female with pouch young, indicating a healthy breeding population. Quenda habitat requirements are listed in Table 4.

Species listed as at-risk by the City and not found within the site are listed in Appendix 4, with their likelihood of occurrence. All five species were considered unlikely to occur within the site due to the small size and isolated nature of the reserve.

Table 4: Mammal habitat considerations for revegetation

Mammals	Habitat Requirements	Diet
Quenda *(Isoodon obesulus fusciventer)*	Dense understory vegetation adjacent open feeding areas, associated with wetlands. Home ranges of 2-7 ha for males and 1-3 ha for females	Invertebrates, underground fungi, subterranean plant material and rarely small vertebrates

(Source: Department of Environment and Conservation, 2012)

2.3.1.2 Bats

No bats were recorded within the reserve during 2015 fauna activities. Target species listed by the City and their likelihood to occur on site are listed in Appendix 4. Of the seven bats listed six were considered likely to occur within the site due to suitable habitat and location, the Western False Pipistrelle was the only one considered unlikely as Perth is north of its known range.

2.3.1.3 Birds

A total of nine bird species were recorded within the Quenda Wetland Reserve during 2015 fauna surveys, of which one, the Laughing Turtle-dove (*Streptopelia senegalensis*) was introduced. The reserve is recorded as a potential Carnaby's Cockatoo *Calyptorhynchus*

latirostris) foraging site (WALGA, 2016), this species is listed as Endangered under the *Environment Protection and biodiversity Conservation Act 1999* (Cwlth).

Target species not found within the site and their potential to occur are listed in Appendix 4. Twenty-seven were assessed as likely to occur due to suitable habitat at the site, and nine that were unlikely to occur due to unsuitable habitat, location, previous degradation and small size and isolated nature of the site. No species recorded were considered locally significant for the Swan Coastal Plain.

2.3.1.4 Reptiles

A total of 9 reptile species were recorded within Quenda Wetland Reserve during the 2015 fauna survey (Appendix 3). All of which were lizard species; no snakes were found within the site, and due to the small size of the reserve snakes are not expected to occur. The Priority 3 listed Perth Slider (*Lerista lineata*) was also captured within the wetland (Figure 6).

Target species of reptiles that were not recorded on site and their potential to occur are listed in Appendix 4; of these 10 are listed as likely to occur on the site due to suitable habitat and location and seven are unlikely due to previous degradation, unsuitable habitat and location, and the small and isolated nature of the site. Reptile indices are listed in Table 5.

Table 5: Reptile indices

Values	Reptiles	Status 2004	Status 2016	Assets
High	Perth Slider (*Lerista lineata*)	No data	Confirmed present	1 Species change not assessable
Medium Bushland dependant species recorded in 1 or 2 Melville reserves	West-coast Laterite Ctenotus (*Ctenotus fallens*)			2 Species change not assessable
	South-west Cool Skink (*Acritoscincus trilineatum*)			
	Bobtail (*Tiliqua rugosa*)			
Low Bushland Dependant species recorded in more than 2 Melville reserves	Oblong Turtle (*Chelodina oblonga*)		Not confirmed	1 Species change not assessable
	Elegant Slider (*Lerista elegans*)		Confirmed present	5 Species change not assessable
	Westcoast Pale-flecked Morethia (*Morethia lineoocellata*)			
	Western Bearded Dragon (*Pogona minor*)			
	Fence Skink (*Cryptoblepharus buchananii*)			
	Two-toed earless skink (*Hemiergis quadrilineata*)			

2.3.1.5 Amphibians

Three species of frogs were recorded during the 2015 fauna survey, including the Moaning Frog (*Heleioporus eyrei*), Rattling or Clicking Froglet (*Crinia glauerti*) and the Slender Tree Frog (*Litoria adelaidiensis*). The Moaning Frog can tolerate drier conditions whilst the other two species require areas of permanent or seasonal moisture. The Slender Tree Frogs requires dense vegetation adjacent to static or slow moving water sources (Tyler M. J. and Doughty P., 2009). The presence of the Litoria and Crinia species indicate that the wetland is receiving enough moisture to support these populations, and any future decrease in these genera may indicate a reduction of ground water levels. Amphibian indices are listed in Table 6.

Table 6: Amphibian indices

Values	Reptiles	Status 2004	Status 2016	Assets
Medium Bushland dependant species recorded in 1 or 2 Melville reserves	Slender Tree Frog (*Litoria adelaidensis*)	No data	Confirmed present	3 species Change not assessable
Low Bushland Dependant species recorded in more than 2 Melville reserves	Rattling or Clicking Froglet (*Crinia glauerti*)			
	Moaning Frog (*Heleioporus eyrei*)			

2.3.1.6 Fish

No fish were recorded during the 2015 fauna survey, and no previous fauna surveys involving fish have occurred within the site.

2.3.1.7 Invertebrates

A total of 18 invertebrates were recorded during 2015 fauna activities in Quenda Wetland Reserve (Appendix 3). The at-risk species, Western Petalura (*Petalura hesperia*) was not found within the reserve and is not likely to occur, due to the absence of its preferred habitat of marshes and drainage basins adjacent to oxygenated streams and rivers.

Perth Slider (*Lerista lineata*)

Quenda (*Isoodon obesulus fusciventer*)

Figure 9: Significant fauna

3 Threats

A number of actual and potential threatening processes are discussed in this section.

3.1 Physical Disturbance

Access infrastructure within Quenda Wetland Reserve allows for both vehicle and pedestrian access into the reserve, with minimal access allowed for pedestrians into the vegetated wetland (Figure 8). Signage within the reserve inform the reserve users of the rehabilitation projects being undertaken within the reserve, the conservation values and threats to the reserve (Figure 7). All signs within the reserve were in a good condition, with four information signs recorded within the reserve during 2016 site assessments.

Physical disturbance within Quenda Wetland Reserve relates to the use of the reserve by people, including trampling of vegetation, graffiti and vandalism, dumping of rubbish and garden waste into the bushland, and removal of vegetation (Table 7).

3.2 Erosion

A number of stormwater drains direct water away from the surrounding urban areas and into the wetland. These have the potential to contribute to erosion from high velocity flow. Stormwater drainage from the hospital car park to the east is causing erosion of the Water Corporation sewerage line embankment, with dislodged soil being washed across the limestone path and into the wetland (Figure 10).

Figure 10: Stormwater runoff from hospital carpark causing erosion

Table 7: Physical disturbance indices

Impacts	Physical disturbance	Disturbances 1994 - 2004	Disturbances 2004 - 2016	Threats
High Potential to substantial change to ecosystem structure, composition or function	Clearing for utilities	No data	No data	Change not assessable
Medium Potential to moderate change to ecosystem structure, composition or function	Trampling	No data	0	
	Rubbish		No data	
	Tree Poisoning, Illegal Clearing, Firewood		0	

Impacts	Physical disturbance	Disturbances 1994 - 2004	Disturbances 2004 - 2016	Threats
	Collection			
Medium Potential costly remediation	Vandalism		0	

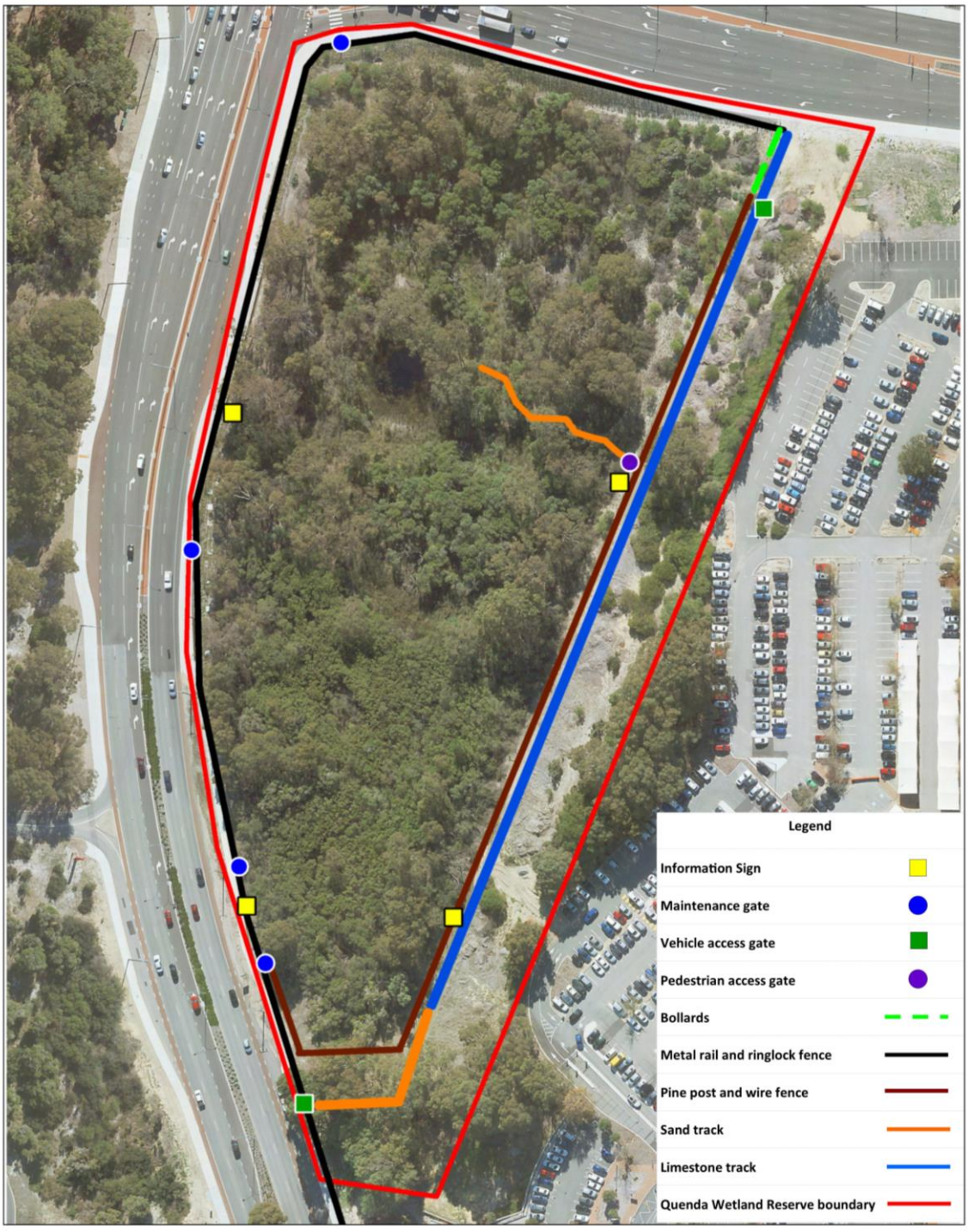

Figure 11:
Access and Signage
Quenda Wetland Reserve, Murdoch

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Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2015
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

3.3 Fire

Vegetation within the reserve has a high fire fuel load and an extreme bushfire hazard level according to AS 3959-2009. The abutting main roads to the north and west, and the limestone track to the east provide suitable firebreaks for the site, with fire appliance and personnel able to suitably fight any fires from the boundary of the reserve. The hospital car park to the east provides further hazard separation from the buildings of the hospital and the vegetated reserve. An occurrence of a fire that affected the entire reserve would be devastating to the resident fauna, due to the lack of safe linkages to other bushland areas. Most fauna fleeing a fire would be at further risk from traffic on the main road or in the hospital car park.

3.3.1 Fire Station Location

The Quenda Wetland Reserve is located in an urban location where the bushfire hazard level is manageable and the time for fire-fighting appliance arrival is lower as the nearest DFES fire station is located on Murdoch Drive in Murdoch, approximately 500 m or one minutes' drive away.

3.3.2 Fire History

Records provided by the City of Melville (2016) and from reviewing aerial imagery (Nearmap, 2016) of the site indicate that one fire has occurred within the last 10 years in March 2010 (Figure 12). Fire indices are listed in Table 8.

Table 8: Fire indices

Impacts	Fires	Extent 1994-2004	Extent 2006-2016	Threats
Very high Potential for local extinctions of ground dwelling species	Large fires	No data	0 ha	Maintained (assumed unchanged)
High Potential for local extinction of trees and shrubs that regenerate only from seed stored on the plant	Repeated fires		0 ha	
Medium Temporarily altered floristic composition of the area, until regeneration occurred	Low occurrences of fire		1 ha	Change not assessable

Figure 12:
March 2010 fire location
Quenda Wetland Reserve, Murdoch

N

Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

3.4 Weeds

A total of 60 introduced flora (weed) species were recorded by Ecoscape (2015). Of these two species Bridal Creeper (*Asparagus asparagoides*) and Japanese Pepper Tree (*Schinus terebinthifolius*) are classified as very high priority weeds. Bridal Creeper is listed as a category C3 declared pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management Act 2007* (WA) requiring management by the land owner, and it is listed as a weed of national significance (WONS), requiring management at a national level (Weeds Australia, 2016). Density weed mapping of grasses and geophytes was undertaken and split into three groups, and are provided in Appendix 5.

The extent of high and very high individual weed species or group infestations is described as either widespread (highlighted pink) or localised, and is shown in Table 9. Maps of woody weeds and very high priority weeds are provided in Appendix 5.

Overall the weed cover of low priority annual and medium priority perennial weeds was < 5%, with most being 1%. Rose Pelargonium (*Pelargonium capitatum*) was the most significant component of the perennial weed cover.

Table 9: Extent of weed infestation

Species or Group	Common Names	Priority	Count	Area >20 Grid Points	Area >2 ha	Area > 50% of Reserve	Extent
Asparagus asparagoides	Bridal Creeper	Very High	38	No	No	Yes	Widespread
Perennial Grasses	-	Very High	n/a	No	No	No	Localised
Schinus terebinthifolius	Japanese Pepper Tree	Very High	15	No	No	No	Localised
Acacia iteaphylla	Flinders Range Wattle	High	1	No	No	No	Localised
Acacia longifolia	Sydney Golden Wattle	High	8	No	No	No	Localised
Corymbia citriodora	Lemon Scented Gum	High	2	No	No	No	Localised
Pinus pinaster	Pinaster Pine	High	7	No	No	No	Localised
Annual Grasses	-	High	n/a	No	No	No	Localised
Geophytes	-	High	n/a	No	No	Yes	Localised

3.5 Habitat Loss

Clearing of the adjacent bushland to the east and south for the development of the Fiona Stanley hospital has left Quenda Wetland Reserve as an isolated pocket of bushland, with no linkages to habitat suitable for Quenda or Turtles. As the site abuts two main roads, South Street and Murdoch Drive, there is no means for safe fauna movement to the bushland on the Murdoch University campus.

Two areas of habitat loss were recorded by Ecoscape (2015), these areas had high bare ground and/or weed coverage (Figure 13). The area in the north-west of the site is associated with erosion and weed introduction due to stormwater runoff into the site. The area along the eastern side of the reserve is associated with the sandy pedestrian track that leads to the lake. This area is utilised by the friends group, contractors and staff members for rehabilitation, maintenance and monitoring within the reserve and is not recommended for revegetation.

Figure 13:
Habitat loss areas
Quenda Wetland Reserve, Murdoch

N

Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: WA Atlas, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

3.6 Feral Animals

Introduced (feral) fauna impact native fauna and flora through predation, competition for food and shelter, spreading disease and destroying habitat. One feral animal was recorded during the 2015 fauna survey, and signs of feral fauna predation on birds were noted. The feral fauna indices are listed in Table 10.

Table 10: Feral Animal Indices

Impact	Feral Animal	Occurrences 1994-2004	Occurrences 2004-2016	Threat
Very High Key threatening process under the EPBC Act 1999	*Vulpes vulpes*	No data	1 scat	Change not assessable
	Oryctolagus cuniculus		No data	
	Felis catus			
High Competition with native birds for hollows and food (impact level variable)	*Apis mellifera*			
	Trichoglossus haematodus			

3.7 Diseases and Pathogens

Vegetation can be subject to diseases that result in a decline in vigour or death in the longer term. Common plant pathogens include *Phytophthora* dieback, *Armillaria*, and *Quambalaria* (Marri Canker). Activities that impact directly on trees, such as the installation of nesting boxes, can result in wounds that make them more susceptible to infection from pathogens. A range of stressors on plants contributes to the spiral of decline and death of plants. No pathogens or diseases were recorded within Quenda Wetland Reserve.

3.8 Stormwater

Stormwater quality monitoring was undertaken by the South West Regional Centre for Urban Landcare Inc. (SERCUL) in 2014 and 2015 at 14 sites within the Bull Creek Catchment, including the Quenda Lake outlet. The results from the Quenda Lake outlet showed:

- a pH that ranged from 6.02 – 6.85, which is below the acceptable limit of 7 – 8.5 for wetlands
- dissolved oxygen (DO) levels of 0.8 to 35%, which is below the acceptable limit for wetlands of > 90%
- total nitrogen concentrations ranging from 1.2 – 1.5 mg/L, which was equal to the trigger value for wetlands of 1.56 mg/L on one out of four sampling occasions
- total aluminium ranging from 0.35 – 0.87 mg/L, which is above the trigger value of 0.055 mg/L on all four sampling occasions
- total iron ranging from 0.58 – 1 mg/L, which is above the guideline of 0.3 mg/L on all four sampling occasions
- total chromium, total copper and total zinc were all recorded in concentrations above the limit of reporting
- total metals in sediments were also recorded above the limits of reporting in September 2014 for aluminium, iron, chromium, total copper and total zinc.

Long term findings at site 9 also found:

- over half the results for pH within the acceptable range with the rest below the acceptable range and one result above
- DO saturation levels and total suspended solids were consistently below the lower acceptable limit or guidelines, with 2014 showing particularly low DO saturation levels, and one exception for total suspended solids
- electrical conductivity results were always within the acceptable range apart from two samples during spring in 2013
- concentrations of total nitrogen and total phosphorus were recorded below the trigger value, with only one sample of nitrogen recorded above the trigger value
- oxidised nitrogen and soluble phosphorus concentrations have always been below the trigger values, as have nitrogen as ammonia/ammonium
- over half the samples of total iron concentrations have been below the guidelines
- total aluminium concentrations were usually above the trigger value
- total metals were below the trigger values and below or equal the limit of reporting for arsenic, chromium, copper, lead and nickel concentrations. Apart from samples

taken in July – September in 2011, total zinc concentrations were usually below the modified trigger value.

3.9 Reticulation

There is no reticulation within Quenda Wetlands Reserve boundary, and the installation of reticulation is not recommended within the site as excess watering can lead to an increase in weed abundance.

3.10 Acid Sulfate Soils

According to WA Atlas (2016) Quenda Wetland Reserve has a moderate potential for ASS to occur within 3 m of the soil surface within the site (Figure 14).

3.11 Climate Change

Climate change within the south-west of Western Australia is expected to cause increased intensity and frequency of storm events, reduced rainfall, rising sea level and increased temperatures. These changes are likely to increase the potential for erosion during storm events and associated strong winds, and increased water stress on plants particularly in water dependent wetlands such as the Quenda Wetland Reserve. Water stress may lead to a change in vegetation types and complexes in particular areas, and affect the fauna that these vegetation associations support.

Figure 14:
Potential acid sulfate soils
Quenda Wetland Reserve, Murdoch

N

Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: WA Atlas, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

4 Management Strategies

4.1 Management Objectives 2016 – 2021

The management objectives and implementation of strategies for 2016 – 2021 will be measured using KPIs discussed in the NAAMP (2011).

4.1.1 Key Performance Indicators

Leading indicators and trends in threats indicate (for the life of a reserve management plan) (Tables 11 and 12):

- whether guidelines and procedures are being effective in meeting objectives of preventing, eliminating, containing and managing impacts from threats
- provide a feedback mechanism as to whether guidelines and procedures need to be modified.

Lagging indicators and trends in assets, indicate whether strategic goals of maintaining and enhancing assets are being met.

Table 11: Total threat indices

Impacts	Prevented	Eliminated (no longer present)	Contained (no change)	Not contained (decrease)	Not assessable	Total threat indices
Very High	9 weeds				4 weeds 1 pathogen	14
High					1 acid sulfate soil 5 weeds 1 fire	7
Medium					1 weed 2 disturbances	3
Low					1 weed	1
Total Threat indices	9				16	25

Table 12: Application of leading indicators

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 short term may only reduce numbers or prevent seed set on site)	▪ 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

Objective	Leading Indicator	Applicable When
		▪ 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

Objectives for weeds are listed in Table 13 and objectives for all other threats are listed in Table 14.

Table 13: Objectives for weed species in Quenda Wetland

Objective	Impact	Weed Species/ Group	2016 Extent	Comment
Prevent	**Very High**	*Anredera cordifolia*	0%	Not present on site
		Asparagus aethiopicus		
		Cuscuta campestris		
		Echium plantagineum		
		Lantana camara		
		Moraea flaccida		
		Rubus laudatus		
		Tamarix aphylla		
		Zantedeschia aethiopica		
Eliminate	**Very High**	*Schinus terebinthifolius*	15 plants	Plants are located along the eastern limestone track and in the periphery of vegetation at the north-east corner of the reserve
		Geophytes	9%	Isolated patches in the north-west corner of the reserve
	High	*Acacia iteaphylla*	7 plants	One isolated patch on the eastern side of the reserve
		Acacia longifolia	8 plants	One area along the west side of the reserve and a smaller isolated patch at the southern end of the reserve
		Corymbia citriodora	2 plants	Both plants located next to each other mid-way down the eastern track
		Pinus pinaster	7 plants	Five isolated patches around the reserve
Contain	**Very High**	*Asparagus asparagoides*	38 plants, 54%	Species are difficult to eliminate in the short and medium term, and the *Asparagus asparagoides* is widespread throughout the reserve
		Perennial Grasses	21%	
Manage	**High**	Annual Grasses	36%	Control of these weeds should focus on asset protection such as revegetation sites and the lake
	Medium	All other perennial weeds	1%	
	Low	All other annual weeds	1%	

Table 14: Objectives for all other threats in Quenda Wetland Reserve

Objective	Impact	Threat	Comments
Prevent	**Very High**	Acid Sulfate Soils	Undertake works in areas of potential acid sulfate soils in accordance with City's guidelines.
		Feral animals (cats)	Not Present – If observed on site implement controls within 10 working days of observation in accordance with the City's guidelines
		Feral animals (rabbits)	Not present – if observed control within 10 working days in accordance with the City's guidelines
	High	Bushfires	Prevent unplanned fires within the reserve, in consultation with the Department of Fire and Emergency Services; record fire occurrences including date, cause (if known) and area burnt.
Eliminate	**High**	Feral animals (Bees)	Present - remove bee hives within 10 working days of observations
Contain	**Very High**	Feral animals (foxes)	Present - implement controls within 10 working days of observations, control in conjunction with rabbits, to mitigate an increase in rabbit numbers due to reduction of their predators
	High	Fire (repeat fires)	Limit fires burning the same portion of bushland, in consultation with the Department of Fire and Emergency Services.
	Medium	Physical Disturbance (Erosion)	It is recommended the City liaise with stakeholders from St. Johns Hospital and the Water Corporation, to determine an appropriate management solution for the erosion caused by the stormwater entering the site from the hospital car park. ▪ The City is already investigating planning for upgrading the stormwater drainage system to increase filtration and reduce flows through vegetated swales/biofilters.
		Stormwater (nutrients)	Continue to monitor stormwater quality and manage the reserve to reduce occurrence of nutrients outside acceptable ranges.
	Low	Stormwater (physical)	Manage the reserve and wetlands to reduce occurrences outside the acceptable range for pH, dissolved oxygen, total suspended solids and conductivity.
Manage	**Very High**	Climate Change	Consideration be given to the wider context of climate impacts that could occur over time, with assessment of vegetation associations for change undertaken. Reference sites should be installed in the wetlands (2 per wetland) to monitor changes in groundwater dependant species and vegetation associations over time, in relation to a changing climate. Management can include: ▪ weed control should be undertaken to minimise competition for water with natives ▪ planting and enhancement of native vegetation cover undertaken within the reserve

Objective	Impact	Threat	Comments
			particularly when large scale plant deaths occur.
		Disease and Pathogens (Dieback)	Not present - continue management in accordance with the City's guidelines through: ▪ review of mapping every three years (due to occur 2017) ▪ preventative phosphite treatments every three years (due to occur 2018) ▪ noting of signs of disease through opportunistic monitoring ▪ appropriate hygiene being undertaken during bushland works ▪ ensuring soils and other material brought to site are free of pathogens.
	Low	Reticulation	Monitor and manage any over spray or leaks within 5 working days of it being observed.

4.1.2 Lagging Indicators

Lagging indicators and trends in assets, indicate whether strategic goals of maintaining and enhancing assets are being met. The levels of acceptable change are discussed in the NAAMP and are summarised in Table 15 and applied to Piney Lakes in Tables 16 and 17.

Table 15: Tiered Goals for assets and associated lagging indicators

Goal	Lagging indicator	Application 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 ▪ 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 ▪ potentially to be in reserve based on habitat and/or proximity of other records

Goal	Lagging indicator	Application When
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 16: Goals for species

Goal	Priority	Asset	No. of Reserves	Comments
Enhance	**High**	*Grevillea obtusifolia*	Unknown	Start seed collection and propagation trials for this species, with plants grown used in revegetation in the dryland areas, increase the numbers from 7 to 50 plants. ▪ seed is easy to collect, usually ready from November to December ▪ readily germinates and plant grows to 1.5 m high.
	Low	*Banksia attenuata*	35	Increase populations of B menziesii and B. attenuata to 250 plants. Increase the other species populations to 100 plants. ▪ avoid planting Banksia's in the dieback affected area and target phosphite treatment to Banksia's surrounding the affected area ▪ increasing these plant populations will increase the foraging food source for the threatened black cockatoos.
		Banksia grandis	16	
		Banksia littoralis	7	
		Banksia menziesii	35	
Maintain Species	**Medium**	*Aotus cordifolia*	Unknown	Species to be maintained through the mitigation of threats, enhancement of habitat (revegetation) and weed control.
		Macarthuria apetala		
		Acacia tetragonocarpa		
		Drosera macrantha		
		Ctenotus fallens	1	Reptiles should be maintained if threats are appropriately mitigated and habitat protected, particularly leaf litter and shrubs maintained on site.
		Acritoscincus trilineatum	Unknown	
	Low	*Lerista elegans*	5	
		Morethia lineoocellata	4	
		Pogona minor	3	
		Cryptoblepharus buchananii	8	

Goal	Priority	Asset	No. of Reserves	Comments
		Hemiergis quadrilineata	6	
		Heleioporus eyrei	4	Require seasonally wetland habitat, and if habitat and threats are managed these species should be retained.
		Litoria adelaidensis	2	Species require permanent static or slow moving water sources. Appropriate management on the habitat and threats on site should ensure this species is maintained.
Monitor	**High**	Isoodon obesulus fusciventer	2	Requires thick understory vegetation and is associated with the wetland on site, home ranges vary from 1-7 ha, control threats such as predators e.g. foxes and cats.
	Low	*Hibbertia cuneiformis*		Monitor this species spread and control its abundance around the wetland area ▪ this species has been known to become invasive and act as an aggressive weed in wetland areas around Perth ▪ this species is not considered to be naturally occurring on site.
		Crinia glauerti	4	Species require permanent or seasonal water sources.
Confirm	**Medium**	*Chelodina oblonga*	3	Confirm the presence of this species, it is known to occur – requires permanent water source.

Table 17: Goals for Site

Goal	Priority	Asset	Comments
Enhance	**High**	Ecological Communities: Bassendean Complex - Central and South, with vegetation types including: ▪ Dry shrubland ▪ Melaleuca preissiana Woodland ▪ Sedgeland ▪ Wet Shrubland	Revegetation within the reserve should take into consideration the vegetation type and flora composition in vegetation associations when planning planting lists. Priorities for each revegetation areas are: ▪ controlling abundance and spread of weeds ▪ enhancing fauna habitat within the reserve, via increased vegetation cover of shrub and tree species particularly in dryland areas ▪ increase abundance of significant flora in their respective vegetation types ▪ maintain the high density of native vegetation in the wetland areas, including understorey vegetation, providing habitat to the Quenda ▪ increase tree cover for bird species in the reserve.

Goal	Priority	Asset	Comments
	Medium	Revegetation site – existing revegetation/ community interest sites	Revegetation to occur in degraded areas identified by Ecoscape 2015 and to continue in the existing community interest revegetation areas, in accordance with the City of Melville's guidelines and procedures.
		Reference sites	Install 2 10 x 10 m reference plots in the wetlands and each revegetation area, to determine trends over time and assess success of revegetation activities.
Maintain	**Very High**	Conservation significant sumplands	Assets to be maintained if threats are managed appropriately in accordance with the City of Melville's guidelines and procedures.
	Medium	Habitat sites - very large native trees	

5 References

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Wildlife Conservation Act 1950 (WA)

Appendix 1: Aboriginal Heritage

Search Criteria

1 Registered Aboriginal Sites in Custom search area (2); 390390.45mE, 6451129.18mN z50 (MGA94) : 391134.98mE, 6451982.54mN z50 (MGA94)

Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Aboriginal Affairs by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at heritageenquiries@daa.wa.gov.au and we will make every effort to rectify it as soon as possible.

South West Settlement ILUA Disclaimer

Your heritage enquiry is on land within the following Indigenous Land Use Agreement(s): Whadjuk People ILUA

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will ‘impact’ (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines and Petroleum (DMP) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMP, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.dpc.wa.gov.au/lantu/Claims/Pages/SouthWestSettlement.aspx.

Further advice can also be sought from the Department of Aboriginal Affairs (DAA) at heritageenquiries@daa.wa.gov.au.

Coordinate Accuracy
Accuracy is shown as a code in brackets following the coordinates. Map coordinates (Latitude/Longitude and Easting/Northing) are based on the GDA 94 Datum. The Easting/Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '500000mE:Z50' means Easting=500000, Zone=50.

Terminology (NB that some terminology has varied over the life of the legislation)
Place ID/Site ID: This a unique ID assigned by the Department of Aboriginal Affairs to the place
Status:
- **Registered Site**: The place has been assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*
- **Other Heritage Place which includes:**
  - **Stored Data / Not a Site:** The place has been assessed as not meeting Section 5 of the *Aboriginal Heritage Act 1972*
  - **Lodged:** Information has been received in relation to the place, but an assessment has not been completed at this stage to determine if it meets Section 5 of the *Aboriginal Heritage Act 1972*

Status Reason: e.g. Exclusion - Relates to a portion of an Aboriginal site or heritage place as assessed by the Aboriginal Cultural Material Committee (ACMC). e.g. such as the land subject to a section 18 notice.
Origin Place ID: Used in conjuction with Status Reason to indicate which Registered Site this Place originates from.
Access and Restrictions:
- **File Restricted = No:** Availability of information (other than boundary) that the Department of Aboriginal Affairs holds in relation to the place is not restricted in any way.
- **File Restricted = Yes:** Some of the information that the Department of Aboriginal Affairs holds in relation to the place is restricted if it is considered culturally sensitive. This information will only be made available if the Department of Aboriginal Affairs receives written approval from the informants who provided the information. Download the Request to Access Restricted Information letter and form.
- **Boundary Restricted = No:** place location is shown as accurately as the information lodged with the Registrar allows.
- **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the place is located. If you are a landowner and wish to find out more about the exact location of the place, please contact DAA.
- **Restrictions:**
  - **No Restrictions:** Anyone can view the information.
  - **Male Access Only:** Only males can view restricted information.
  - **Female Access Only:** Only females can view restricted information

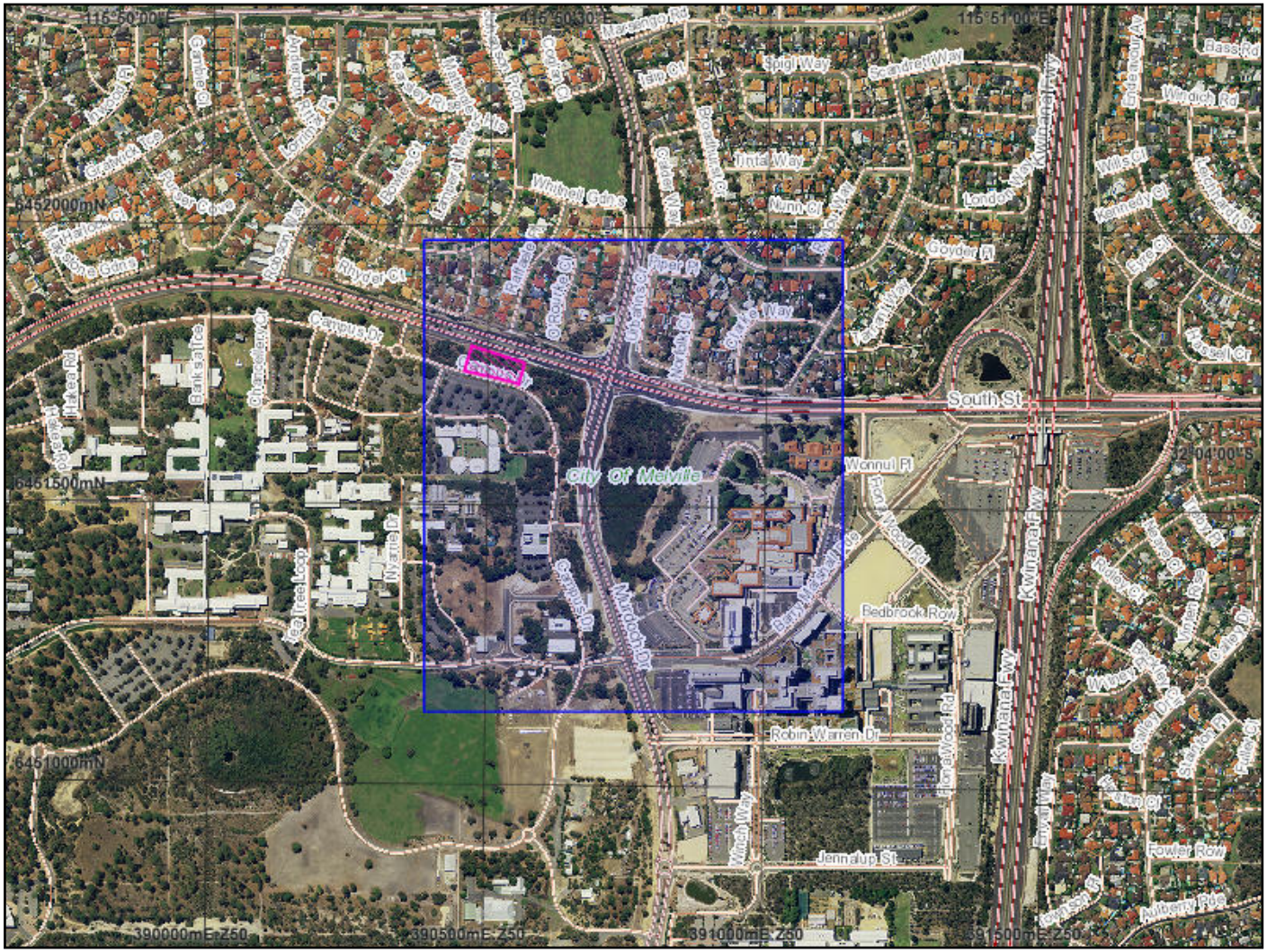
Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place. This has been replaced by the Place ID / Site ID.

List of Registered Aboriginal Sites with Map

Site ID	Site Name	File Restricted	Boundary Restricted	Restrictions	Status	Status Reason	Origin Place ID	Site Type	Knowledge Holders	Coordinates	Legacy ID
3630	MURDOCH UNIVERSITY	No	No	No Gender Restrictions	Registered Site			Artefacts / Scatter		390511mE 6451750mN Zone 50 [Reliable]	S02309

Aboriginal Heritage Inquiry System

Aboriginal Sites Database



Legend

Selected Heritage Sites

- Registered Sites
- Aboriginal Community Occupied
- Aboriginal Community Unoccupied
- Town
- Search Area

Appendix 2: Flora Lists

The following species lists were recorded by Ecoscape (2015) within Quenda Wetland Reserve, with species listed by family for the first two tables and by species name for the third table.
*Denotes weed species
# Denotes species recorded as dubious by Ecoscape (2015), which are considered native to the area but not native to the reserve and have been naturalised through plantings.

Weed Species List

Family	Species Name	Common Name
Aizoaceae	**Carpobrotus edulis*	Hottentot Fig
Anacardiaceae	**Schinus terebinthifolius*	Japanese Pepper Tree
Arecaceae	**Washingtonia filifera*	Desert Fan Palm
Asparagaceae	**Asparagus asparagoides*	Bridal Creeper
Asphodelaceae	**Asphodelus fistulosus*	Onion Weed
	**Trachyandra divaricata*	Trachyandra
Asteraceae	**Arctotheca calendula*	Cape Weed
	**Cirsium vulgare*	Spear Thistle
	**Conyza bonariensis*	Flaxleaf Fleabane
	**Conyza sumatrensis*	
	**Gamochaeta coarctata*	
	**Hypochaeris glabra*	Smooth Catsear
	**Lactuca serriola*	Prickly Lettuce
	**Leontodon rhagadioloides* (Syn. *Hedypnois rhagadioloides*)	Cretan Weed
	**Monoculus monstrosus*	Stinking Roger
	**Sonchus oleraceus*	Common Sowthistle
	**Urospermum picroides*	False Hawkbit
	**Ursinia anthemoides*	Ursinia
Brassicaceae	**Brassica oxyrrhina*	Smooth-stem Turnip
	**Brassica tournefortii*	Mediterranean Turnip
Caryophyllaceae	**Petrorhagia dubia*	
Convolvulaceae	**Ipomoea cairica*	Coast Morning Glory
Cyperaceae	**Cyperus polystachyos*	Bunchy Sedge

Family	Species Name	Common Name
	*Cyperus tenuiflorus	Scaly Sedge
Euphorbiaceae	*Euphorbia peplus	Petty Spurge
	*Euphorbia terracina	Geraldton Carnation Weed
Fabaceae	*Acacia iteaphylla	Flinders Range Wattle
	*Acacia longifolia	Sydney Golden Wattle
	*Medicago polymorpha	Burr Medic
	*Melilotus indicus	
	*Trifolium campestre	Hop Clover
Geraniaceae	*Erodium botrys	Long Storksbill
	*Geranium molle	Dove's Foot Cranesbill
Geraniaceae	*Pelargonium capitatum	
Iridaceae	*Gladiolus caryophyllaceus	Pink Gladiolus
Lamiaceae	*Mentha pulegium	Pennyroyal
Myrtaceae	*Corymbia citriodora	Lemon Scented Gum
Onagraceae	*Oenothera laciniata	
Oxalidaceae	*Oxalis corniculata	Yellow Wood Sorrel
Papaveraceae	*Fumaria capreolata	Whiteflower Fumitory
Pinaceae	*Pinus pinaster	Pinaster Pine
Poaceae	*Avena barbata	Bearded Oat
	*Briza maxima	Blowfly Grass
	*Briza minor	Shivery Grass
	*Bromus diandrus	Great Brome
	*Cenchrus echinatus	Burrgrass
	*Cynodon dactylon	Couch Grass
	*Ehrharta calycina	Perennial Veldt Grass
	*Ehrharta longiflora	Annual Veldt Grass
	*Eragrostis curvula	African Lovegrass
	*Hordeum vulgare	Barley
	*Lagurus ovatus	Hare's Tail Grass
	*Lolium multiflorum	Italian Ryegrass
	*Polypogon monspeliensis	Annual Beardgrass
	*Vulpia myuros	Rat's Tail Fescue

Family	Species Name	Common Name
	**Vulpia* sp. indet.	
Primulaceae	**Lysimachia arvensis*	Pimpernel
Rubiaceae	**Galium murale*	Small Goosegrass
Solanaceae	**Solanum nigrum*	Black Berry Nightshade

Native Flora List

Family	Species Name	Common Name
Anarthriaceae	*Lyginia barbata*	
Apiaceae	*Centella asiatica*	
	Platysace filiformis	
Asparagaceae	*Lomandra preissii*	
	Thysanotus multiflorus	Many-flowered Fringe Lily
	Thysanotus sparteus	
Campanulaceae	*Lobelia anceps*	Angled Lobelia
	Lobelia tenuior	Slender Lobelia
	Wahlenbergia preissii	
Crassulaceae	*Crassula colorata*	Dense Stonecrop
Cupressaceae	*#Callitris preissii*	Rottnest Island Pine
Cyperaceae	*Baumea articulata*	Jointed Rush
	Baumea juncea	Bare Twigrush
	#Ficinia nodosa	Knotted Club Rush
	Lepidosperma striatum	
	Schoenus efoliatus	
	Schoenus subfascicularis	
Dasypogonaceae	*Dasypogon bromeliifolius*	Pineapple Bush
Dilleniaceae	*#Hibbertia cuneiformis*	Cutleaf Hibbertia
	Hibbertia stellaris	Orange Stars
	Hibbertia subvaginata	
Elaeocarpaceae	*Platytheca galioides*	
Ericaceae	*Leucopogon conostephioides*	

Family	Species Name	Common Name
Euphorbiaceae	*Monotaxis grandiflora*	Diamond of the Desert
Fabaceae	*Acacia applanata*	
	Acacia cyclops	Coastal Wattle
	Acacia lasiocarpa	Panjang
	Acacia pulchella	Prickly Moses
	Acacia saligna	Orange Wattle
	Aotus procumbens	
	Bossiaea eriocarpa	Common Brown Pea
	Daviesia physodes	
	Euchilopsis linearis	Swamp Pea
	Eutaxia virgata	
	Gastrolobium capitatum	
	Gompholobium tomentosum	Hairy Yellow Pea
	Hardenbergia comptoniana	Native Wisteria
	Hovea pungens	Devil's Pins
	Jacksonia furcellata	Grey Stinkwood
	Kennedia prostrata	
	Viminaria juncea	Swishbush
Goodeniaceae	*Goodenia pulchella* subsp. Coastal Plain B (L.W. Sage 2336)	
Haemodoraceae	*Anigozanthos manglesii*	Mangles Kangaroo Paw
	Conostylis juncea	
Haloragaceae	*Gonocarpus pithyoides*	
Hemerocallidaceae	*Dianella revoluta*	Blueberry Lily
Iridaceae	*Patersonia occidentalis*	Purple Flag
Juncaceae	*Juncus pallidus*	Pale Rush
Lamiaceae	*Hemiandra pungens*	Snakebush
Loranthaceae	*Nuytsia floribunda*	Christmas Tree
Myrtaceae	*Astartea scoparia*	
	Beaufortia elegans	
	#Callistemon sp.	Bottlebrush
	#Calothamnus quadrifidus	One-sided Bottlebrush
	Corymbia calophylla	Marri

Family	Species Name	Common Name
	Eucalyptus rudis	Flooded Gum
	Kunzea glabrescens	Spearwood
	Melaleuca lateritia	Robin Redbreast Bush
	Melaleuca preissiana	Moonah
	Melaleuca rhaphiophylla	Swamp Paperbark
	Melaleuca seriata	
	Melaleuca thymoides	
	Pericalymma ellipticum	
	Scholtzia involucrata	Spiked Scholtzia
Orchidaceae	*Microtis media*	Tall Mignonette Orchid
	Microtis sp. indet.	
	Pterostylis pyramidalis	Snail Orchid
Poaceae	*Deyeuxia quadriseta*	Reed Bentgrass
Proteaceae	*#Adenanthos cygnorum*	Common Woolybush
	Banksia attenuata	Slender Banksia
	Banksia grandis	Bull Banksia
	Banksia littoralis	Swamp Banksia
	Banksia menziesii	Firewood Banksia
	Banksia nivea	Honeypot Dryandra
	Grevillea obtusifolia	Obtuse Leaved Grevillea
	Hakea prostrata	Harsh Hakea
	Hakea varia	Variable-leaved Hakea
	Petrophile linearis	
Ranunculaceae	*Clematis linearifolia*	
Restionaceae	*Desmocladus flexuosus*	
	Hypolaena exsulca	
	Phlebocarya ciliata	
Rubiaceae	*Opercularia vaginata*	Dog Weed
Rutaceae	*Boronia ramosa*	
Stylidiaceae	*Stylidium repens*	Matted Triggerplant
Thymelaeaceae	*Pimelea rosea*	Rose Banjine
Xanthorrhoeaceae	*Xanthorrhoea preissii*	Grass Tree, Balga
Zamiaceae	*Macrozamia riedlei*	Zamia

Flora Species by Vegetation Types

Species	qDryShrub	qMp	qSedge	qWetshrub	Native/Weed/ Dubious
Acacia applanata		1			Native
Acacia cyclops			1	1	Native
Acacia iteaphylla		1			Introduced Flora on WAH
Acacia lasiocarpa		1			Native
Acacia longifolia		1		1	Introduced Flora on WAH
Acacia pulchella	1	1		1	Native
Acacia saligna	1	1	1		Native/Dubious
Adenanthos cygnorum	1	1			Native/Dubious
Anigozanthos manglesii		1			Native/Dubious
Aotus procumbens		1			Native
Arctotheca calendula	1				Introduced Flora on WAH
Asparagus asparagoides		1		1	Introduced Flora on WAH
Asphodelus fistulosus	1				Introduced Flora on WAH
Astartea scoparia		1	1	1	Native
Avena barbata	1	1			Introduced Flora on WAH
Banksia attenuata	1				Native
Banksia grandis	1	1			Native
Banksia littoralis		1	1	1	Native
Banksia menziesii	1				Native
Banksia nivea	1			1	Native
Baumea articulata				1	Native
Baumea juncea				1	Native
Beaufortia elegans	1				Native
Boronia ramosa	1	1	1		Native
Bossiaea eriocarpa		1			Native
Brassica oxyrrhina	1				Introduced Flora on WAH
Brassica tournefortii	1				Introduced Flora on WAH
Briza maxima			1	1	Introduced Flora on WAH
Briza minor		1			Introduced Flora on WAH
Bromus diandrus	1	1			Introduced Flora on WAH
Callistemon sp.		1			Dubious
Callitris preissii		1			Dubious

Species	qDryShrub	qMp	qSedge	qWetshrub	Native/Weed/ Dubious
Calothamnus quadrifidus	1				Dubious
Carpobrotus edulis		1	1		Introduced Flora on WAH
Cenchrus echinatus		1			Introduced Flora on WAH
Centella asiatica				1	Native
Cirsium vulgare		1			Introduced Flora on WAH
Clematis linearifolia	1	1			Native
Conostylis juncea		1			Native
Conyza bonariensis	1		1	1	Introduced Flora on WAH
Conyza sumatrensis	1	1			Introduced Flora on WAH
Corymbia calophylla		1			Native
Corymbia citriodora		1			Introduced Flora on WAH
Crassula colorata			1		Native
Cynodon dactylon	1	1		1	Introduced Flora on WAH
Cyperus polystachyos				1	Introduced Flora on WAH
Cyperus tenuiflorus				1	Introduced Flora on WAH
Dasypogon bromeliifolius	1	1			Native
Daviesia physodes	1				Native/Dubious
Desmocladus flexuosus	1				Native
Deyeuxia quadriseta				1	Native
Dianella revoluta				1	Native
Ehrharta calycina	1	1	1	1	Introduced Flora on WAH
Ehrharta longiflora	1				Introduced Flora on WAH
Eragrostis curvula		1			Introduced Flora on WAH
Erodium botrys	1				Introduced Flora on WAH
Eucalyptus rudis	1	1	1	1	Native
Euchilopsis linearis		1		1	Native
Euphorbia peplus	1	1			Introduced Flora on WAH
Euphorbia terracina	1	1			Introduced Flora on WAH
Eutaxia virgata		1			Native
Ficinia nodosa	1	1			Dubious
Fumaria capreolata		1			Introduced Flora on

Species	qDryShrub	qMp	qSedge	qWetshrub	Native/Weed/ Dubious
					WAH
Galium murale		1			Introduced Flora on WAH
Gamochaeta coarctata		1			Introduced Flora on WAH
Gastrolobium capitatum		1			Native
Geranium molle		1			Introduced Flora on WAH
Gladiolus caryophyllaceus		1			Introduced Flora on WAH
Gompholobium tomentosum	1			1	Native
Gonocarpus pithyoides	1		1		Native
Goodenia pulchella subsp. Coastal Plain B (L.W. Sage 2336)		1			Native
Grevillea obtusifolia	1				Native
Hakea prostrata	1				Native
Hakea varia	1				Native
Hardenbergia comptoniana		1			Native
Hedypnois rhagadioloides	1				Introduced Flora on WAH
Hemiandra pungens	1			1	Native
Hibbertia cuneiformis	1	1	1	1	Introduced Flora on WAH
Hibbertia stellaris		1			Native
Hibbertia subvaginata		1			Native
Hordeum vulgare	1				Introduced Flora on WAH
Hovea pungens	1	1			Native
Hypochaeris glabra		1	1	1	Introduced Flora on WAH
Hypolaena exsulca			1		Native
Ipomoea cairica		1			Introduced Flora on WAH
Jacksonia furcellata	1	1			Native/Dubious
Juncus pallidus		1		1	Native
Kennedia prostrata		1		1	Native
Kunzea glabrescens	1	1			Native
Lactuca serriola		1			Introduced Flora on WAH
Lagurus ovatus		1			Introduced Flora on WAH
Lepidosperma striatum		1	1	1	Native

Species	qDryShrub	qMp	qSedge	qWetshrub	Native/Weed/ Dubious
Leucopogon conostephioides		1			Native
Lobelia anceps				1	Native
Lobelia tenuior				1	Native
Lolium multiflorum		1			Introduced Flora on WAH
Lomandra preissii	1				Native
Lyginia barbata	1				Native
Lysimachia arvensis		1			Introduced Flora on WAH
Macrozamia riedlei	1				Native
Medicago polymorpha	1				Introduced Flora on WAH
Melaleuca lateritia	1	1			Native
Melaleuca preissiana	1	1	1	1	Native
Melaleuca rhaphiophylla				1	Native
Melaleuca seriata		1			Native
Melaleuca thymoides		1			Native
Melilotus indicus		1			Introduced Flora on WAH
Mentha pulegium		1			Introduced Flora on WAH
Microtis media		2			Native
Microtis sp. indet.		1			Native
Monoculus monstrosus	1				Introduced Flora on WAH
Monotaxis grandiflora		1			Native
Nuytsia floribunda		1			Native
Oenothera laciniata	1				Introduced Flora on WAH
Opercularia vaginata		1			Native
Oxalis corniculata		1			Introduced Flora on WAH
Patersonia occidentalis		1		1	Native
Pelargonium capitatum	1	1	1		Introduced Flora on WAH
Pericalymma ellipticum		1			Native
Petrophile linearis		1			Native
Petrorhagia dubia	1	1			Introduced Flora on WAH
Phlebocarya ciliata	1				Native
Pimelea rosea		1	1		Native

Species	qDryShrub	qMp	qSedge	qWetshrub	Native/Weed/ Dubious
Pinus pinaster	1	1	1		Introduced Flora on WAH
Platysace filiformis	1	1	1		Native
Platytheca galioides	1	1			Native
Polypogon monspeliensis				1	Introduced Flora on WAH
Pterostylis pyramidalis		1			Native
Schinus terebinthifolius	1	1			Introduced Flora on WAH
Schoenus efoliatus		1			Native
Schoenus subfascicularis		1	1		Native
Scholtzia involucrata	1	1			Native
Solanum nigrum	1	1			Introduced Flora on WAH
Sonchus oleraceus	1	1		1	Introduced Flora on WAH
Stylidium repens			1		Native
Thysanotus multiflorus		1		1	Native
Thysanotus sparteus		1			Native
Trachyandra divaricata		1			Introduced Flora on WAH
Trifolium campestre	1	1			Introduced Flora on WAH
Urospermum picroides	1	1			Introduced Flora on WAH
Ursinia anthemoides		1			Introduced Flora on WAH
Viminaria juncea	1				Native
Vulpia myuros	1			1	Introduced Flora on WAH
Vulpia sp. indet.		1			Introduced Flora on WAH
Wahlenbergia preissii		1			Native
Washingtonia filifera	1				Introduced Flora on WAH
Xanthorrhoea preissii		1			Native

Appendix 3: Fauna List

The total species list undertaken by Natural Area Consulting Management Services in 2015 is provided in this section, with fauna listed by listed in groups and by species name.
*Denotes introduced species

Family	Species Name	Common Name
Mammals		
Peramelidae	*Isoodon obesulus fusciventer*	Southern Brown Bandicoot
Canidae	**Vulpes vulpes*	European Red Fox
Birds		
Anthochaera	*Anthochaera carunculata*	Red Wattle Bird
Cacatuidae	*Cacatua roseicapilla*	Galah
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike
Corvidae	*Corvus coronoides*	Australia Raven
Artamidae	*Cracticus tibicen*	Australian Magpie
Monarchidae	*Grallina cyanoleuca*	Magpie Lark
Meliphagidae	*Lichenostomus virescens*	Singing Honeyeater
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater
Columbidae	**Streptopelia senegalensis*	Laughing Turtle-dove
Reptiles		
Scincidae	*Acritoscincus trilineatum*	South-west Cool Skink
Gekkonidae	*Christinus marmoratus*	Marbled Gecko
Scincidae	*Cryptoblepharus buchananii*	Fence Skink
Scincidae	*Ctenotus fallens*	West-coast Laterite Ctenotus
Scincidae	*Lerista elegans*	Elegant Slider
Scincidae	*Lerista lineata*	Perth Lined Lerista
Scincidae	*Morethia lineoocellata*	Westcoast Pale-flecked Morethia
Agamidae	*Pogona minor*	Western Bearded Dragon
Scincidae	*Tiliqua rugosa*	Bobtail
Amphibians		
Myobatrachidae	*Crinia glauerti*	Rattling or Clicking Froglet
Myobatrachidae	*Heleioporus eyrei*	Moaning Frog
Hylidae	*Litoria adelaidensis*	Slender Tree Frog

Family	Species Name	Common Name
Invertebrates		
Paradoxosomatidae	*Akamptogonus novarae*	Brown Millipede
Formicidae	*Camponotus dryandrae*	Brownmiddle Darkened Ant
Formicidae	*Camponotus terebrans*	Brownleg Mattneck Glossblack Ant
Curculionidae	*Catasarcus impressipenis*	Red-legged Weevil
Lepismatidae	*Ctenolepisma* sp.	Native silver fish
Libellulidae	*Diplacodes bipunctata*	Dragonfly
Tenebrionidae	*Ecnolagria aeneoviolacea*	Rough Metallic Tenebeetle
Mutillidae	*Ephutomorpha* sp.	Flower Wasp
Acrididae	*Goniaea australasiaea*	Gumleaf grasshopper
Gryllidae	*Gryllodes suplicans*	Field Cricket/Indian House Cricket
Coenagrionidae	*Ishnura heterosticta*	Common Bluetail
Muscidae	*Musca vetustisissima*	Bush fly
Sparassidae	*Neosparassus* sp.	Badge Huntsman
Nephilidae	*Nephila edulis*	Garden Orb-weaver
Libellulidae	*Orthetrum caledonicum*	Blue skimmer dragon fly
Amorphoscelidae	*Paraoxypilus laticollis*	Praying mantis
Pholcidae	*Pholcus phalangioides*	Daddy Longlegs
Tenebrionidae	*Pterohelaeus* sp.	Pie-dish Beetle

Appendix 4: Likelihood of At-risk Fauna Species to Occur

The likelihood of at-risk fauna species not recorded on site to occur within the reserve is shown in the tables below.

Likelihood of at-risk mammal species to occur

Species Name	Common Name	Likelihood of occurrence
Macropus Irma	Western Brush Wallaby	Unlikely to occur due to the isolation and small size of the reserve, the surrounding built up area and previous clearing of the pine forests
Macropus fuliginosus	Western Grey Kangaroo	Unlikely to occur due to the isolation of the site and the small size of the reserve, the surrounding built up area and previous clearing of the pine forests
Rattus fuscipes	Bush Rat	Unlikely to occur due to previous disturbance and clearing
Tarsipes rostratus	Honey Possum	Unlikely to occur due to previous disturbance and clearing, and is a rare species on the Swan Coastal Plain
Trichosurus vulpecula	Brush-tailed Possum	Unlikely to occur as it has not been recorded in Melville for a number of years, and due to the small size and isolated nature of the site

Likelihood of at-risk bat species to occur

Species Name	Common Name	Likelihood of occurrence
Chalinolobus gouldii	Gould's Wattle Bat	Likely to occur as habitat and location are suitable
Chalinolobus morio	Chocolate Wattle Bat	Likely to occur as the site is within their range and the habitat is suitable
Falsistrellus mackenziei	Western False Pipistrelle	Unlikely to occur as Perth is north of their known range and the habitat is unsuitable as no Karri, Jarrah or Tuart forests occur on site
Nyctophilus geoffroyi	Lesser Long-eared Bat	Likely to occur as habitat and location are suitable
Nyctophilus gouldii	Gould's Long-eared Bat	Likely to occur as the site is within their range and the habitat is suitable
Nyctophilus major	Greater Long-eared Bat	Likely to occur as the site is within their range and the habitat is suitable
Vespadelus regulus	Southern Forest Bat	Likely to occur as the site is within their range and the habitat is suitable

Likelihood of at-risk bird species to occur

Species Name	Common Name	Likelihood of occurrence
Acanthiza apicalis	Inland Thornbill	Unlikely has not been recorded on site since 1986, due to disturbance to vegetation and fragmentation of bushland areas during surrounding development
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Likely as the location and habitat surrounding the thick vegetation is suitable
Acanthiza inornata	Western Thornbill	Likely, as it was recorded in 2003, and location and habitat is suitable, moderately common in the Swan Coastal Plain except suburban areas
Acanthorhynchus superciliosus	Western Spinebill	Likely, it was recorded in 2013, and location and habitat is suitable
Anas rhynchotis	Australian Shoveler	Likely as it has been recorded in previous surveys, and location and habitat are suitable
Anas superciliosa	Pacific Black Duck	Likely to occur as habitat and location is suitable
Anthochaera lunulata	Western Wattlebird	Unlikely as habitat is unsuitable
Apus pacificus	Fork-tailed Swift	Unlikely, not previously recorded and vegetation type is not their preferred habitat
Ardea ibis	Cattle Egret	Likely as the habitat and location are suitable
Ardea alba	Eastern Great Egret	Likely, as it is a highly migratory species and the habitat is suitable, but it would only be a seasonal visitor
Aythya australis	Hardhead	Unlikely as habitat is unsuitable
Biziura lobata	Musk Duck	Likely as the habitat and location are suitable, and it has been recorded previously
Cacatua sanguinea	Little Corella	Likely as habitat and location are suitable
Calyptorhynchus banksii naso	Forest Red-tailed Cockatoo	Likely to use the site as a food source as habitat is suitable
Calyptorhynchus baudinii	Baudin's Cockatoo	Likely as location and foraging habitat are suitable
Calyptorhynchus latirostris	Carnaby's Cockatoo	Likely to use the site as a food source as habitat is suitable
Climacteris rufa	Rufous Treecreeper	Unlikely as this species is very scarce on the Swan Coastal Plain
Colluricincla harmonica	Grey Shrike-thrush	Likely as habitat and location are suitable
Gallinula tenebrosa	Dusky Moorhen	Likely as habitat and location are suitable, and has been recorded previously
Hirundo nigricans	Tree Martin	Likely as habitat and location are suitable, and has been recorded previously
Malacorhynchus membranaceus	Pink-eared Duck	Likely as habitat and location are suitable, although uncommon on the Swan Coastal Plain

Species Name	Common Name	Likelihood of occurrence
Malurus splendens	Splendid Fairy-wren	Likely to occur as habitat and location are suitable, it is common in bushland of the Swan Coastal Plain and observed in nearby reserves
Merops ornatus	Rainbow Bee-eater	Likely to occur as a seasonal visitor, as it breeds in clear sandy soils which are present on site, and it has been found at nearby reserves
Ninox connivens	Barking Owl	Unlikely as they are scarce in the south-west and their main food source are small marsupials which limit their distribution
Nycticorax caledonicus	Nankeen Night-Heron	Likely as habitat and location are suitable
Oxyura australis	Blue-billed Duck	Likely as habitat and location are suitable
Pardalotus striatus	Striated Pardalote	Likely as habitat and location are suitable, and this species is common in the Perth Region
Petroica boodang	Scarlet Robin	Unlikely as vegetation is not their preferred habitat
Phaps chalcoptera	Common Bronzewing	Likely as habitat and location are suitable
Phylidonyris novaehollandiae	New Holland Honeyeater	Likely as habitat and location are suitable
Platycercus zonarius	Australian Ringneck	Unlikely as habitat is unsuitable
Purpureicephalus spurius	Red-capped Parrot	Likely as habitat and location are suitable, and has been recorded previously
Smicrornis brevirostris	Weebill	Likely as habitat and location are suitable
Todiramphus sanctus	Sacred Kingfisher	Likely as habitat and location are suitable, and has been recorded previously
**Trichoglossus haematodus*	Rainbow Lorikeet	Likely as habitat and location are suitable, and this species is a common pest throughout the Perth Metropolitan Region
Turnix varia	Painted Button-quail	Unlikely due to previous disturbance and clearing

(Source: Birdlife Australia, 2016)

Likelihood of at-risk reptile species to occur

Species Name	Common Name	Likelihood of occurrence
Aprasia repens	Worm Lizard	Likely as habitat and location are suitable, common on the Swan Coastal Plain
Ctenophorus adelaidensis	Western Heath Dragon	Likely as habitat and location are suitable
Delma fraseri	Fraser's Legless Lizard	Likely as habitat and location are suitable
Delma greyii	Gray's Legless Lizard	Likely as habitat and location are suitable

Species Name	Common Name	Likelihood of occurrence
Demansia psammophis	Yellow-faced Whipsnake	Likely as habitat and location are suitable
Lialis burtonis	Burton's Snake Lizard	Likely as habitat and location are suitable, common on the Swan Coastal Plain
Lissolepis luctuosa	Mourning Skink	Likely as habitat and location are suitable
Neelaps bimaculatus	Black-naped Snake	Unlikely as the site has been heavily disturbed in the past and this species in very rare on the Swan Coastal Plain
Neelaps calonotos	Black-striped Snake	Unlikely as the site has been heavily disturbed in the past and this species in very rare on the Swan Coastal Plain
Notechis scutatus	Western Tiger Snake	Unlikely due to the small size and isolated nature of the reserve
*Parasuta gouldii (*syn. *Rhinoplocephalus gouldii)*	Gould's Hooded Snake	Unlikely as they usually occur in the Darling Range, and the
Pletholax gracilis	Keeled Legless Lizard	Unlikely as habitat is unsuitable, and this species is rare on the Swan Coastal Plain
Pseudonaja affinis	Dugite	Unlikely due to the small size and isolated nature of the reserve
Pygopus lepidopodus	Common Scaly-Foot	Unlikely as habitat is unsuitable
Ramphotyphlops australis	Southern Blind Snake	Likely as habitat and location are suitable
Ramphotyphlops waitii	Common Beaked Blind Snake	Likely as habitat and location are suitable, common on the Swan Coastal Plain
Varanus gouldii	Gould's Monitor	Likely as habitat and location are suitable

Appendix 5: Weed Maps

Weed maps were prepared by Natural Area using grid point data recorded by Ecoscape (2015).

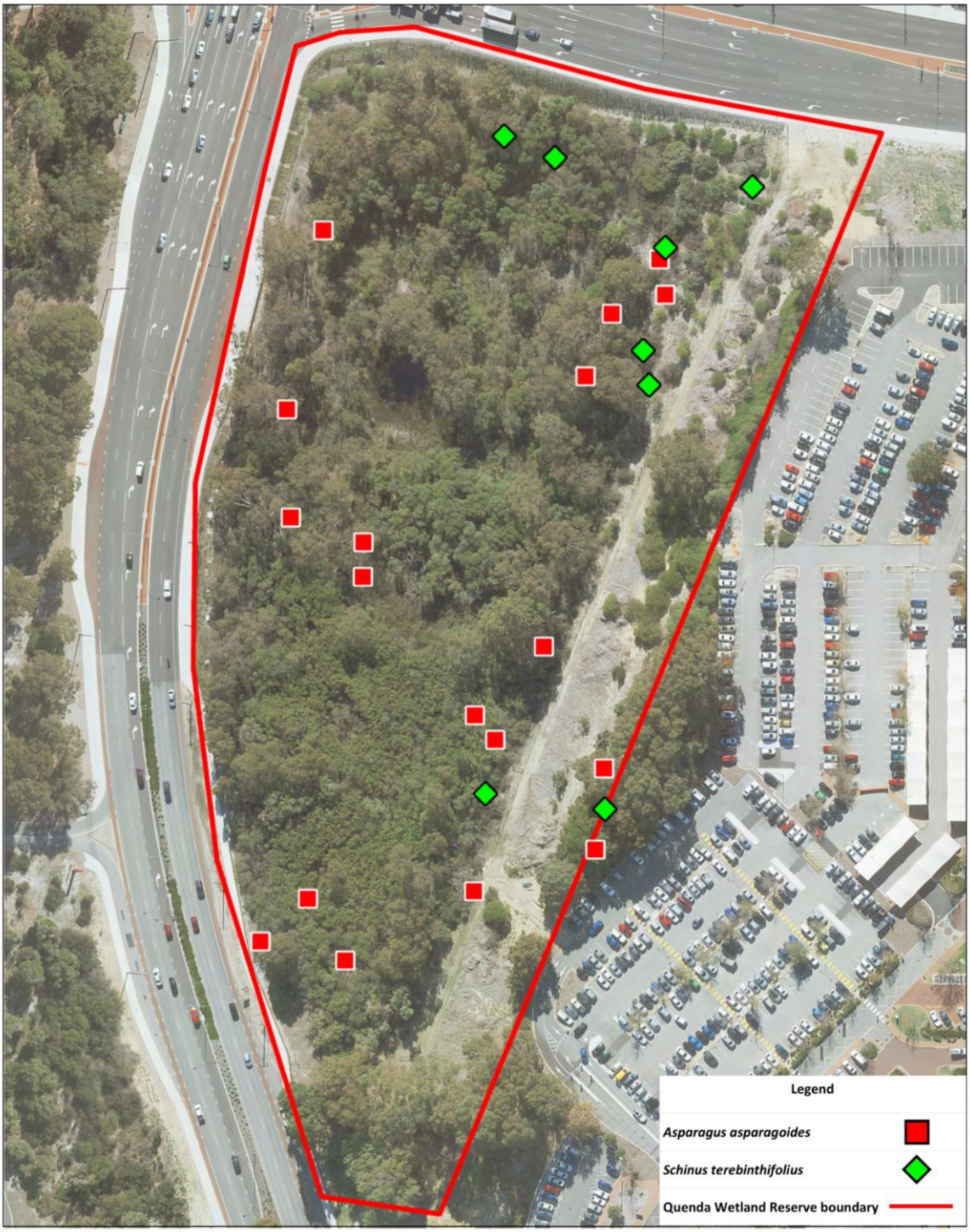

Density
Low (<5)
Quenda Wetland Reserve boundary
Annual grasses density and distribution
Quenda Wetland Reserve, Murdoch
N
Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50
0
25
Metres

Geophytes density and distribution
Quenda Wetland Reserve, Murdoch

N

Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres

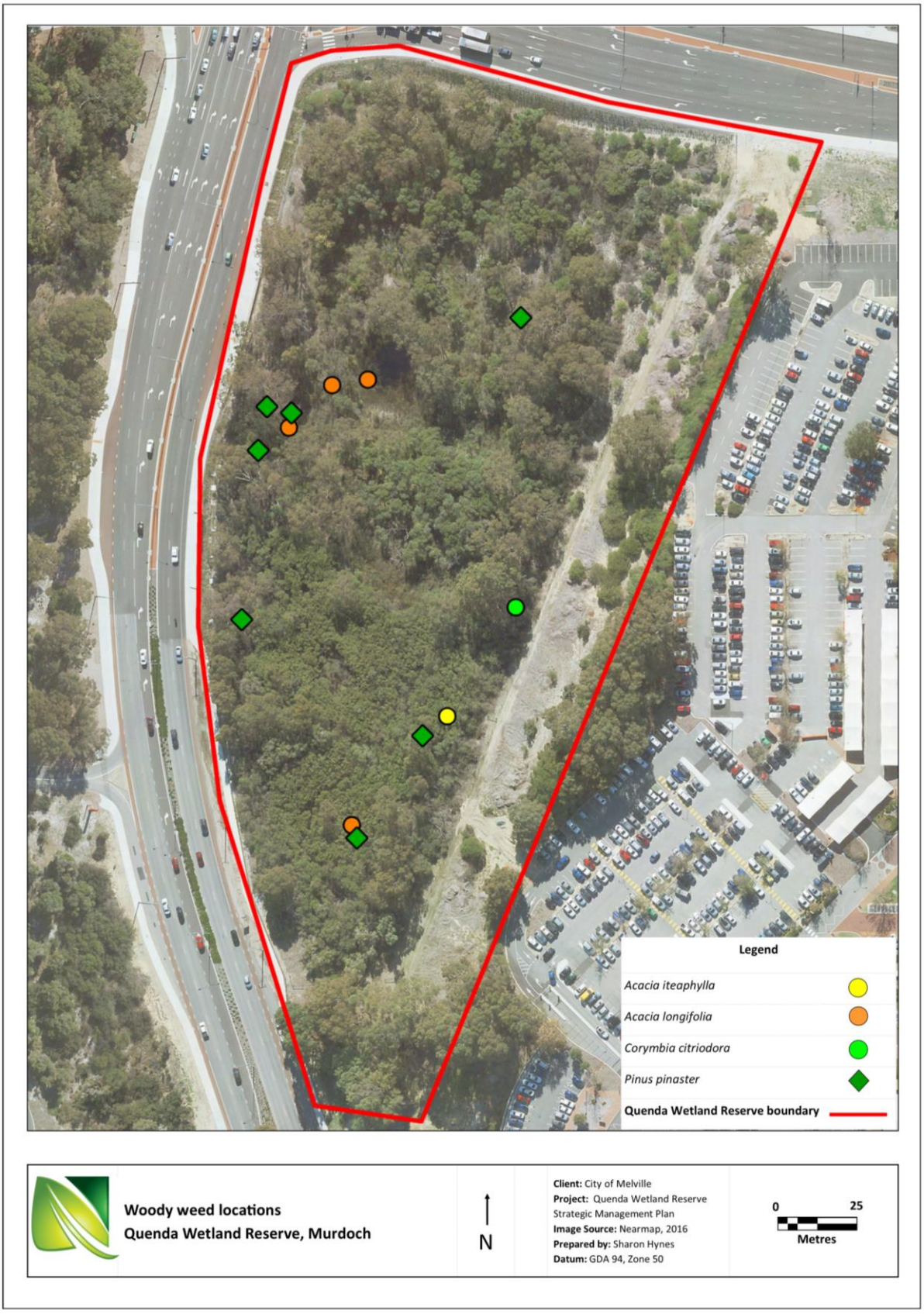


Very high priority weed locations
Quenda Wetland Reserve, Murdoch

N

Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50

0 25
Metres


Legend
Acacia iteaphylla
Acacia longifolia
Corymbia citriodora
Pinus pinaster
Quenda Wetland Reserve boundary
Woody weed locations
Quenda Wetland Reserve, Murdoch
N
Client: City of Melville
Project: Quenda Wetland Reserve Strategic Management Plan
Image Source: Nearmap, 2016
Prepared by: Sharon Hynes
Datum: GDA 94, Zone 50
0
25
Metres