City of Nedlands

nedlands.wa.gov.au

Shenton Bushland Management Plan 2013—2018

Final Adopted 25 March 2014

City of Nedlands
(08) 9273 3500
Council@nedlands.wa.gov.au
71 Stirling Highway Nedlands 6009
Cover Photo Sally Wallace

Document Information

Document Title:	Shenton Bushland Management Plan 2013 - 2018
Prepared by:	Vicki Shannon, City of Nedlands
Doc. Status:	Final Adopted 25 March 2014

Document History

Version	Description	Date
1.	First Draft	14/02/2013
2.	Second Draft	19/03/2013
3.	Third Draft	13/09/2013
4.	Public Consultation Draft	29/11/2013
5.	Final for Council Endorsement	10/03/2014
6.	Final Adopted 25 March 2014	25/03/2014

ACKNOWLEDGEMENTS

The City of Nedlands would like to acknowledge and thank the following individuals who assisted in the development of this Management Plan.

Andrew Melville, City of Nedlands Manager Health and Compliance
Daniel Boase – Jelinek, Friends of Shenton Bushland
Friends of Shenton Bushland
John Stuart, City of Nedlands Environmental Conservation Officer
Kate Brown, Department of Parks and Wildlife
Rachelle Hannah, City of Nedlands GIS Officer
Rob Davis, Edith Cowan University
Roz Hart, Friends of Shenton Bushland and Perth Urban Bushland Fungi Project
Ruth and John Luyer, Friends of Allen Park
Syrinx Environmental Pl

SUMMARY

This section of the City of Nedlands Natural Areas Management Plan 2013 - 2018 is dedicated specifically to the management of Shenton Bushland. Detailed information that relates to all natural areas within the City such as mapping methodology, rehabilitation, environmental weed control, climate change, geomorphology and soils, planning information, interpretation, priority flora and fauna, fire management, community involvement, access and feral animal management has been detailed on pages 1 – 76 of the Natural Areas Management Plan 2013 - 2018.

The Shenton Bushland Management Plan 2013 – 2018 has drawn heavily from the following documents:

- The Shenton Bushland Management Plan 1996 (Ecoscape, 1996); and
- The Shenton Bushland Management Plan 2005 – 2010 (Ecoscape, 2005).

A five year management plan has been developed that provides management actions and strategies for the conservation and restoration of Shenton Bushland. A summary of key actions for Shenton Bushland are listed below.

Table 1: Summary of Shenton Bushland Management Actions 2013 – 2018.

ACTIONS	
MANAGEMENT BOUNDARIES	
1.	Manage Shenton Bushland on the basis of 8 Zones.
REHABILITATION	
2.	Focus rehabilitation on good condition bushland areas as a priority.
3.	Develop rehabilitation plans for degraded sites (including soil mounds) that are to be the focus of reconstruction. These should include as a minimum the boundary of works, a planting list and native plants present that require protection.
4.	Coordinate the removal of soil mounds with path upgrade works.
5.	Asbestos if found in the bushland should be left alone and reported to the City.
6.	Improve the appearance of the Lemnos Street frontage by installation of a rubbish bin and bollards and activities such as litter removal, planting and mulching.
REVEGETATION	
7.	If revegetation work is proposed work with local nurseries to grow species found in low abundance.
8.	Use species such as *Allocasuarina humilis; Conostylis aculeata, Conostylis setigera, Rhagodia baccata, Jacksonia sericea, Scaevola canescens and Scaevola repens* at low fuel sites.
WEED CONTROL	
9.	Undertake annual monitoring and control of *Chasmanthe floribunda*, *Centranthus macrosiphon*, *Gladiolus undulatus*, *Lachenalia bulbifera*, *Asparagus asparagoides*, *Acacia longifolia* and Coast Teatree to ensure they do not spread or reestablish.
10.	Continue to control the following weeds as a high priority: *Ehrharta calycina, Euphorbia terracina, Ferraria crispa, Freesia alba x leichtlinii, Ixia maculata, Lachenalia reflexa, Moraea flaccida, Pelargonium capitatum and Watsonia meriana.*
11.	Control Weeds in Zones A & B as a priority.
12.	Continue to liaise with the Department of Defence regarding weeds adjacent to Shenton Bushland, within Irwin Barracks.
13.	Continue to collaborate with the Health Department for weed management on Health Department owned land.
14.	Control weeds in The Barrens and along the front fence periodically so they do not invade adjacent bushland areas.

MONITORING	
15.	Undertake biannual monitoring of transects and photo monitoring points every five years.
16.	Consider installing additional photo monitoring points.
17.	Continue to map priority weeds through Management Plan reviews.
18.	Monitor, control and document the distribution of new invasive weeds as they arise.
19.	Annually monitor weeds with the potential to expand rapidly and map changes in their distribution if required.
20.	Collate historical mapping and monitoring data along with management activities undertaken in the bushland since the late 1990's by DPAW, the City and the Friends of Shenton Bushland.
FIRE MANAGEMENT	
21.	Undertake annual management of grass weeds to reduce fuel loads.
NATIVE ANIMALS	
22.	Carefully relocate reptiles if they are encountered when removing soil mounds.
23.	Retain hollows for refuges in large old and dead trees.
24.	Control feral European Bees as they can displace native animals.
25.	Protect nests of Rainbow Bee-eaters if they are encountered.
26.	Continue the feral fox control program.
27.	Undertake surveying to determine if there are any marsupials in the bushland.
COMMUNITY INVOLVEMENT	
28.	Collaborate with adjacent organisations on projects to improve the Lemnos frontage and increase awareness of the bushland.

BACKGROUND

Study Site

Shenton Bushland is bordered by Selby Older Adult Mental Health Hospital and Grace Vaughn House to the east, Irwin Army Barracks to the south and west and the Shenton Park Dog's Home to the north west. It is located in the City of Nedlands approximately 7km west south west of the Perth CBD as shown in Figure 1 on the next page.

Shenton Bushland contains A Class Reserve 43161 vested in the City of Nedlands for "Conservation and Recreation". This Reserve was previously vested with the State Government for "Health Purposes" and zoned Light Industry under the Metropolitan Region Scheme (MRS) it covers an area of approximately 21Ha.

Shenton Bushland also contains C Class Reserve 20074 which is vested with the Department of Health for "Health Purposes" and under the MRS as "Light Industry". Reserve 20074 covers an area of approximately 9Ha of which 4.8Ha consists of bushland. The 4.8Ha of bushland is cooperatively managed by the City of Nedlands, the Friends of Shenton Bushland and the Department of Health. A Memorandum of Understanding (MOU) between the City and the Department of Health outlines the Department of Health's contribution towards natural area management on Reserve 20074 for 2013 – 2017. A small area of 0.4Ha is also owned by the Department of Education on the eastern edge of the bushland.

Figure 1: Location of Shenton Bushland and Vesting

Disturbance Factors

Shenton Bushland has a long history of disturbance including illegal dumping of rubbish, soil, garden waste and car bodies, logging activities, frequent fires, weed invasion, clearing, informal access and other activities such as construction of the Prisoner of War Camp (POW) along the western portion of the bushland.

Implementation of previous Management Plans

Previous management plans developed for Shenton Bushland include the *Shenton Bushland Management Plan* (Ecoscape, 1996) and the *Shenton Bushland Management Plan 2005 – 2010* (Ecoscape, 2005). The Friends of Shenton Bushland also have their own management plan that was

developed to guide their activities and their relationship with the City of Nedlands this can be viewed at http://shentonbushland.pbworks.com/w/page/10257773/FrontPage.

Following the development of the 1996 Management Plan the bushland has been actively managed by the City of Nedlands and the Friends of Shenton Bushland. The 4.8Ha of bushland owned by the Department of Health on Reserve 20074 has been cooperatively managed between the City of Nedlands, the Friends of Shenton Bushland and the Department of Health since 2007.

The 2005-2010 Management Plan consolidated information regarding activities undertaken since the development of the 1996 Management Plan along with reviewing and updating the information detailed in the 1996 Plan. Thirty-six recommendations were developed in the 2005 -2010 Management Plan of which twenty nine were implemented, two were partially implemented and five that were not implemented. The two that were partially implemented included one in relation to reconstruction of *Very Poor* condition bushland which only commenced in some small areas along Lemnos Street and at Mount Pelargonium and one relating to developing rehabilitation plans for sites to be intensively managed of which the information was recorded however not formally in the development of a document. The five that were not implemented included two relating to the removal of weed mounds of which none have been removed since 2005, one relating to liaising with the Department of Defence regarding weed invasion from their adjacent land; one relating to the monitoring of indigenous species found in low abundance which will aim to be implemented in the 2013 – 2018 Management Plan and one relating to the development of an interpretation plan of which interpretation is being addressed through the Whadjuk Trails project. A summary of the implementation of the 2005 – 2010 Management Plan is shown in Appendix 5.

Management Activities, Challenges and Successes

Shenton Bushland has been actively managed since the late 1990's. Since that time the Department of Parks and Wildlife (DPAW) and the Friends of Shenton Bushland have undertaken a significant amount of weed mapping and other monitoring activities in the bushland. Review of historical mapping data shows that over the years there has been a significant reduction in the density and/or distribution of the following environmental weeds across Shenton Bushland:

- Black wattle (*Acacia longifolia*),
- Blue and Narrow-leaf lupin (*Lupinus cosentinii* and *Lupinus angustifolius)*,
- Flinders Ranges Wattle (*Acacia iteaphylla*),
- Fountain Grass (*Pennisetum setaceum*),
- Freesia (*Freesia alba x leichtlinii*),
- *Lachenalia*,
- Pelargonium (*Pelargonium capitatum*) – particularly on Mount Pelargonium,
- Perennial Veldt Grass (*Ehrharta calycina*); and
- Watsonia (*Watsonia meriana*).

However with the removal of many perennial grass weeds across the bushland, some other weeds have increased such as Fumitory (*Fumaria capreolata*), *Oxalis* sp. and Vetch (*Vicia sativa*) these should be monitored and a control program developed if resources allow.

<u>Documentation of Bushland Activities 2008-2012</u>

The Friends of Shenton Bushland began using GPS equipment to monitor bushland activities since 2004, and in 2008 began to identify which weed(s) were being controlled. The data below summarises the 2008-2012 activities for the main weeds targeted (*Freesia*, Geraldton Carnation Weed, *Lachenalia*, Veldt Grass; and *Watsonia*).

Freesia and *Lachenalia*

Hand weeding of *Freesia* and *Lachenalia* by the Friends of Shenton Bushland was quite intensive up until 2008. It has been less of a focus in recent years since the City of Nedlands increased chemical bulbous weed control. Due to funding restrictions and as *Lachenalia* and *Freesia* have similar chemical weed control strategies along with similar timing for optimal treatment the spraying of these weeds have been undertaken in conjunction with each other.

This could be seen as a compromise if they are not both at the right stage for spraying however; it is currently the best option available to use existing funding. In recent years the incidence of both *Freesia* and *Lachenalia* appears to be declining, so the focus of the Friends of Shenton Bushland has been to remove isolated patches of *Freesia* and *Lachenalia* that have been missed by spraying.

Lessons learnt:

- Chemical control appears to be more effective than hand control (less soil disturbance, and more significant reduction of density and distribution of the weeds); and
- Hand control is useful for isolated patches that have been missed by the spraying contractors.

Geraldton Carnation Weed

Geraldton Carnation weed has been a major focus for over 10 years, and it does not appear to have been significantly reduced in either density or distribution. This is in part due to its long residual soil seed bank life (up to 5 years), that it is spread by some birds (such as Spotted Doves); and that it responds quickly to rain from autumn through summer where it requires little water to grow and produce seed. Geraldton Carnation Weed also appears to have benefited greatly from the successful Veldt Grass control program in the bushland (through reduced competition) which has allowed it to spread more vigorously.

Lessons learnt:

- Geraldton Carnation Weed has been difficult to control at Shenton Bushland at best its rate of spread is being reduced through an ongoing control programs.

Veldt Grass

The City of Nedlands has been spraying Veldt Grass consistently for over 10 years. During that time its density has significantly reduced. Any remnants that have survived the spraying or that have emerged in response to autumn or summer rain are hand weeded by the Friends of Shenton Bushland. Hand weeding concentrates on areas that are only lightly infested with heavy infestations marked for spraying the following year.

Lessons learnt:

- Chemical control has resulted in the bushland being almost free of Veldt Grass,
- The reduction of Veldt Grass has great benefits for the bushland including reduced fire hazard and increased space for native species to grow. However, invasive seed species such as Geraldton Carnation Weed also have the potential to take advantage,
- Hand weeding of Veldt Grass over summer is useful for reducing the likelihood of potential re-infestation emerging from late autumn and summer rain; and
- Continued spraying is required otherwise Veldt Grass will re establish dense infestations very quickly.

Watsonia

Watsonia control is possibly the most successful management activity that has been undertaken by the Friends of Shenton Bushland over the past ten years. The Watsonia infestation was initially targeted by one person, then the whole Friends Group for several years until it came under control.

There are still a few isolated plants that emerge each year from residual bulbs. However, these are removed as they emerge which prevents them from seeding therefore eliminating the establishment of new plants.

Lessons learnt:

- During the first few years Watsonia was hand weeded intensively which succeeded in reducing its density to a level where it could be controlled with only one or two visits per year,
- Removing Watsonia bulbs is essential to stop them from re-emerging; and
- Chemical control does not appear to be necessary for small infestations.

Miscellaneous Weeds

A number of weeds (such as Coast Teatree, Flinders Ranges Wattle, Fountain Grass, and Pelargonium) are being controlled by removal whenever they are encountered. The Coast Teatree (Victorian Tea Tree) infestation comes from plantings on the adjacent Department of Defence land. Whilst the area is quite large, the plants are scattered, take a number of years to mature and are easy to detect and remove. Pelargonium is the most widespread of the miscellaneous weeds listed above, and there are a few infestations that require concentrated effort. Generally, it seems that they can be controlled simply by removing them when they are encountered.

Lessons learnt:

- Remove miscellaneous weeds whenever they are encountered. If the plant is too large to remove they should be GPS mapped for later removal; and
- Pelargonium infestations can become problematic if left too long, therefore large patches need to be monitored and removed annually.

Albuca canadensis

Another infestation of a potentially invasive weed is *Albuca canadensis* which has been a focus in recent years as it was increasingly becoming dense and spread out.

Lessons learnt:

- The Albuca infestation was neglected for too long, and is now proving to be quite-time consuming to deal with. The plants are quite difficult to remove because they produce many bulbuls that tend to remain in the soil after the main bulb is removed, so we have to take quite a bit of soil with each plant; and
- The Coast Teatree infestation is not a major problem and is easily controlled with occasional visits during summer when things are quieter in the bushland.

BIOLOGICAL ENVIRONMENT

Landscape Elements
Shenton Bushland is characterised by a major north/south ridgeline located towards the eastern boundary of Reserve 43161 which would have once been the crest of a coastal dune. This ridge varies in height from 31 m Australian Height Datum (AHD) adjoining Lemnos Street to the highest point in the bushland, 34 m AHD in the south east corner of Reserve 43161. There is a uniform westerly slope from this ridge to the lowest part of the bushland, at only 8 m AHD in the south west corner.

In discrete places within Shenton Bushland the topsoils have been modified due to the introduction of foreign materials. These include lateritic gravels laid to stabilise vehicle tracks, build the Prisoner of War (POW) camp and mixed topsoils of stone, rubble and organic material introduced via previous illegal dumping of debris and rubbish in the bushland.

Soils and Geomorphology
Shenton Bushland lies on the Spearwood Dune System of McArthur & Bettenay (1960). There is no outcropping rock in the bushland itself, but Tamala Limestone is exposed in the nearby railway cutting. The sand which underlies the bushland (and presumably overlies the limestone there) is clearly derived from that unit. It is a pale yellow or grey, moderately well-sorted, moderately well-rounded, medium-grained, quartz sand, with occasional feldspar grains and calcareous fragments. Tuart (*Eucalyptus gomphocephala*) and dense Parrot Bush (*Banksia sessilis*), particularly in the northeastern and southeastern sectors, indicate the near-surface presence of limestone.

As in other parts of the central Spearwood Dune System, soils throughout the bushland are poorly developed and infertile. In the nomenclature of Bolland (1998), they belong to the 'grey phase of the Karrakatta sands'. The soil is conspicuously modified -- in places, the entire surface is obscured with building rubble; items of general household rubbish are incorporated in the profile; there are mounds and trenches throughout the bushland. Scattered pea-gravel (lateritic pisoliths) and granitic mica flakes are probably the remains of surfacing material imported from the Darling Range (or possibly even further inland).

Vegetation
Vegetation Complex Heddle et al (1980)
Shenton Bushland is mapped as occurring on the Karrakatta – Central and South Vegetation Complex. This Complex is characteristic of the Karrakatta Soil Association and consists of predominately low open-forest of Tuart/Jarrah/Marri. Tuart is dominant on the western side of the Complex, particularly on hills and ridges, where limestone is nearer the surface with Jarrah replacing Tuart on deeper sands, and Marri occurring on localised moister soils.

Floristic Community Type Gibson (1994)
Floristic Community Types (FCTs) classify vegetation into groups of plant species that tend to co-occur in small to medium areas. The Floristic Community Type detailed in Bush Forever (2000) for Shenton Bushland was determined to be Spearwood *Banksia attenuata – Eucalyptus* woodland (FCT 28) which forms part of Super Group 4 - Uplands Centred on Spearwood and Quindalup Dunes.

Structural Plant Community - Natural Area Initial Assessments
In the Natural Area Initial Assessments undertaken in 2008 the structural plant community across the entire bushland was mapped as Jarrah-Banksia Woodland over open *Xanthorrhoea preissii* shrubland with mixed shrub and herb/grass layer. This information is detailed on the Local Biodiversity Projects Natural Area Assessments database for Shenton Bushland.

Site-Specific Classification of Vegetation

The 1996 Management Plan identified three vegetation associations:

- Jarrah–Banksia Woodland,
- Banksia Woodland; and
- Tuart–Banksia Woodland.

However these were remapped as two vegetation associations in the 2005 Management Plan which included:

- Jarrah–Banksia Woodland; and
- Banksia Woodland.

This excluded the most dense stands of Tuarts that were mapped as Tuart–Banksia Woodland in the 1996 Management Plan. In the 2005 Management Plan it was noted that those denser stands of Tuart were limited in extent with no noticeable understorey difference, and that Tuarts occurred throughout the bushland in very low numbers. In 2005 all Tuarts were individually mapped and included within the two major vegetation associations identified.

According to Ecoscape (2005[2]), the distribution of the two communities onsite is a typical manifestation of variation in topography and soil. Beard (cited in Ecoscape 2005[2]) noted that *Eucalyptus gomphocephala* usually occurs on ridges and that *Banksia menziesii* and *Banksia attenuata* (with scattered *Eucalyptus todtiana*) tend to occur to the exclusion *of Eucalyptus marginata* on deep white sands or limestone outcrops carrying little or no soil, and where moisture levels are very low. The location of the Jarrah–Banksia Woodland and Banksia Woodland communities are shown in the map section on page 38 and are detailed further below (as described in the 2005 Management Plan).

Jarrah–Banksia Woodland

This community is the most common on the site, covering most of the Bushland. The woodland is dominated in the upper storey by Jarrah (*Eucalyptus marginata*) which varies in density throughout the Bushland. The small tree layer is comprised of Candle or Slender Banksia (*Banksia attenuata*) and Firewood Banksia (*Banksia menziesii)* with the latter species being less common than the former two. Sheoak (*Allocasuarina fraseriana*) is not a dominant overstorey species onsite, and is mainly distributed along the interface of the Jarrah-Banksia Woodland and Banksia Woodland.

The shrub layer is dominated by *Jacksonia furcellata, Hakea prostrata* and most commonly by grass trees (*Xanthorrhoea preissii*). The greatest floristic richness is found in the lower vegetation stratum, comprising small shrubs, herbs and grasses. Small shrubs include Prickly Moses (*Acacia pulchella*), *Gompholobium tomentosum, Jacksonia sericea, Hovea trisperma, Hibbertia hypericoides, Daviesia nudiflora, Grevillea vestita, Daviesia triflora, Scaevola canescens, Scaevola paludosa* and Pixie Mops (*Petrophile linearis*). Herbs include *Conostylis sp., Haemodorum spicatum, Burchardia umbellata, Lomandra sp* and various orchids. Native sedges that are dominant include *Mesomelaena pseudostygia* and *Alexgeorgea nitens* with the latter forming extensive mats in the bushland.

Banksia Woodland

Patches of Banksia woodland also occur along the ridge, noticeable by an absence of Jarrah. It is dominated by *Banksia attenuata, Banksia menziesii* and some Bull Banksia (*Banksia grandis*). However, Bull Banksia are no longer present in the bushland (as at 2013).

The understorey is generally less diverse than the Jarrah-Banksia Woodland and is dominated by Prickly Moses, *Acacia pulchella*. The 1996 Management Plan records the more common shrubs, herbs and grasses as including *Jacksonia furcellata, Hakea prostrata, Xanthorrhoea preissii, Acacia*

pulchella, Jacksonia sericea, Mesomelaena pseudostygia, Hardenbergia comptoniana, Scaevola canescens, Conostephium pendulum, Corynotheca micrantha and *Alexgeorgea nitens*.

Bush Forever Site 218 and Corridor Value

Shenton Bushland forms part of Greenway 19 identified in '*A Strategic Plan for Perth's Greenways*' by Tingay and Associates (1998). This Greenway extends from Bold Park to Kings Park via Underwood Avenue, Bedbrook Place and Shenton Bushland. Shenton bushland also forms important ecological linkages with the Irwin Barracks bushland, the Railway Reserve and Hollywood Reserve.

The City of Nedlands administered portion of Shenton Bushland is identified as regionally significant through its inclusion in Bush Forever as Site 218. Bush Forever noted the structural units of vegetation and flora as:

"Uplands: Eucalyptus marginata Woodland over Banksia attenuata, B. menziesii and Allocasuarina fraseriana and Low Woodland; Banksia attenuata, B. menziesii and Allocasuarina fraseriana Low Woodland with scattered emergent Eucalyptus marginata and with occasional emergent Eucalyptus gomphocephala."

Its recognition as regionally significant bushland in Bush Forever is in part due to:

- Being part of a regionally significant potential bushland/wetland linkage,
- The rich reptile assemblage for the size of reserve,
- Significant reptile species: Gould's Goanna (*Varanus gouldii*),
- Significant bird species: Category 1 (1), Category 3 (3), Category 4 (3); and
- Significant flora: *Jacksonia sericea* (Priority 3 – currently reclassified as P4).

Bushland Condition

The methodology followed for bushland condition assessments undertaken in 2012/13 is detailed on pages 27 - 30 of the Natural Areas Management Plan 2013 – 2018. Bushland condition is useful in tracking large changes overtime and should continue to be measured each time this Management Plan is reviewed. This will allow changes to be regularly monitored and recorded.

Historical Bushland Condition Assessment Data

Over the years bushland condition has been mapped using different methods and scales. Bushland condition was not mapped in the 1996 Management Plan. It was mapped in the 2005 - 2010 Management Plan using the Kaesehagen Scale. These maps were digitised but they did not use 20 x 20m polygons.

The Bush Forever Site Description for Shenton Bushland assessed the vegetation condition using the Keighery Scale as**:** >50% *Very Good* to *Excellent*, <50% *Good* to *Degraded*, with areas of severe localised disturbance. The bushland condition mapping undertaken in 2005 using the Kaesehagen Scale assessed just over half the bushland as *Fair – Excellent* condition and just under half as *Poor – Very Poor* condition. The poorer condition bushland in 2005 was generally located around the periphery of the site, along tracks and in "The Barrens".

The bushland condition mapping undertaken in 2008 using the Keighery Scale through the Natural Area Initial Assessments assessed the majority of the bushland as *Good* condition with small patches of *Degraded* to *Completely Degraded* in "The Barrens".

2012/13 Bushland Condition Assessment

The mapping in 2012/13 was undertaken in spring using the Keighery Scale and divided the bushland into 20 x 20m polygons. The Keighery condition ratings assessed the impact of disturbance on vegetation structure for each 20 x 20m polygon and provided a rating from *Very Good*, *Good*, *Degraded* to *Completely Degraded*.

The use of 20 x 20m polygons allows a systematic, measurable and repeatable means for collecting data overtime. Where each 20 x 20m polygon represents an individual unit with a GPS coordinate. When bushland condition is undertaken in future this method will allow a quantitative assessment to be undertaken to compare changes overtime.

Table 2: Bushland condition Assessment 2012/13

Bushland Condition	Area Vested with City of Nedlands	Area Vested with the Department of Health	Area not Vested with the Department of Education	Total Area (Ha)
Very Good	11.57	1.94	0.049	13.56
Good	6.8	2.06	0.063	8.92
Degraded	2.22	0.74	0.24	3.2
Completely Degraded	0.03	0.01	0.062	0.1
Total	20.62Ha	4.75Ha	0.414Ha	25.78Ha

Flora

There are 214 flora species recorded at Shenton Bushland. This includes *Caladenia huegelii* (Grand Spider Orchid) which is listed as Schedule 1 Threatened Flora (Declared Rare Flora). Of the 214 flora species 132 are identified as native species and 82 as introduced weed species please refer to the flora lists in Appendix 1. The flora lists have been updated as additional species are discovered or renamed.

The flora lists are expected to contain the majority of the plants known to occur onsite. This is because the Government of WA through Bush Forever (2000) considered that previous inventories for the site (which only included 109 native plants) included more than 90% of the expected flora.

Changes in plants recorded in Shenton Bushland since the 2005-2010 Management Plan.

In 2008 two small infestations of the weed Pretty Betsy *(Centranthus macrosiphon)* were found in Shenton Bushland. They have not increased their distribution since that time and should be annually monitored and removed as required. Some small seedlings of Prickly Pear (*Opuntia stricta*) found near the Grace Vaughn House entrance were removed by the Friends of Shenton Bushland in 2005 and 2009. These have not reappeared since and should be monitored and removed if required.

A specimen of *Rhagodia baccata* (Berry Saltbush) was found in 2009. This native species occurs widely across the Swan Coastal Plain and is found in the adjacent Irwin Barracks bushland however it was not previously recorded in Shenton Bushland prior to 2009. Two specimens of *Olearia axillaris* (Coastal Daisybush) have also been recorded in the bushland. They are the only specimens found at Shenton Bushland and are usually found along coastal dunes ecosystems where they are abundant.

Native Species of Significance or of Low Abundance within the Bushland

Plant species that are either rare in Western Australia or in Shenton Bushland, should be monitored and considered for special management to ensure their survival onsite. Six species have been identified in Shenton Bushland that fit into this category.

Species identified as being of low abundance within the bushland include:

- Dwarf Sheoak (*Allocasuarina humilis*) – two plants located,
- Catspaw (*Anigozanthos humilis*),
- *Caladenia huegelii* (Grand Spider Orchid),
- Tuart (*Eucalyptus gomphocephala*) – twenty six mature trees recorded, and
- Berry Saltbush (*Rhagodia baccata*) – only one individual found along western boundary.

Jacksonia sericea is identified by the Department of Parks and Wildlife (DPAW) as Priority 4 (Rare, Near Threatened and other taxa in need of monitoring). *Jacksonia sericea* is also listed as *Endangered* under the International Union for Conservation of Nature (IUCN). This is because of its restricted range in the highly populated urban area of Perth and the reserves where it is found are highly fragmented and have threats such as dieback.

Plant Pathogens

A survey of plant pathogens undertaken across the City's natural areas in 2011 did not isolate any plant pathogens at Shenton Bushland. Through this survey Shenton Bushland was the only natural area that did not test positive for the plant pathogen '*phytophthora*'. However, this does not necessarily mean that no plant pathogens exist in Shenton bushland. There were 8 Jarrah trees sampled and the following observations noted:

- All 8 Jarrahs exhibited Crown thinning and Epicormic growth,
- Two were being attacked by insect borers; and
- 5 exhibited symptoms of drought stress such as 'crown collapse'.

Refer to pages 41 - 44 of the Natural Areas Management Plan 2013 – 2018 for management strategies and hygiene protocols. In summary, strict hygiene protocols are required (of which many are already being implemented) such as ensuring no soil or plant material is transferred between natural areas or restoration sites by pressure cleaning vehicles, brushing excess soil off clothing, machinery and equipment, and sterilising with 70% solutions of methylated spirits. At Shenton Bushland, the main hygiene protocol identified was for contractors to commence restoration work in Shenton Bushland before moving to other natural areas that do contain plant pathogens.

Weeds

There are 82 weeds recorded in Shenton Bushland (Appendix 1) some of these include native plants to Western Australia that are found outside their normal range such as *Leschenaultia biloba* which was brought in with gravel transported from the Perth Hills. The distributions of 11 of these were mapped along with woody weeds and are shown in the map section on page 38.

Weed mapping

Over the years weeds have been mapped using different methods and cover classes. The mapping in 2012/13 was undertaken in spring using 20 x 20m polygons and cover classes using DPAW's Standard Operating Procedure 22.1: *Techniques for Mapping Weed Distribution and Cover in Bushland and Wetlands*. This included:

- Individual plants (mapped as GPS points),
- Less than 5%,
- 6-75%; and
- 76-100%.

These procedures and cover classes were developed to address the subjectivity that can be encountered when different people undertake mapping. Mapping of the bushland using 20 x 20m polygons also allows a systematic, measurable and repeatable means for collecting weed cover and density overtime. Where each 20 x 20m polygon represents an individual unit with a GPS coordinate.

When weed mapping is undertaken in future this method will allow a quantitative assessment to be undertaken to compare changes overtime.

Target Species for Weed Mapping 2012

In 2012/13, 11 weeds were requested to be mapped. These included Bridal Creeper *(Asparagus asparagoides),* Long Tubed Painted Lady *(Gladiolus angustus*), Perennial Veldt Grass *(Ehrharta calycina), Euphorbia terracina (*Geraldton Carnation Weed*),* Black Flag *(Ferraria crispa),* Freesia *(Freesia alba x leichtlinii*), Yellow Ixia *(Ixia maculat*a), Yellow soldier *(Lachenalia reflexa*), One-leaf Cape Tulip (Moraea flaccida), Rose Pelargonium *(Pelargonium capitatum)* and Watsonia *(Watsonia meriana)*. Along with woody weeds and *Albuca Canadensis* that were mapped by City staff.

Limitations of weed mapping

There are always going to be some limitations encountered with weed mapping. These include:

Timing of mapping

Mapping should always be undertaken in spring when weeds are active. There are six natural areas that require mapping and they all cannot all be mapped simultaneously. This means that some weeds that may not be flowering at the time of survey or they may be covered over by taller weeds and therefore not visible when the surveying is undertaken.

Weather variations from year to year

Some years can have early rain which will provide an early flowering and germination period. Other years have late rain that extends into late spring which provides successive germination events by which time the mapping could have concluded.

Only 10 priority weeds along with woody weeds could be mapped. This was in part due to the time and the cost involved with the mapping process and that Bridal Creeper was not encountered when the mapping was undertaken and therefore there is no corresponding map for Bridal Creeper. At the time of surveying, many of the *Gladiolus* encountered across the bushland were not in flower and therefore Long Tubed Painted Lady could not be easily distinguished from Wild Gladiolus. Wild Gladiolus are not a target species for control in Shenton Bushland and are distributed widely across the bushland, in order to develop a weed map to guide control programs previous GPS data collected by the Friends of Shenton Bushland was used to develop a map for both *Gladiolus undulatus* and G*ladiolus angustus* of which both are target species for management at Shenton Bushland.

Fungi

There are 49 fungi species that have been recorded in Shenton Bushland to date which are listed in Appendix 2. This list was compiled from data provided through Fungi Forays undertaken by Dr Neale Bougher and Roz Hart (Perth Urban Bushland Fungi Project) along with ongoing observations by the Friends of Shenton Bushland and Roz Hart.

The number of fungi known to occur in Shenton Bushland has increased significantly since original fungi inventories were first developed in 2004. Fungi are the second largest group of organisms in the world, after the insects. Australia is estimated to have about 250 000 species, of which only about five per cent have been described. The majority of fungi in the Perth region are probably yet to be discovered, well defined or named. Due to the nature of fungi, which fruit irregularly and intermittently, it is necessary to conduct ongoing surveys to produce an accurate inventory of fungi present in Shenton Bushland.

Native Fauna

Birds

There are 52 native bird species recorded as occurring in Shenton Bushland which are listed in Appendix 3. This includes three species protected under the Environmental Protection Biodiversity Conservation Act 1999 (EPBC Act) the Carnaby's Cockatoo *(Calyptorhynchus latirostris)* which is listed as *Endangered,* the Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksii)* which is listed as *Vulnerable* and the Rainbow Bee-eater *(Merops ornatus)* which is listed as a *Migratory* and a *Marine* species.

Mammals

There are three mammals recorded in Shenton Bushland. These include Brushtail Possum *(Trichosurus vulpecula),* Goulds Wattle Bat (*Chalinolobus gouldii)* and White Striped Mastiff Bat (*Tadarida australis).*

Herpetofauna (Reptiles & Amphibians)

There are 28 reptile and amphibian species, including 12 skinks, 5 geckoes, 3 frogs, 3 legless lizards, 2 goannas and 2 snakes. These are listed in Appendix 3.

Invertebrates

There is little information available of the invertebrates inhabiting Shenton Bushland. However the bushland was surveyed for butterflies and day-flying moths through research undertaken by Curtin University and DPAW between 2001 and 2005. The surveying resulted in the following findings:

- Two resident butterflies, the Western Grass-Dart Butterfly (*Taractrocera papyria*) and Marbled Xenica Butterfly (*Geitoneura klugii*);
- One Resident Moth, the Graceful Sun Moth (*Synemon gratiosa*); and
- One non-resident butterfly, the Australian Painted Lady (*Vanessa kershawi).*

The Graceful Sun Moth was surveyed and recorded again in 2010 by the Friends of Shenton Bushland. The Graceful Sun Moth species is associated with two habitat types:

- Coastal heathland on Quindalup Dunes where it is restricted to secondary sand dunes due to the abundance of the preferred host plant *Lomandra maritima*; and
- Banksia woodland on Spearwood and Bassendean Dunes, where the second known host plant *Lomandra hermaphrodita* is widespread.

Their remaining habitat is considered severely fragmented where populations are separated by urban and agricultural areas. The Graceful Sun Moth is identified by DPAW as Priority 4 (Rare, Near Threatened and other taxa in need of monitoring).

Introduced Fauna

Please refer to pages 65 – 69 of the Natural Areas Management Plan 2013 - 2018 for details of feral animal control strategies.

Mammals

The only confirmed introduced mammal of concern in Shenton Bushland includes the Fox *(Vulpes vulpes*). Other possible (however unconfirmed) introduced fauna include the Cat (*Felis catus*), the House Mouse (*Mus musculus*) and the Black Rat (*Rattus rattus)*.

Invertebrates

One introduced invertebrate of concern in Shenton Bushland includes the European Honey Bee *(Apis mellifera).* Another introduced invertebrate includes the Cabbage White Butterfly (*Pieris rapae*) (Williams, Cited in Ecoscape 2005[2]).

Introduced Birds

There are six known introduced birds within Shenton Bushland these include the Rock Dove (*Columba livia*); Spotted Dove (*Streptopelia chinensis*); Laughing Dove (*Streptopelia senegalensis*); Rainbow Lorikeet (*Trichoglossus haematodus*); Laughing Kookaburra (*Dacelo novaeguineae*) and Long Billed Corella (*Cacatua tenuirostris*).

PLAN FOR MANAGEMENT

Please refer to pages 31 - 40 of the Natural Areas Management Plan 2013 – 2018 for general management principles and weed control strategies that relate to all natural areas.

Management Zones

External Boundaries

For management purposes it is important to distinguish between parkland and bushland zones. At Shenton Bushland the boundaries between bushland and lawn areas on adjacent properties is well defined by fences, car parks and lawn areas.

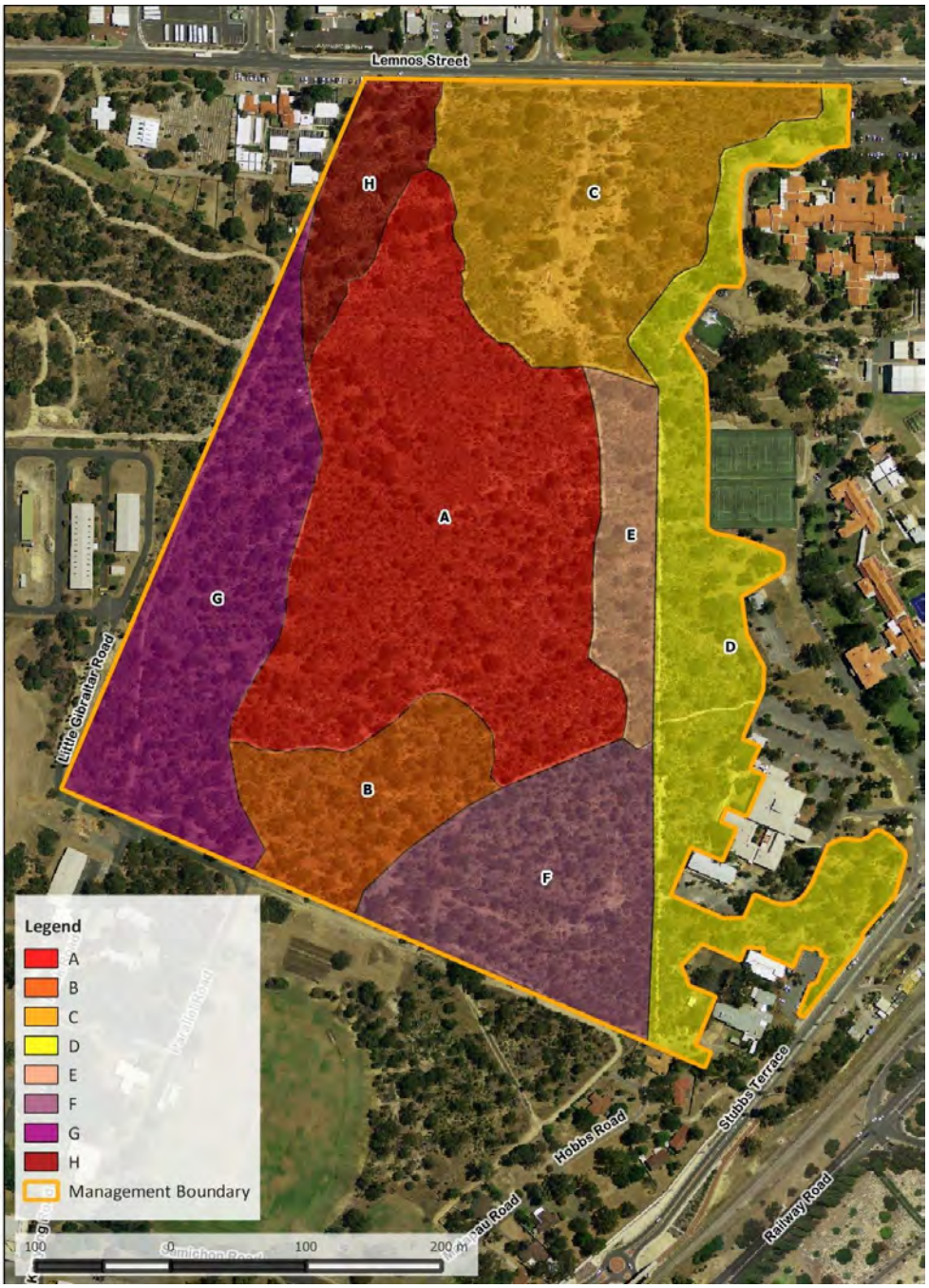
Internal Boundaries

Over the years the Friends of Shenton Bushland have managed Shenton Bushland on the basis of 8 Zones and used paths as boundaries between these zones. These zones were detailed in the 2005 – 2010 Management Plan and have been retained in this Management Plan with the mapping having been extended to include all of the Health Department land and a small section of the Department of Education land on the eastern boundary. The management zones are shown in Table 3 below and Figure 2 on the following page.

Table 3: Management Zones

Zone	Zone Name	Primary Zone Consideration
A	Core Bushland	Conservation
B	Core Bushland	Conservation
C	Lemnos	Protection
D	Education and Health Department	Protection
E	Lemnos	Protection
F	Karrakatta	Protection
G	Karrakatta	Protection
H	Dog Home	Protection

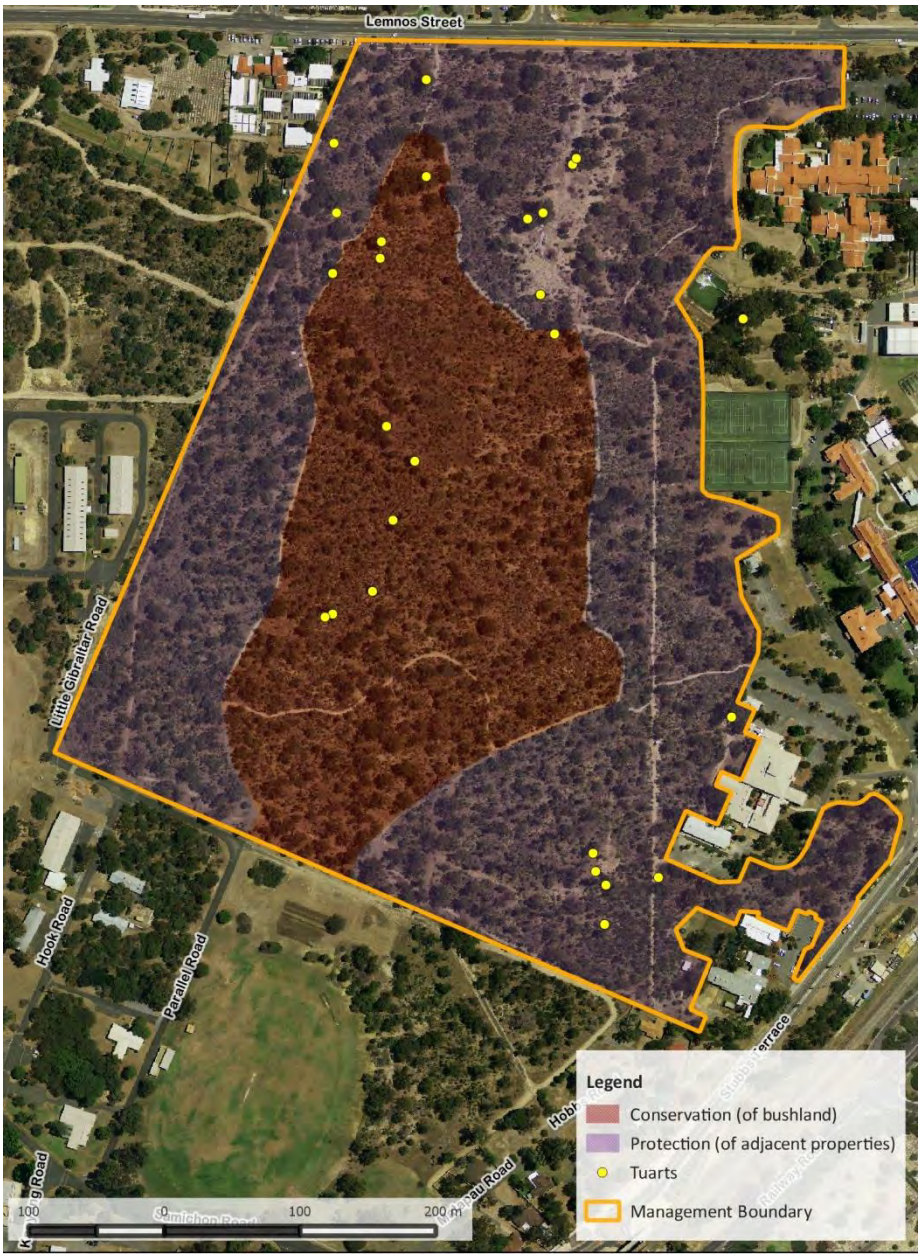
Figure 2: Management Zones in Shenton Bushland.



All the Zones have previously been designated as either Primary Protection or Conservation Zones. These two designations indicate where protection of neighbouring infrastructure should take precedence over ecological values in managing fire hazards within the bushland. Essentially the internal Zones are Conservation Zones and the external Zones are Fire Hazard Protection Zones. The conservation and protection Zones are shown in Figure 3 on the next page.

Zone C on the northern boundary of the bushland which includes “The Barrens” is currently identified as a Protection Zone and is highly degraded. There are no immediate plans for rehabilitation in this Zone, but if this occurs then it should be rezoned as a Conservation Zone on the basis that any seedlings will have no or limited ability to recover from fire in the first 5 years after planting and there are no buildings or infrastructure directly adjacent to this Zone.

Figure 3: Conservation and Protection Zones



Management Actions 2013 - 2018

ACTIONS	
1.	Manage Shenton Bushland on the basis of 8 Zones.

Rehabilitation

The improvement of bushland condition at Shenton Bushland will be achieved by assisting natural regeneration through weed control as the highest priority. As a secondary priority, if funding were available, then improvements in bushland condition could be achieved through reconstruction at selected degraded sites. Once bushland condition improves at selected reconstruction sites these sites can then become assisted natural regeneration sites.

Sites

Sites are areas within Zones where resources for rehabilitation and monitoring are focused. Areas where rehabilitation has previously occurred are also considered Sites. A rehabilitation plan should be developed for each area requiring reconstruction to minimise any possible detrimental impacts such as trampling, erosion, spraying native species in low abundance or the introduction of weed species.

Assisted natural regeneration following the Bradley Method should be undertaken in bushland in *Good* condition or better and reconstruction in *Degraded* or *Completely Degraded* condition areas. However in Shenton Bushland, reconstruction is not proposed for the entire areas comprised of *Degraded* or *Completely Degraded* bushland condition. Therefore by default, Assisted Natural Regeneration will also be implemented in areas of *Degraded* or *Completely Degraded* condition where they are not specifically identified for reconstruction. Areas should only be identified for reconstruction if resources are available and therefore the priority for rehabilitation should only be in *Good* to *Very Good* condition bushland areas.

Potential Reconstruction Sites

The sites to be considered for reconstruction are shown in Table 4 below with the informal names used by the Friends of Shenton Bushland adopted for "The Barrens" and "Mount Pelargonium". These sites are prioritised in Table 4, with a discussion on the basis for these priorities on the following page.

Table 4: Priorities for Sites Requiring Reconstruction

Site	Priority
Mount Pelargonium	High
Northeast boundary with Selby Lodge	Moderate
Southeast boundary with Grace Vaughn House and Education Department	Moderate
Junction of Tracks	Moderate
Southern Boundary	Moderate
The Barrens (existing overstorey)	Low
The Barrens (no existing overstorey)	Very low
Degraded patches along path edges	Moderate
The Sump	High
Weed mounds adjacent to good bushland	High

A rehabilitation plan should be developed for each site requiring reconstruction to minimise any possible detrimental impacts such as trampling, spraying native species in low abundance or the introduction of weed species.

Mount Pelargonium

There are some degraded areas at Mount Pelargonium. Eighty plants were planted in this area in 2013 with some left over plants from a community planting day that planted along degraded sections of the Lemnos Street boundary and "The Sump". Mount Pelargonium is a high priority because:

- Revegetation of this site will consolidate and expand the surrounding area of *Very Good* bushland to the north and west and *Good* condition bushland to the west and south; and
- The site supports a number of juvenile Tuarts (*Eucalyptus gomphocephala*), which is significant given that there were only twenty six mature trees recorded across the entire site.

Northeast Boundary with Selby Lodge
This site is a high priority in terms of managing real and perceived threats of bushfires to adjacent property. From an environmental perspective, the site would be a lower priority as it forms the interface between *Degraded* to *Completely Degraded* bushland in *"*The Barrens*"* and the *Degraded* edges adjacent to the lawn area on the firebreak.

Southeast boundary with Grace Vaughn House and the Department of Education
This site is a high priority in terms of managing real and perceived threats of bushfires to adjacent property. From an environmental perspective, the site would be a moderate priority as whilst it is fragmented by pathways, the majority of this area is adjacent to *Good* and *Very Good* condition bushland areas and is potentially a source of weed invasion into these areas.

The northeast and southeastern boundaries with the Selby Lodge and Grace Vaughn House, are on land managed by the Department of Health and therefore fall under the MOU developed between the City and the Department for natural area management on Department of Health owned land. A small section is also located on land owned by the Department of Education therefore if a reconstruction project is undertaken in Zone D the City and the Friends of Shenton Bushland will need to collaborate with the Department of Health and Department of Education.

Southern Boundary
This site is a moderate priority as it occupies a narrow strip along the firebreak and is vulnerable to weed re-invasion from adjacent land along with requiring ongoing firebreak maintenance. If restoration is undertaken in this area, plants used for revegetation will need to be low spreading plants that can suppress weeds, and tolerate incidental slashing or traffic. This is discussed further in the Revegetation Section below.

Junction of Access Tracks
This site has some localised *Degraded* patches adjacent to *Very Good* and *Good* bushland condition areas. The focus for this area should be to consolidate and expand the surrounding *Very Good* and *Good* condition areas. One of the tracks should be maintained as a Fire Access Way and should therefore not be revegetated.

The Barrens
This site is a low priority because:
- It contains *Degraded* and *Completely Degraded* condition bushland,
- Its condition cannot further deteriorate provided that basic weed control continues,
- The site contains an asbestos contamination which will require remediation prior to any revegetation occurring; and
- The site contains numerous soil mounds.

<u>Rubbish and Other Disturbances</u>
Over the years, Shenton Bushland has been subjected to a significant amount of illegal dumping in the form of rubbish, soil and garden waste and car bodies. This was a result of the bushland having little surveillance due to its relative isolation from passive surveillance, combined with easy access for vehicles from Lemnos Street (prior to the limestone wall being installed).

The majority of the rubbish and car bodies have been removed along with some soil mounds however; many soil and rubble mounds remain. Some of the soil mounds were produced during the creation of the path network. These mounds have relatively few weeds in them. However, this is not the case for soil mounds located in "The Barrens" and others at various locations within the bushland.

The soil mounds were mapped by the Friends of Shenton Bushland for the 2005 Management Plan and some of them have since been removed. In the 2005 – 2010 Management Plan, a five year target to remove 80 soil and rubbish mounds was established. These mounds were selected where they were adjacent to tracks. With the mounds that were more than 5m from tracks to be assessed on a case by case basis. It was noted that advantage should be taken if a fire occurred that improved access to particular mounds not located along pathways. Another recommendation in the 2005 – 2010 Management Plan was to use the soil from the mounds that did not contain weeds for spreading over reconstruction areas to introduce native seed to these areas.

No soil mounds have however been removed in recent years. This is due to the difficulty in removing the remaining soil mounds without causing damage to the existing eroded pathways and/or native vegetation adjacent to the mounds.

Soil mounds should only be removed if their removal does not cause damage to pathways or native vegetation. The pathways in Shenton Bushland are due to be upgraded in 2022 in accordance with the City's Natural Area Path Network Policy. An option could be to coordinate the removal of soil mounds when the paths are upgraded as machinery will already be needed on site. In the interim, many of the existing soil mounds are adjacent to *Good* or *Very Good* condition bushland. In order to address this issue a weed management program should be developed for the remaining soil mounds so that weed invasion from mounds does not threaten *Good* bushland condition areas.

There still remains a significant litter problem along the Lemnos Street frontage of the bushland, especially adjacent to the bus shelter. This may reflect a lack of awareness of the bushland and result from the untidy appearance of long grass and dead branches along the frontage as well as the entrance and bushland signage being obstructed by cars parking along the verge. In order to reduce litter along the Lemnos Street frontage and identify the bushland as a conservation zone that is actively cared for and managed the following actions should be implemented:

- Install bollards stopping cars from parking directly in front of the entrance,
- Install a rubbish bin adjacent to the bus shelter,
- Undertake regular litter removal and maintenance of grasses along the frontage,
- Install a picnic table and/or benches near the entrance; and
- Plant native seedlings and mulch around the entrance.

<u>Asbestos</u>

An asbestos contamination has been discovered in "The Barrens" likely to have been introduced to the site through past illegal dumping activities. Asbestos is a building material that was used widely between the 1940's to late 1980's. It was considered a good building product as it was durable, fire resistant and had good insulation properties. However, after many years of use in the building industry in Western Australia, asbestos was found to pose health risks. If left untouched, asbestos poses no immediate danger. However, if asbestos products are broken or disturbed through activities they can release hazardous fibres. Asbestos contaminated material must only be handled by appropriately qualified and trained personnel.

Following an assessment by SERS (Site Environmental and Remediation Services) the asbestos contamination in "The Barrens" was detailed as being Potential Asbestos-Containing Cement sheet fragments (ACM). These were detected on the surface across the majority of open spaces however; no impact to underlying soil was identified with the exception of a piece of ACM detected approximately 0.2m below ground level.

Until remediation is completed, any works carried out in "The Barrens" should be planned to prevent the generation of air borne asbestos fibres such as vegetation clearance or digging. If any further asbestos contamination is found within the bushland it should be reported to the City.

Management Actions 2013 - 2018

ACTIONS	
1.	Focus rehabilitation on good condition bushland areas as a priority.
2.	Develop rehabilitation plans for degraded sites (including soil mounds) that are to be the focus of reconstruction. These should include as a minimum the boundary of works, a planting list and native plants present that require protection.
3.	Coordinate the removal of soil mounds with path upgrade works.
4.	Asbestos if found in the bushland should be left alone and reported to the City.
5.	Improve the appearance of the Lemnos Street frontage by installation of a rubbish bin and bollards and activities such as litter removal, planting and mulching.

Revegetation

Over the years some revegetation has been undertaken along the degraded edges of the bushland and within the bushland at localised degraded sites using local provenance seed collected from within the bushland.

Species Selection

Ideally species used for revegetation in reconstruction sites would consist of the entire collection of plants that naturally occur at the sites. This is not always possible as not all species can be propagated and there are also situations where certain species provide specific management functions such as *Acacia pulchella* and *Banksia sessilis* which help to restrict access as they have spiny leaves.

Species of Significance or Low Abundance

There are a number of species of significance or found in very low numbers within Shenton Bushland special consideration should be given to maintain these populations. They should be mapped, monitored, and if possible propagated, for revegetation at reconstruction sites. These species include:

- *Jacksonia sericea,*
- *Allocasuarina humilis,*
- *Anigozanthos humilis,* and
- *Eucalyptus gomphocephala*.

Species for Low Fuel Sites

The appropriate species to be used for rehabilitation at these sites are indicated on the flora inventory in Appendix 1. These species have been selected on the basis of:

- Their low height,
- Non-woody stems,
- Ability to be propagated; and
- Ability to naturally compete with weeds.

These species include:

- *Allocasuarina humilis,*
- *Conostylis aculeata,*
- *Conostylis setigera,*
- *Jacksonia sericea,*
- *Rhagodia baccata,*
- *Scaevola canescens; and*
- *Scaevola repens.*

There are also other native species which could be used in these sites that have a more limited capacity to compete with, or suppress, weeds such as *Kennedia prostrata* or *Lechenaultia linarioides*.

Management Actions 2013 - 2018

	ACTIONS
1.	If revegetation work is proposed work with local nurseries to grow species found in low abundance.
2.	Use species such as *Allocasuarina humilis; Conostylis aculeata, Conostylis setigera, Rhagodia baccata, Jacksonia sericea, Scaevola canescens and Scaevola repens* at low fuel sites.

Environmental Weed Control

A total of 30 priority weeds have been listed for management in Shenton Bushland (Table 5). Each priority weed has been provided management notes and the Invasive Plant Prioritisation Process rating (DEC, 2008). Priority weeds will be managed according to management notes provided on DPAW's Florabase website at http://florabase.dec.wa.gov.au and are detailed in Appendix 4. Priority weeds have been selected from:

- The Swan Region Assessment 2008 (Invasive Plant Prioritisation Process (DEC)),
- 30 highest priority weeds for the Swan Region 2008,
- State and federal weed lists; and
- Their ability to be controlled without causing disturbance.

Table 5: Priority Weeds for Control – Shenton Bushland (Ratings taken from DEC Invasive Plant Prioritisation Process 2008 (Swan Region)).

SPECIES NAME		COMMON NAME	NOTES	RATING
1.	*Acacia iteaphylla*	Flinders Range Wattle	Requires ongoing monitoring and control.	FAR (Further Assessment Required)
2.	*Avena fatua*	Wild Oat	Control required in conjunction with grass spraying program.	Very High
3.	*Asparagus asparagoides*	Bridal Creeper	Monitor and control as required.	Very High
4.	*Brachychiton populneus*	Kurrajong	Requires ongoing monitoring and control.	High
5.	*Carpobrotus edulis*	Hottentot Fig	Monitor for re-infestation.	Medium/High
6.	*Chamelaucium uncinatum*	Geraldton Wax	Monitor spread and control if necessary.	Medium
7.	*Centranthus macrosiphon*	Pretty Betsy	Monitor and hand weed populations annually.	Medium/High
8.	*Chasmanthe floribunda*	African Cornflag	Requires ongoing monitoring and control for re-infestation.	Medium
9.	*Eragrostis curvula*	African Lovegrass	Ongoing control required along Health Department boundary.	High
10.	*Ehrharta calycina*	Perennial Veldt Grass	Ongoing control required.	Very High
11.	*Euphorbia terracina*	Geraldton Carnation Weed	Ongoing hand weeding required.	Very High
12.	*Ferraria crispa*	Black Flag	Ongoing control required.	Very High
13.	*Freesia alba x leichtlinii*	Freesia	Ongoing control required.	Very High
14.	*Fumaria capreolata*	Climbing Fumitory	Hand weeding or spraying with selective herbicides if funding is available.	Medium/High
15.	*Gladiolus angustus*	Long Tubed Painted Lady	Ongoing control required.	High
16.	*Gladiolus undulatus*	Wavy Gladiolus	Monitor and control as required.	Very High
17.	*Ixia maculata*	Yellow Ixia	Ongoing control required.	FAR
18.	*Lachenalia aloides*	Soldiers	Control required.	High
19.	*Lachenalia bulbifera*	Soldiers	Ongoing monitoring and control required. Hand remove populations in degraded sites.	High
20.	*Lachenalia reflexa*	Soldiers	Ongoing control required.	Very High
21.	*Leptospermum laevigatum*	Coast Teatree	Requires ongoing monitoring for re-infestation.	Very High
22.	*Moraea flaccida*	One-leaf Cape Tulip	Ongoing control required.	Very high
23.	Melinis repens	Red Natal Grass.	Control if funding is available in collaboration with the Department of Health.	Unknown
24.	*Olea europaea*	Olive	Requires ongoing monitoring for re-infestation/ resprouting.	High
25.	*Pelargonium capitatum*	Rose Pelargonium	Ongoing control required. Only remove large infestations where native vegetation has established.	Medium/High
26.	*Pennisetum setaceum*	Fountain Grass	Requires ongoing monitoring for re-infestation.	Medium
27.	*Schinus terebinthifolius*	Brazilian Pepper	Requires ongoing monitoring for re-infestation/ resprouting.	Very High
28.	Trachyandra divaricata	Dune Onion Weed	Monitor and control as required (only small population located along South eastern fire break).	FAR
29.	*Vicia sativa*	Common Vetch	Hand weeding or spraying with selective herbicides if funding is available.	FAR
30.	*Watsonia meriana*	Watsonia	Requires ongoing monitoring and control.	Very High

Table 6: Alert Weeds for Shenton Bushland.

Species Name	Common Name	Notes
Acacia longifolia	Sydney Golden Wattle	Previously removed from Shenton Bushland
Asparagus asparagoides	Bridal Creeper	One or two small infestations exist seedlings are distributed by seed eating birds

Strategy

Priority weeds should be controlled in all management sectors across Shenton Bushland in accordance with management notes in Appendix 4.

Of the priority weeds listed in Table 5 the following weeds are considered the highest priority for management:

- *Ehrharta calycina,*
- *Euphorbia terracina,*
- *Ferraria crispa,*
- *Freesia alba x leichtlinii,*
- *Gladiolus angustus,*
- *Lachenalia reflexa,*
- *Ixia maculata,*
- *Moraea flaccida,*
- *Pelargonium capitatum; and*
- *Watsonia meriana.*

If for some reason, funding is not available to control priority weeds in all management sectors, then priority areas for weed control should be focused on areas of better condition bushland as shown in Table 7 below.

Table 7: Priority for Weed Control by Zones.

Priority	Zone
High	A & B
Intermediate	E, F & G
Lowest	C, D & H

It is important to undertake weed control across the entirety of Shenton Bushland every year. However if this is not possible then Zones A and B should continue to have weed control every year.

Ongoing weed control will always be required in the other zones to protect the values of *Good* bushland condition areas, reduce fuel loads from exotic grasses and reduce reinfestation of weeds that were previously well controlled.

Collaboration with Adjacent Landowners

The Department of Health provides funding towards weed management on the Department's land within Shenton Bushland. Previously, the Friends of Shenton Bushland and the City have liaised with the Department of Defence regarding control of invasive weeds such as Geraldton Carnation Weed, Tagasaste and *Lachenalia* on Irwin Barracks. In which the Department of Defence actively co-operated in controlling those weeds. The City and the Friends of Shenton Bushland should continue

to collaborate with the Department of Health and the Department of Defence for the purposes of weed management.

Maintenance Areas
Numerous weeds are present in "The Barrens" and along the fence line on Lemnos Street and these include Tall Fleabane *(Conyza bonariensis*), Flat Weed *(Hypochaeris glabra*), Prickly Lettuce *(Lactuca serriola*), Sour Sob *(Oxalis pes-capre*), Nightshade *(Solanum nigrum*), Climbing Fumitory *(Fumaria capreolata*) and Lupinus sp. These require ongoing periodic maintenance so they do not invade nearby *Good* bushland areas.

Management Actions 2013 - 2018

	ACTIONS
1.	Undertake annual monitoring and control of *Chasmanthe floribunda*, *Centranthus macrosiphon*, *Gladiolus undulatus*, *Lachenalia bulbifera*, *Asparagus asparagoides*, *Acacia longifolia* and Coast Teatree to ensure they do not spread or reestablish.
2.	Continue to control the following weeds as a high priority: *Ehrharta calycina, Euphorbia terracina, Ferraria crispa, Freesia alba x leichtlinii, Ixia maculata, Lachenalia reflexa, Moraea flaccida, Pelargonium capitatum and Watsonia meriana.*
3.	Control Weeds in Zones A & B as a priority.
4.	Continue to liaise with the Department of Defence regarding weeds adjacent to Shenton Bushland, within Irwin Barracks.
5.	Continue to collaborate with the Health Department for weed management on Health Department owned land.
6.	Control weeds in The Barrens and along the front fence periodically so they do not invade adjacent bushland areas.

Monitoring
There is still much to learn in terms of rehabilitation techniques and all rehabilitation works offer an opportunity to build upon the knowledge base of the City and the wider community of bushland enthusiasts.

Bushland condition is useful in tracking large changes in the bushland's status and should continue to be measured each time this Management Plan is reviewed. However subtle improvements are not necessarily reflected in the results and more subtle changes are better measured more frequently by monitoring the distribution and abundance of selected weed species, or quantitative data collected from fixed quadrats or transects and photo points.

Transect monitoring
The City of Nedlands and the Friends of Shenton Bushland have collected quantitative data on flora along transects within Shenton Bushland. These include *Lachenalia*, *Freesia* and *Watsonia* transects. At the moment these are being monitored on average every two years. The data collected from transects should be incorporated into a report on the management activities and condition of Shenton Bushland.

Photo Points
The Friends of Shenton Bushland have photo monitoring points aligned along pathways of which are photographed approximately every five years. These photographs provide a useful record of changes over time. Consideration should be given to having additional photo points to the ones along the pathways such as at revegetation sites, areas containing different ratings of bushland condition and of the monitoring transects.

Weed Mapping

Of the 82 weeds identified as occurring within Shenton Bushland, the distribution and densities of 10 weeds were mapped along with woody weeds. These should continue to be mapped every five years as part of the management plan review process. Historical weed mapping data should also be incorporated into a report on the management activities and condition of Shenton Bushland.

Weed Monitoring

Species that have small populations or have previously been removed from the bushland require annual monitoring and control. These include:

- *Chasmanthe floribunda*,
- Centranthus,
- *Lachenalia bulbifera*,
- *Asparagus asparagoides*; and
- Coast Teatree – as there are populations in adjacent defence department land.

Blue Leschenaultia

A patch of Blue Leschenaultia that has heritage value occurs on the western side of the bushland. It was transported into the bushland with gravel from Perth Hills for the construction of the POW camp. Blue Leschenaultia is not native to Shenton Bushland and it appears to be increasing its distribution. Its normal range is confined to the gravel soils in the Darling Scarp. It is unknown whether it will increase its distribution beyond the remnants of the gravel that was transported to construct the POW camp. Its distribution in the bushland should therefore be monitored and future consideration be given to finding a balance between managing heritage and conservation values.

Base of Tuarts

In addition to areas in *Poor* condition or those adjacent to weed infestations, the base of tuart trees are susceptible to the establishment of weeds. Tuarts are generally significantly taller than other bushland trees are often used preferentially for roosting by birds. As a consequence there are a number of weeds that often establish at the base of Tuarts which include *Asparagus asparagoides, Asparagus crispus, Brachychiton populneus, Carpobrotus edulis, Lycium edulis, Lycium ferocissimum, Olea europaea, Rhamnus alaternus, Solanum linnaeanum, Solanum nigrum* and *Zantedeschia aethiopica* (Keighery, Cited in Ecoscape 2005[2]).

Management Actions 2013 - 2018

	ACTIONS
1.	Undertake biannual monitoring of transects and photo monitoring points every five years.
2.	Consider installing additional photo monitoring points.
3.	Continue to map priority weeds through Management Plan reviews.
4.	Monitor, control and document the distribution of new invasive weeds as they arise.
5.	Annually monitor weeds with the potential to expand rapidly and map changes in their distribution if required.
6.	Collate historical mapping and monitoring data along with management activities undertaken in the bushland since the late 1990's by DPAW, the City and the Friends of Shenton Bushland.

FIRE MANAGEMENT

Fire management actions for all natural areas have been detailed on pages 45 - 50 of the Natural Areas Management Plan 2013 – 2018 and the fire history map shown in the map section on page 38 of this Management Plan. In the 2005 – 2010 Management Plan certain zones within Shenton Bushland were designated as either Primary Protection or Conservation Zones. These two designations indicate where protection of neighbouring infrastructure should take precedence over ecological values in managing fire hazards at Shenton Bushland. Essentially, the internal zones are Conservation Zones and the external zones are Fire Hazard Protection Zones. These are shown in the map section on page 38.

The City recently undertook bushfire risk assessments in all of City's natural areas using Australian Standard AS 3959 (*Buildings in Bush Fire Prone Areas*) and ISO AS/NZ 31000-2009 (Risk Management - Principles and Guidelines). As a result of these assessments the following actions are to be implemented for Shenton Bushland:

Location	Details
Health Department land - Grace Vaughn House and Family Pathways buildings.	Manually remove dead material on grass tree skirts. Construct/upgrade/maintain 3m FAW around boundary where required.
Shenton Dogs Home, Grace Vaughn House, Selby Older Adult Mental Health Service and Family Pathways buildings.	Remove excess grasses and litter within 25m of buildings and leaf litter in gutters.
City of Nedlands Bushland	Construct/upgrade/maintain 3m FAW around boundary where required. Install gates along defence boundary if suitable.

Future actions have also been identified which include mechanical and/or low intensity burning in mosaic areas when fuel loads exceeds 8 tpha (tonnes per hectare). Currently the City will not implement these works. If and when they are implemented they will only be undertaken in consultation with the Friends of Shenton Bushland.

In addition to the above listed actions fire bans should be maintained at all times at Shenton Bushland and reduction of fuel loads through grass weed control along with annual maintenance of fire access ways are also ongoing fire hazard reduction strategies that need to be implemented for Shenton Bushland.

Management Actions 2013 - 2018

ACTIONS	
1.	Undertake annual management of grass weeds to reduce fuel loads.

ACCESS

The "*Objectives for Access*" have been detailed for all natural areas on pages 51 – 54 of the Natural Areas Management Plan 2013 - 2018. Generally the fences, walls and path network within Shenton Bushland are considered appropriate. A small section of the path network from the Lemnos Street front entrance to the noticeboard provides for disability access. This is shown on the map of pathways in the map section on page 38.

Based on the current funding provided to implement the City of Nedlands Natural Area Path Network Policy the pathways within Shenton Bushland will not be upgraded until 2022 – 2027. Considering sections of the pathways are already suffering erosion interim stabilisation works may be required in coming years. When paths are upgraded, consideration should be given to coordinating the removal of some of the soil mounds along pathways.

CULTURAL HERITAGE, INTERPRETATION & EDUCATION

Cultural Heritage, Interpretation and Education has been detailed for all natural areas on pages 55 - 62 of the Natural Areas Management Plan 2013 - 2018.

Background

At present interpretation at Shenton Bushland is in the form of:

- Information on the Friends of Shenton Bushland website and activities blog; and
- Two recently upgraded information shelters.

Strategy

Information Shelter

The information shelter has recently been upgraded with a lockable perspex cover. This allows information to be displayed including work undertaken by the Friends of Shenton Bushland and values of the bushland. Ongoing maintenance of the information shelter should be undertaken as required.

Whadjuk Trails

New signage and bar codes capturing the environmental, European and Aboriginal history of Shenton Bushland is in the process of being developed for the Bush to Beach Trail (which is part of the Whadjuk Trails Project). The Whadjuk Trails are a series of walking trails linking all bushlands areas in the Western Suburbs. They are a collaboration with Lotterywest, natural area friends groups across the Western Suburbs, WESROC Councils, the Botanic Gardens and Parks Authority and the City's of Fremantle and Stirling. A website displaying information about the trails including Shenton Bushland is also being developed where people can download a map and App of sections of the trail network.

Other Forms for Presenting Information

Printed materials go out of date quickly. The preference is to have information that can be updated easily. Both the City of Nedlands and the Friends of Shenton Bushland provide information on Shenton Bushland on the internet. This information should be reviewed and updated as required.

NATIVE ANIMALS

Background

Shenton Bushland has been extensively surveyed over the years and there are 63 confirmed native animal species (52 birds, 3 mammals, 28 reptile and amphibian species and 4 invertebrates). At present all these species are managed indirectly through improving bushland condition and control of feral animals which have the potential to predate, compete with, or displace native animals. This is discussed under the section on feral animal management on pages 65 – 69 of the Natural Areas Management Plan 2013- 2018.

Strategy for Protection of Native Animals

Three mammals have been recorded at Shenton Bushland these include Goulds Wattle Bat, White Striped Mastiff Bat and Brushtail Possums. Some diggings have recently been encountered in the bushland that in appearance look like marsupial diggings. Surveying should be undertaken to determine if these are marsupial diggings.

Goulds Wattle Bat (*Chalinolobus gouldii)*
Gould's Wattle Bat is common throughout mainland Australia except for Cape York Peninsula. They roost in tree hollows and buildings and occur in many towns and cities (Menkhorst & Knight, cited in Ecoscape 2005 [2]).

White Striped Mastiff Bat (*Tadarida australis)*
White Striped Mastiff Bats weigh about 37 grams and are 40-55 mm long. They roost in singular or in small groups within tree hollows and are common and widespread across the southern two-thirds of Australia (Menkhorst & Knight, cited in Ecoscape 2005 [2]).

Brushtail Possum
Brushtail Possums are among the most adaptable of the native mammals they live in a variety of habitats often favouring open forest and woodland areas with older trees that provide hollows.

Due to the adaptability and resilience of the Brushtail Possum, no specific measures are proposed to manage them onsite. However, hollows in larger old and dead trees should be retained as refuges and ongoing control of feral European Honey Bees should be undertaken as they can displace native animals from hollows.

Birds
Of the 52 native bird species recorded onsite there are three species protected under the EPBC Act 1999. These include the Carnaby's Cockatoo *(Calyptorhynchus latirostris)* which is listed as *Endangered,* the Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksii)* which is listed as *Vulnerable* and the Rainbow Bee-eater *(Merops ornatus)* which is listed as a *Migratory* and a *Marine* species.

Carnaby's Cockatoos have a roost site at Perry Lakes (R15) and Hollywood Hospital (R3) and Red Tailed Black -cockatoos have a roost site near McGillivray Oval in Mount Claremont. Both species are regularly seen foraging at Shenton Bushland. Rainbow Bee-eaters migrate annually in summer to Perth and nest in Perth's sandy soils. They have been seen nesting and foraging at Shenton Bushland. If nests are encountered in the bushland they should be protected so that any restoration work undertaken does not disturb their nests. Feral fox control should also be implemented as they can predate on their nests.

Feral birds
Feral birds compete with native birds for foraging material and nesting hollows. Some also carry diseases which have the potential to infect native bird populations such as the Rainbow Lorikeet that carry Beak and Feather disease. DPAW have been undertaking a five year regional feral bird control program focussing on Rainbow Lorikeets and Long-billed Corellas. They are currently seeking funding from Local Governments to continue this program.

The protection of the mammals and birds in Shenton Bushland can be achieved through:

- Minimising fires that may destroy tree hollows,
- Retaining hollows for refuges in large old and dead trees,
- Controlling feral European Honey Bees as they can displace native animals,
- Protecting nests of Rainbow Bee-eaters if they are encountered,
- Continuation of the fox control program; and
- Contributing to regional program being undertaken by DPAW for feral bird control.

Reptiles and Amphibians

Reptiles and amphibians are much more persistent in urban areas within the Swan Coastal Plain than mammals. 21 of 33 mammal species have become locally extinct since European settlement but only 2 of the 71 reptile species and none of the 15 amphibians have become locally extinct during the same period. A relatively large group of lizards can persist on small and modified patches of native vegetation, and areas as small as 4 ha in size is important to maintain lizard assemblages in inner urban areas (How & Dell, cited in Ecoscape 2005[2]).

There are a number of reptiles recorded onsite that How & Dell (1994) have identified as being able to persist in urban gardens and the inner city of Perth. These are the least likely to be lost from Shenton Bushland and include:

- Marbled Gecko *(Phyllodactylus marmoratus),*
- Fence Skink *(Cryptoblepharus plagiocephalus),*
- Two-toed earless Skink *(Hemiergis quadrilineata),*
- West Coast Four-toed Lerista (*Lerista elegans),*
- Western Worm Lerista (*Lerista praepedita),*
- Common Dwarf Skink (*Menetia greyii); and*
- Bobtail or Shingleback (*Tiliqua rugosa).*

How & Dell, cited in Ecoscape 2005[2], also noted that the Spiny-tailed Gecko (*Diplodactylus spinigerus)* can survive in recently developed urban areas provided some bushland remains. There are a number of species in Shenton Bushland that are identified by How and Dell (cited in Ecoscape 2005[2]) as being at the southern limits of their distributions on the Swan Coastal Plain in Perth. These include:

- White-spotted Ground Gecko (*Diplodactylus alboguttatus),*
- Keeled Legless Lizard *(Pletholax gracilis)*,
- West Coast Line-spotted Lerista (*Lerista lineopunctulata),*
- West Coast Four-toed Lerista (*Lerista elegans),*
- Western Worm Lerista (*Lerista praepedita); and*
- Black Tailed Monitor *(Varanus tristis).*

Several of these species are recorded as uncommon on the Swan Coastal Plain by Bush *et al* (cited in Ecoscape 2005[2]), including the Black Tailed Monitor *(Varanus tristis)* and Keeled Legless Lizard *(Pletholax gracilis)*.

It is worth noting that in January 2005, 11 years since the West Australian Museum began animal trapping in Shenton Bushland, the South-western Spiny-tailed Gecko (*Strophurus spinigerus)* was caught for the first time in Shenton Bushland. This is an indication that monitoring over long periods is required to fully document the fauna inhabiting or visiting sites such as Shenton Bushland including those species that are not usually expected to occur (this gecko favours heathland and coastal dune habitat such as is found in areas of Bold Park and Allen Park and has not been recorded in Kings Park).

Only two snakes have been recorded in Shenton Bushland, and whilst comprehensive searches have not been undertaken for them, How and Dell (cited in Ecoscape 2005[2]) noted that snakes appear less able to accommodate habitat fragmentation on the Swan Coastal Plain.

When soil heaps and rubbish are removed, care should be taken to note whether any native animals are being disturbed as species such as:

- Western Slender Bluetongue (*Cyclodomorphus branchialis*) which is a nocturnal lizard that shelters beneath dense, low vegetation, leaf litter, limestone, rubbish and inside soil heaps;
- Turtle Frogs (*Myobatrachus gouldii*) which can occur in soil heaps;
- Western Limestone Ctenotus *(Ctenotus lesueurii)* which has burrows at the base of shrubs, beneath rocks or rubbish; and
- Bobtails (*Tiliqua rugosa*) can shelter amongst rubbish such as corrugated iron (Bush *et al*, cited in Ecoscape 2005[2]).

These reptiles may utilise the soil and rubbish mounds onsite, but are not dependent upon them for habitat and therefore given the issue of weeds and aesthetics these mounds should still be removed. However consideration should be given to the process of removing the mounds to minimise impacts (e.g. by initial sorting through mounds by hand or shovel) and if such animals are discovered then handling should be minimised and the animals placed in a well vegetated area nearby. Care also needs to be exercised by volunteers moving soil and rubbish mounds that that are not bitten by Bobtail (*Tiliqua rugosa)* which have very powerful jaws that can inflict a painful bite but are only likely to bite if mishandled or Dugites (*Pseudonaja affinis*) which are dangerously venomous but will only bite if trodden on, handled or threatened.

Invertebrates

There are four confirmed invertebrates at Shenton Bushland (two butterflies including the Western Grass-Dart Butterfly (*Taractrocera papyria*) and Marbled Xenica Butterfly (*Geitoneura klugii*); the Graceful Sun Moth (*Synemon gratiosa*); and the Australian Painted Lady (*Vanessa kershawi*). These are all managed indirectly through improving bushland condition, maintaining habitat and reducing fires.

Management Actions 2013 - 2018

	ACTIONS
1.	Carefully relocate reptiles if they are encountered when removing soil mounds.
2.	Retain hollows for refuges in large old and dead trees.
3.	Control feral European Bees as they can displace native animals.
4.	Protect nests of Rainbow Bee-eaters if they are encountered.
5.	Continue the feral fox control program.
6.	Undertake surveying to determine if there are any marsupials in the bushland.

COMMUNITY INVOLVEMENT

The objectives and strategies for Community Involvement for the City's Community Friends Groups are detailed on pages 63 - 64 Natural Areas Management Plan 2013 - 2018. In summary, the activities of bushland community groups should continue to be supported by the City through the Bushland Friends Group Policy, and assistance should be provided to help Friends groups remain sustainable through advertising and the volunteer referral centre. Specific details of the Friends of Shenton Bushland (FOSB) are stated below.

The FOSB formed in 1991 to protect the bushland from development as a light industrial estate, and preserve it for conservation and recreation purposes. The Friends, in conjunction with the City of Nedlands and local residents, succeeded in having the Reserve vested to the City of Nedlands as an A Class Reserve in 1993. The Friends group became incorporated on 12th May 1994, and have collaborated with the City of Nedlands, the Department of Health and Shenton College to manage the bushland since that time.

The Friends of Shenton Bushland generally concentrate their efforts in the south western portion of the bushland. Their weed control activities depend on the time of year. Some of their focus species for control include Geraldton Carnation Weed, Perennial Veldt Grass (and other perennial grasses), Pelargonium, Watsonia, Freesia and Flinders Range Wattles.

The City of Nedlands overseas weed spraying for bulbous weeds such as Black Flag, Freesias, Lachenalia and grass weeds (primarily Perennial Veldt Grass). Teams undertaking bushland maintenance focus hand weeding on Geraldton Carnation Weed, *Centranthus macrosiphon*, Perennial Veldt Grass and Lupins and Wild Radish (in some degraded areas).

The Friends of Shenton Bushland are very active in the management of Shenton Bushland and meet every Sunday from 8 – 10am. Projects the Friends of Shenton Bushland are involved in include:

- Revegetation,
- Seed collection,
- Environmental weed management,
- Community education and guided walks,
- Weed mapping,
- Flora surveys,
- Development of management actions for Shenton Bushland,
- Projects with Shenton College,
- Sourcing grant funding for project such as the installation of bat boxes; and
- Photographing flora and fauna.

The Friends of Shenton Bushland are keen to involve anyone interested in caring for Shenton Bushland. The contact details for the Friends of Shenton Bushland are:

Convenor Daniel Boase-Jelinek
bojel@iinet.net.au
(08) 9381 3470
0420334601

Activities blog http://shenton-bushland.blogspot.com.au
Website http://members.iinet.net.au/~kerribj/shenton
Urban Bushland Council
http://www.bushlandperth.org.au/member-groups/3-north-of-the-river/59-friends-of-shenton-bushland

Community Projects to Increase Awareness and Conservation

The Lemnos Street frontage of the bushland provides an opportunity to develop mutually beneficial partnerships with adjacent organisations such as the Arthritis Centre, Cat Haven, Dog's Home and a number of businesses along Lemnos Street. Such partnerships could be utilised to foster a sense of community ownership of the bushland and thereby attract volunteers and reduce littering and dumping of rubbish.

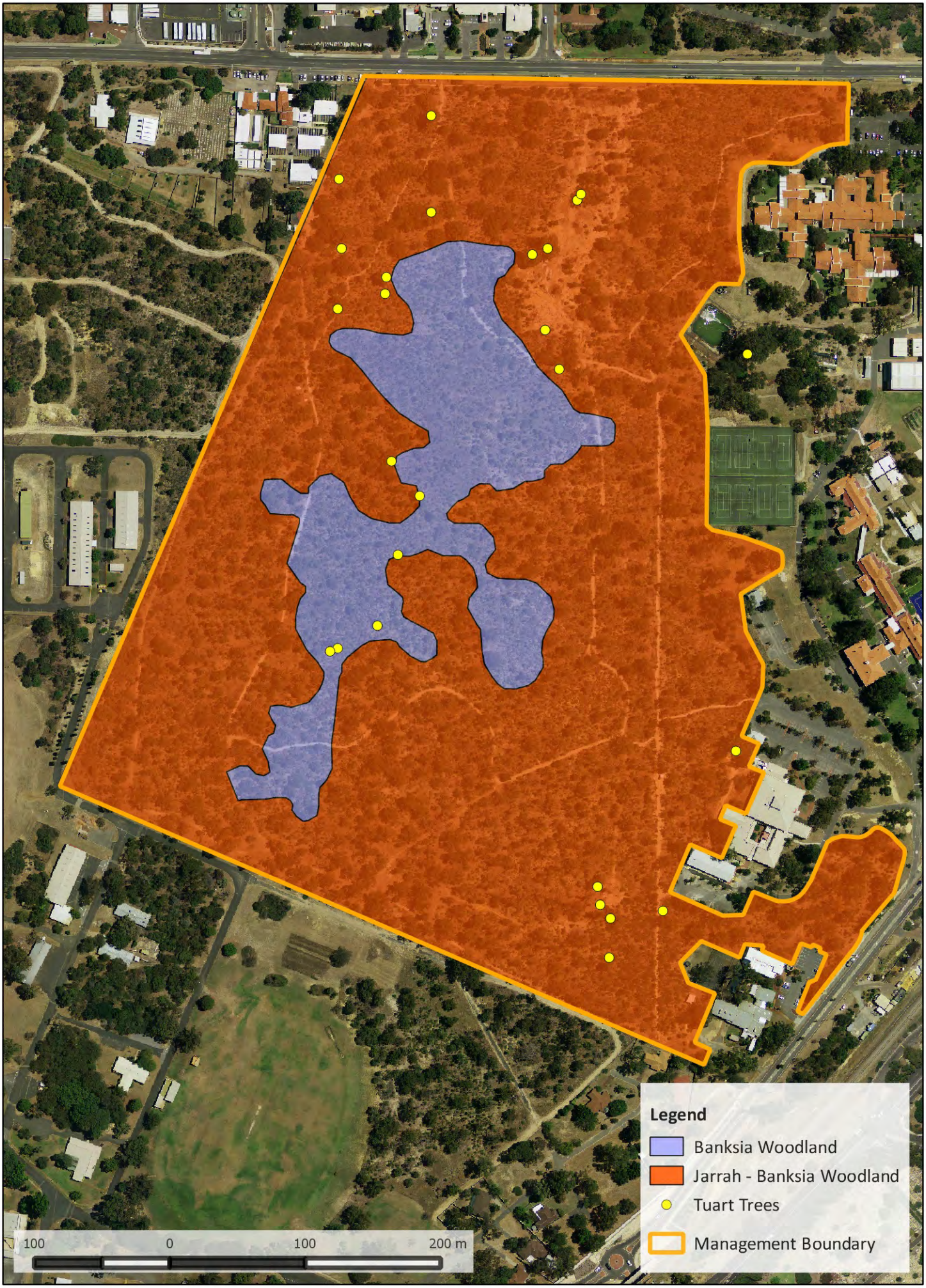
Some ideas and potential projects to be explored for developing such partnerships include:

- Raising the profile of the bushland and the activities of the Friends group by liaising more closely with adjacent organisations,
- Exploring options for collaboration to improve the appearance of the bushland along the Lemnos Street frontage such as regular litter removal, maintenance of grass, removal of dead branches, mulching and planting local species and installing seating and a picnic table near the entrance; and
- Providing information about bushland activities and opportunities for community involvement.

Management Actions 2013 - 2018

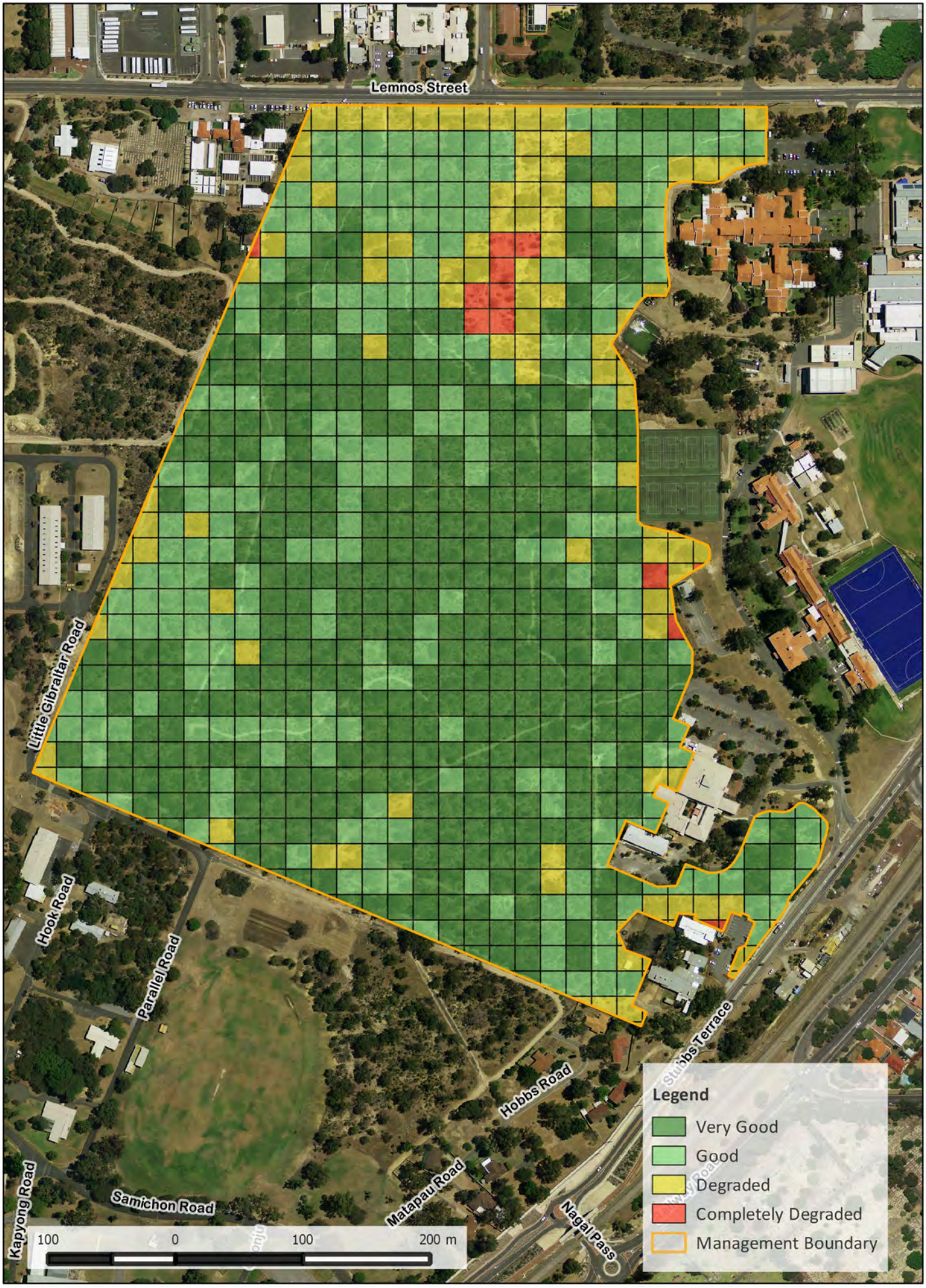
ACTIONS	
1.	Collaborate with adjacent organisations on projects to improve the Lemnos frontage and increase awareness of the bushland.

MAPS



Map 1: Vegetation Communities

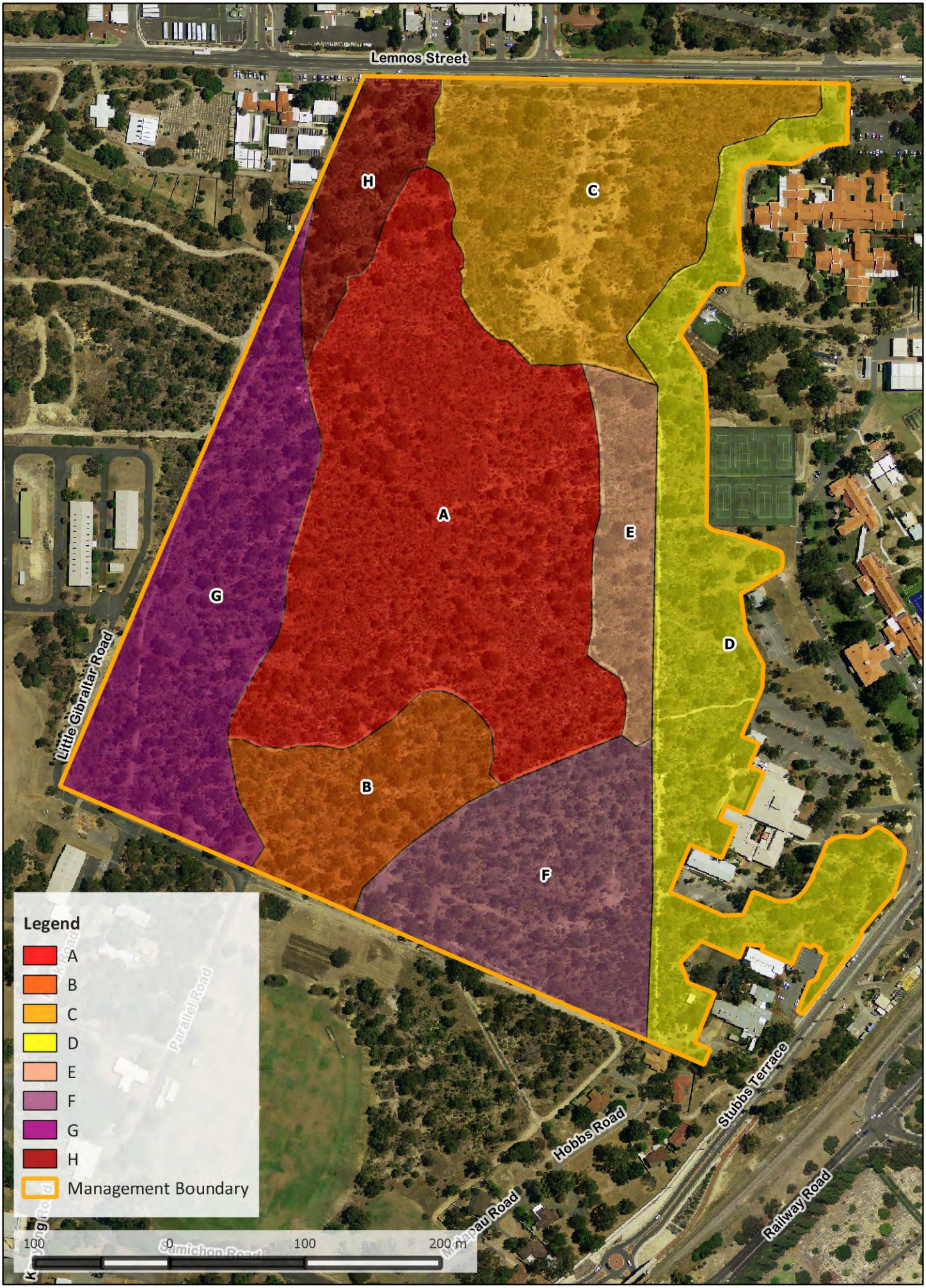
City of Nedlands



Map 2: Bushland Condition

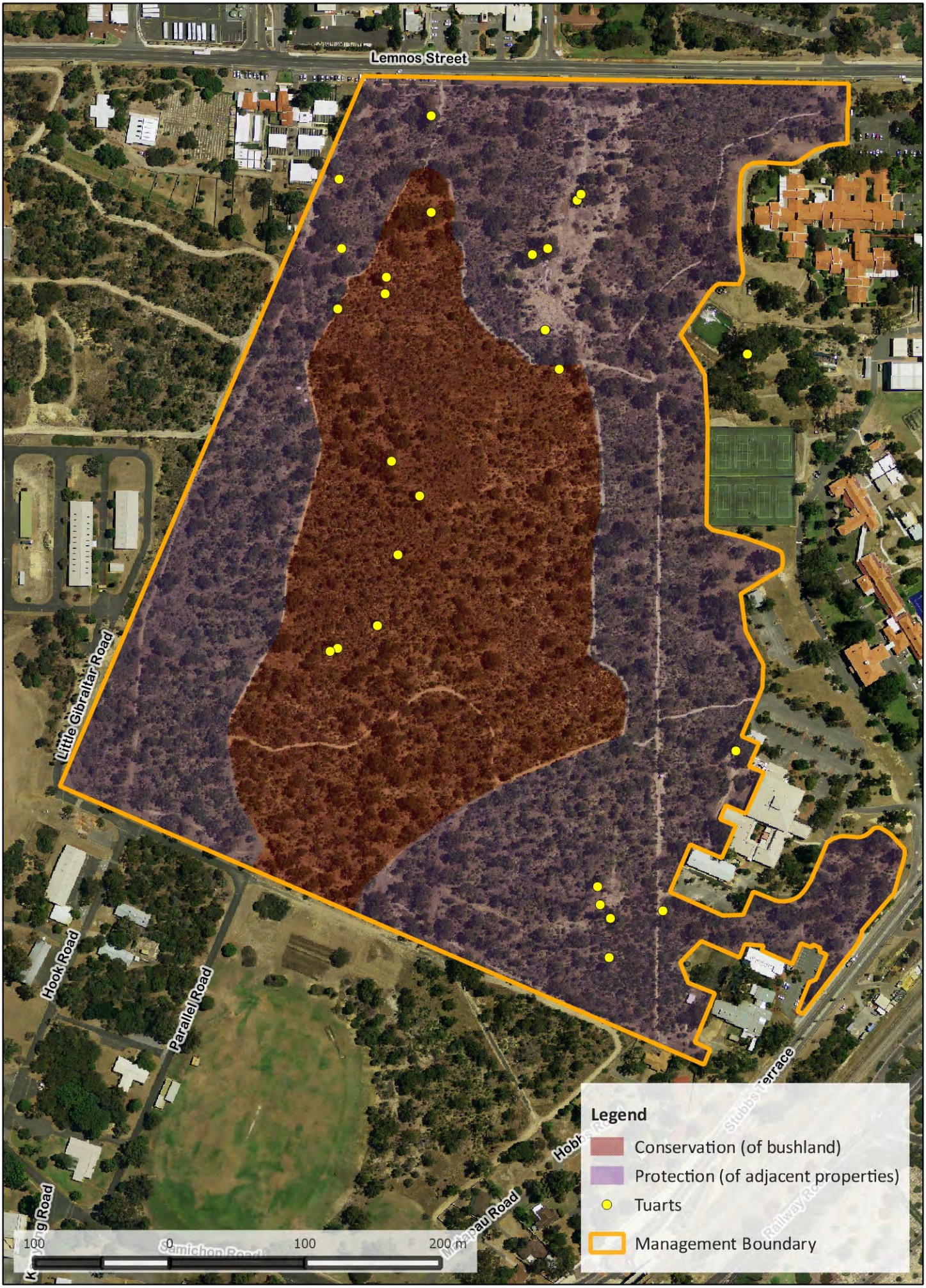
City of Nedlands

N



Map 3: Management Zones

City of Nedlands



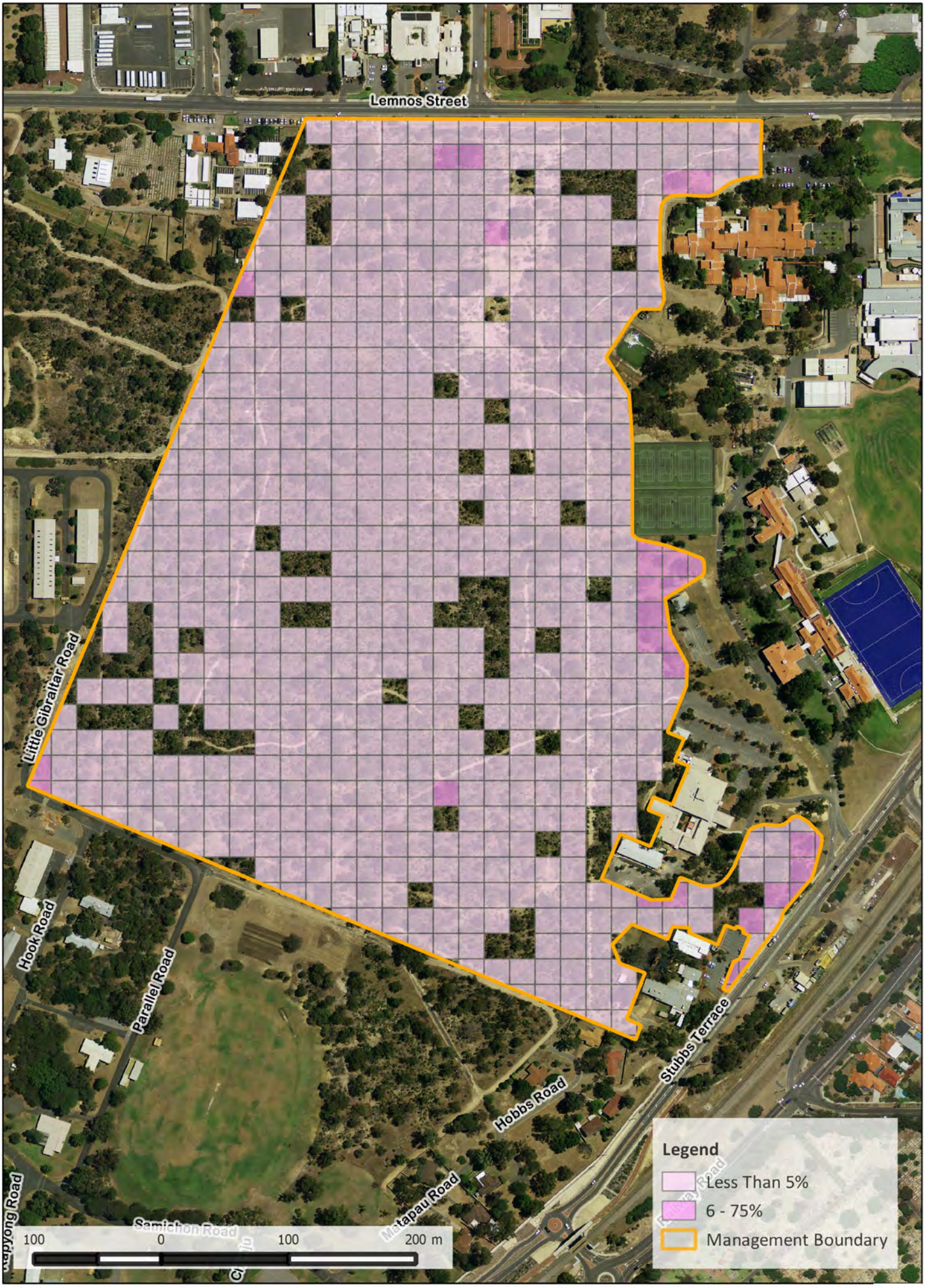
Map 4: Conservation and Protection Zones

Map 5 *Albuca Canadensis*

City of Nedlands

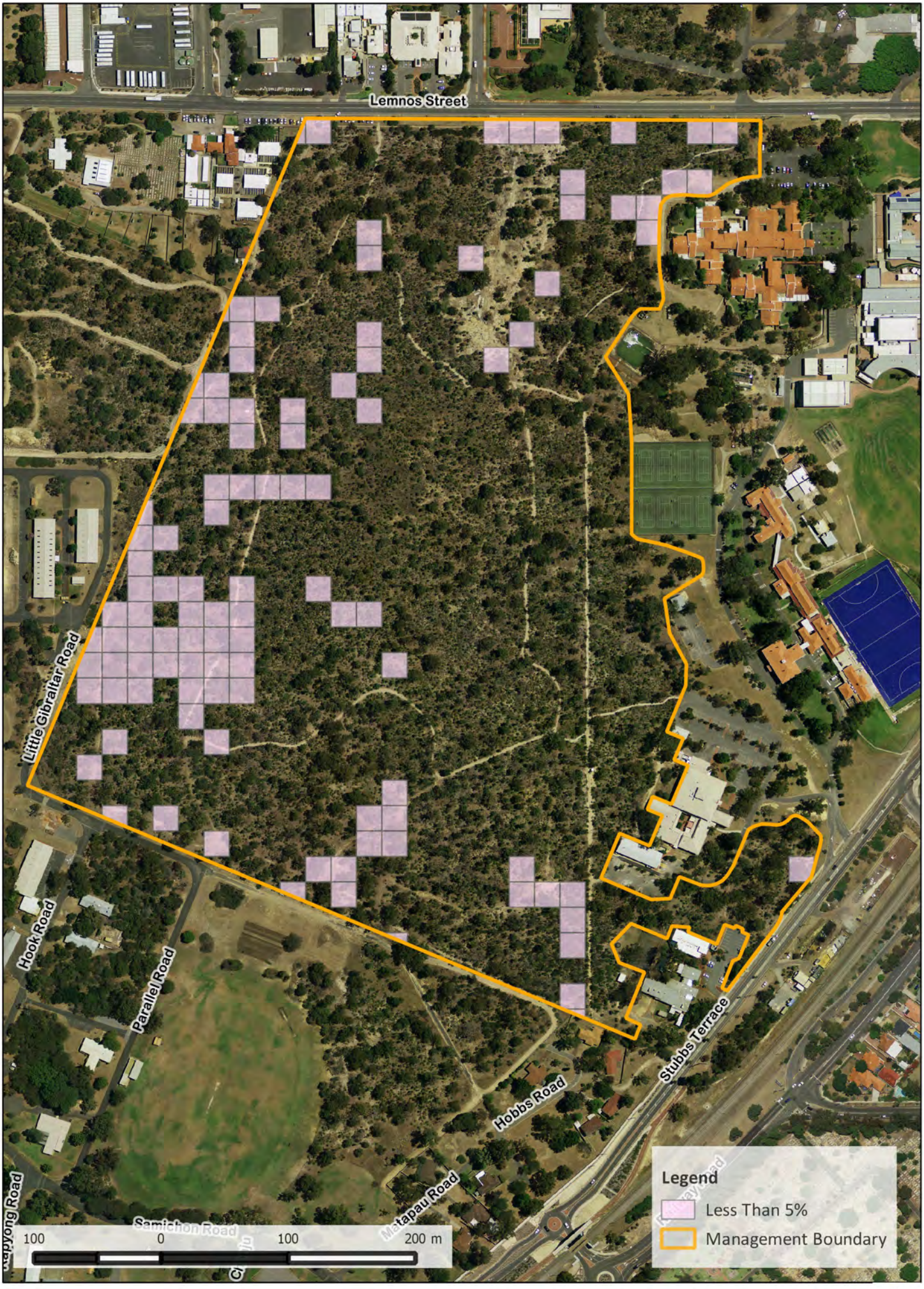
Map 6: *Babiana angustifolia* - Baboon Flower

City of Nedlands



Map 7: *Ehrharta calycina* - Perennial Veldt Grass

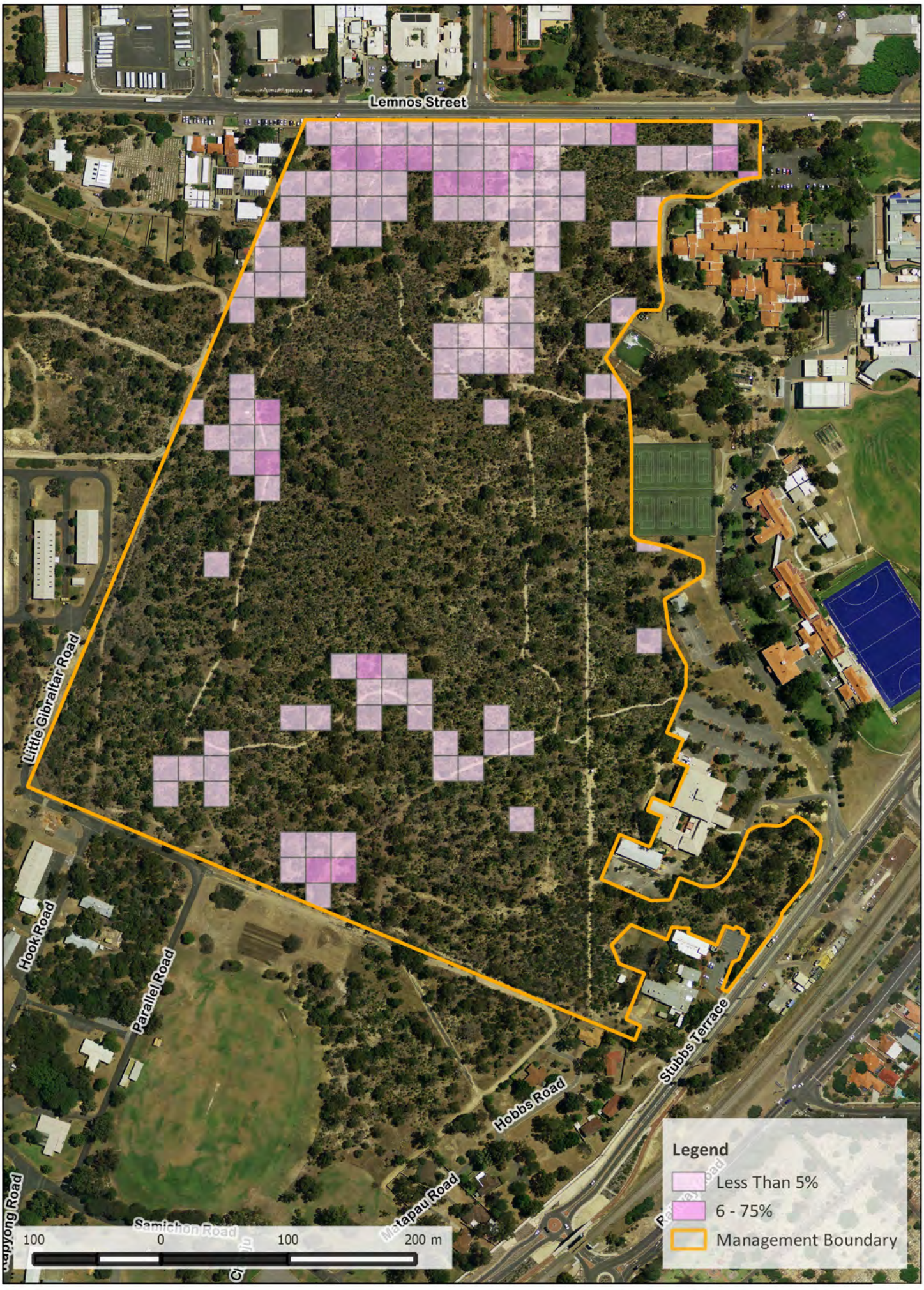
City of Nedlands



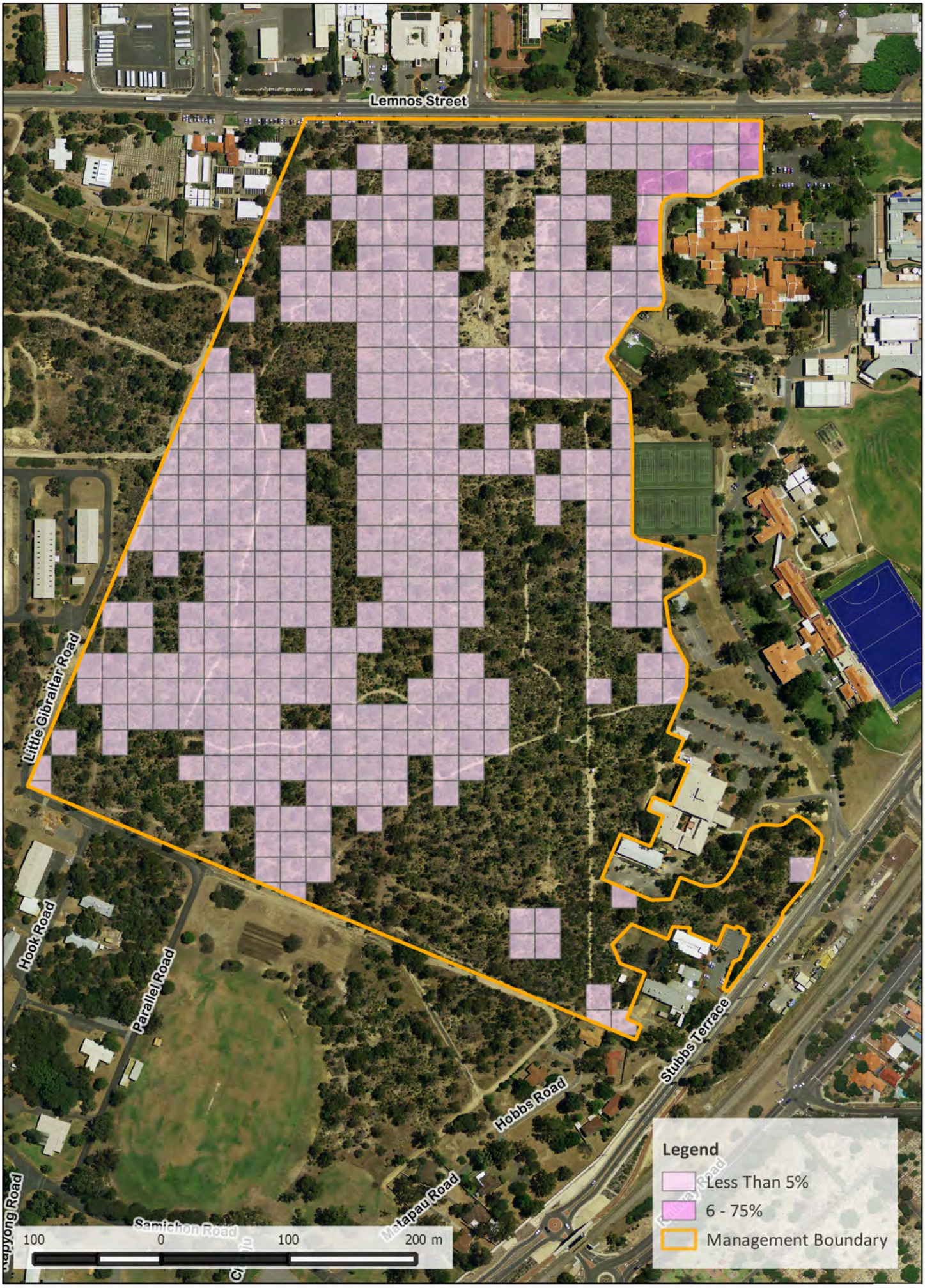
Map 8 *Euphorbia terracina* - Geraldton Carnation Weed

City of Nedlands

N



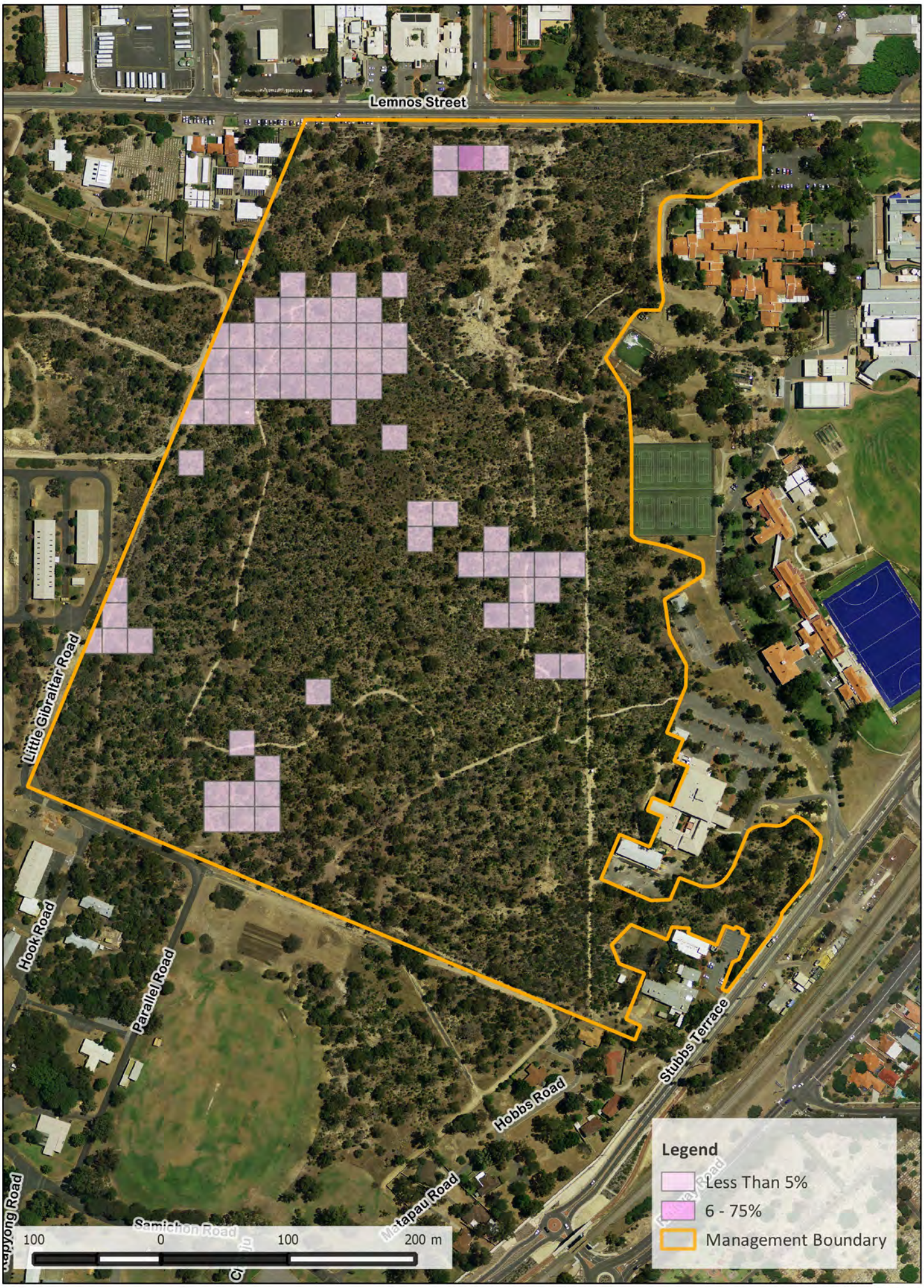
Map 9: *Ferraria crispa* - Black Flag



Map 10: *Freesia alba x leichtlinii* - Freesia

Map 11: *Ixia maculata* - Yellow Ixia

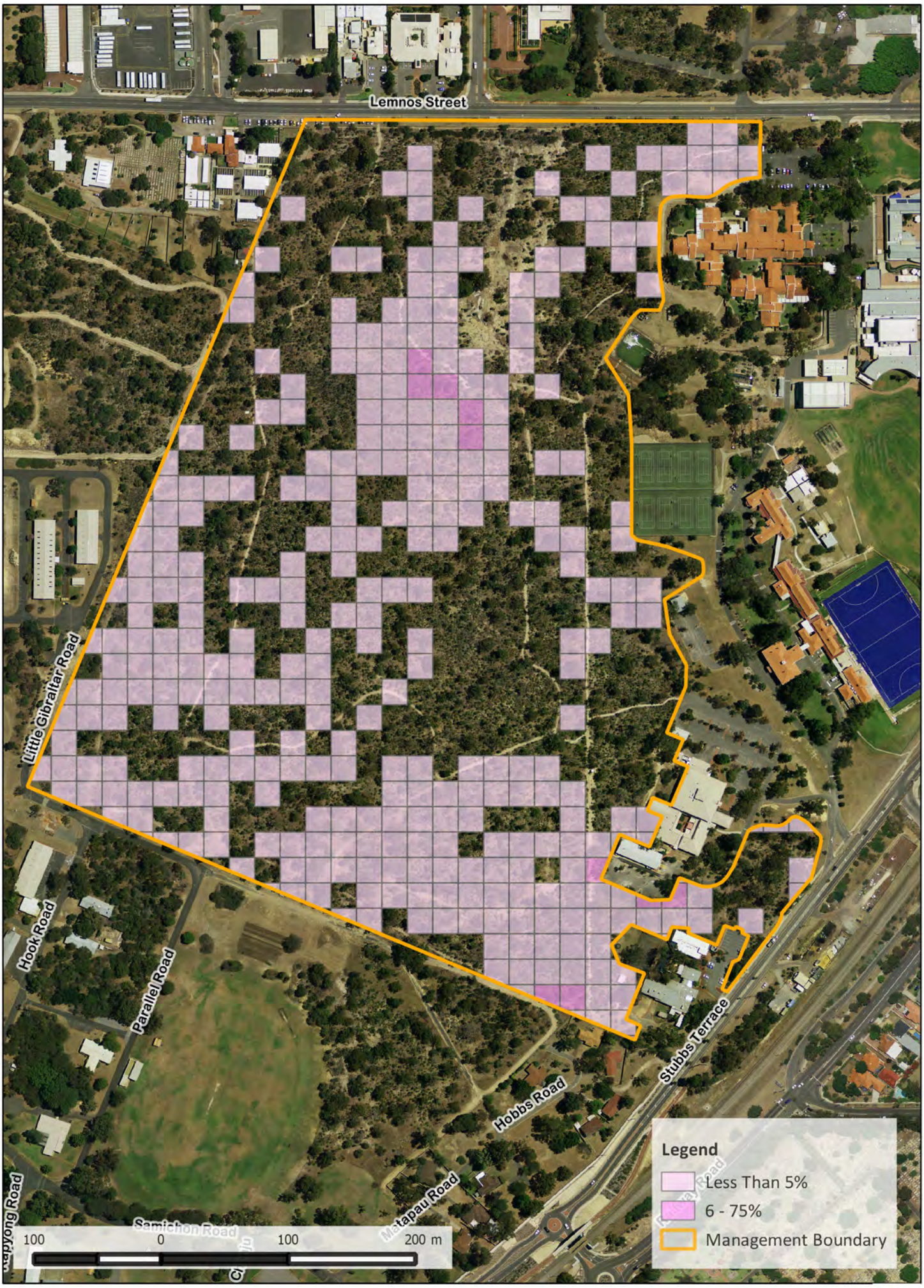
City of Nedlands



Map 12: Lachenalia reflexa - Yellow Soldier

Map 13: *Moraea flaccida* - One-leaf Cape Tulip

City of Nedlands



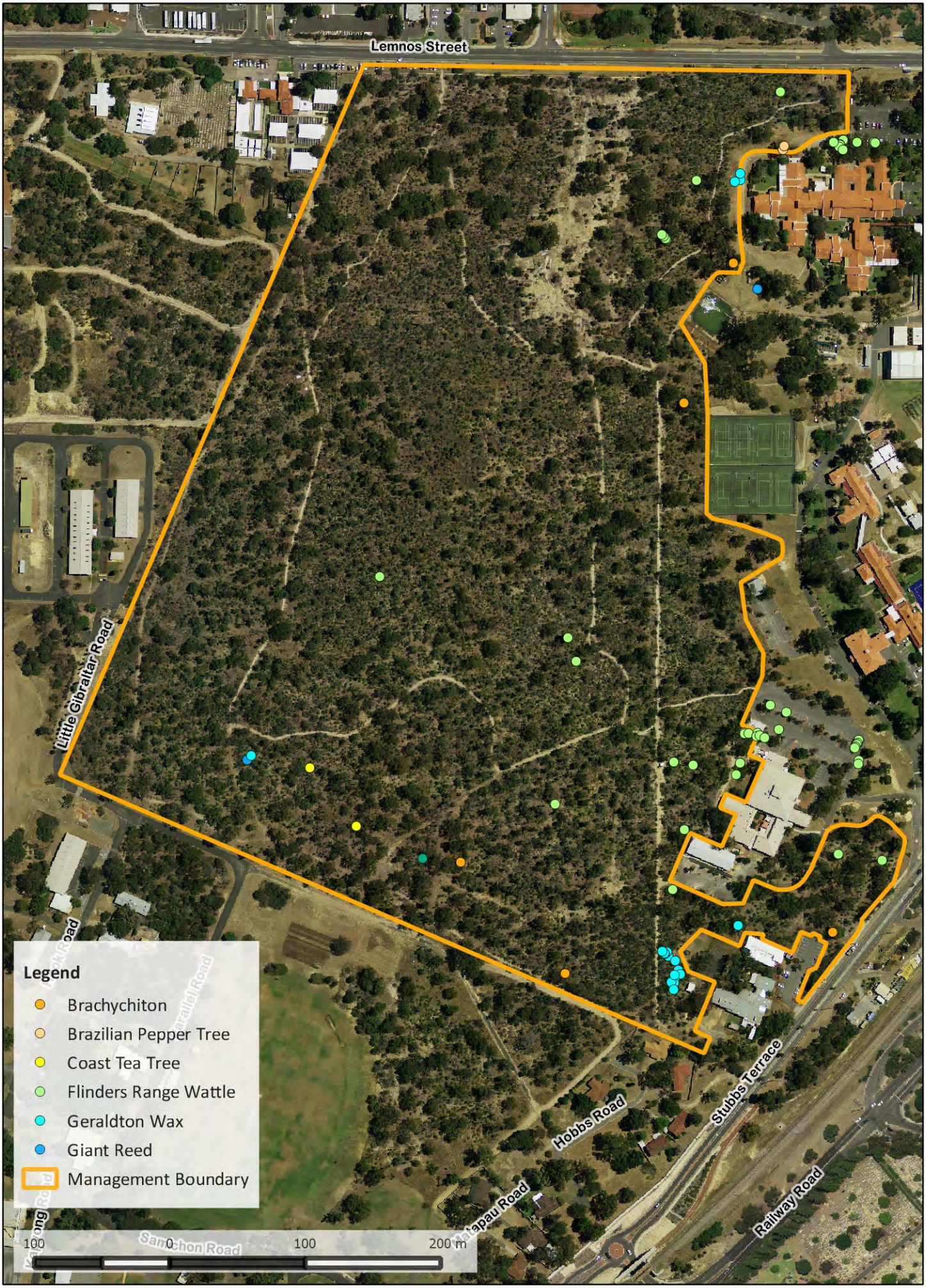
Map 14: *Pelargonium capitatum* - Rose Pelargonium

City of Nedlands

N

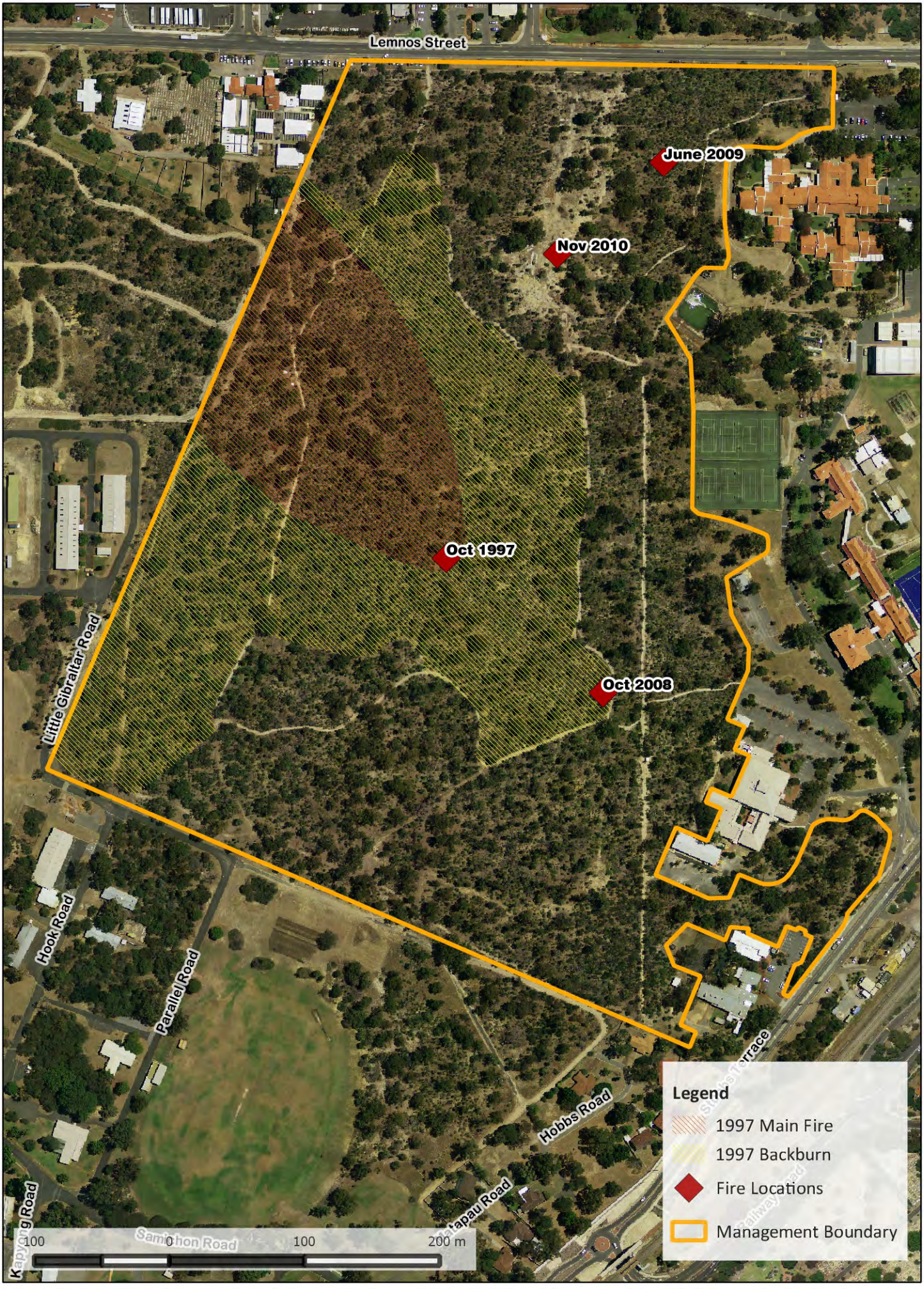
Map 15: *Watsonia meriana* - Bulbil Watsonia

Map 16: Gladiolus sp. (*Gladiolus angustus and undulatus)*



Map 17: Woody Weeds

City of Nedlands



Map 18: Fire History

City of Nedlands

Map 19: Access, Pathways, Signage and Interpretation

City of Nedlands

N

REFERENCES

Alan Tingay and Associates 1998, *A Strategic Plan for Perth's Greenways*. Prepared for Environment Australia, Ministry for Planning, Department of Conservation and Land Management, Western Australian Municipal Association, Department of Environmental Protection, Water and Rivers Commission, Main Roads WA, Swan Catchment Centre, Conservation Council, Greening WA and Australian Trust for Conservation Volunteers, Perth.

Arbor Carbon 2011, *Disease Assessment Bush and Green Reserves City of Nedlands*. Unpublished report for the City of Nedlands, Perth.

Beard, J.S. 1967, Natural Woodland in King's Park, Perth in *The Western Australian Naturalist*, Vol 10 Number 4.

Bolland, M. 1998, *Soils of the Swan Coastal Plain*. Bulletin 4359. Department of Agriculture, Bunbury.

Department of Parks and Wildlife (DPAW) *Department of Environment and Conservation*. http://www.dpaw.wa.gov.au. Various dates between January 2013 - November 2013.

Bettink, K., Keighery, G., Swan Catchment Council (SCC) and Department of Environment and Conservation (DEC) 2008, *Environmental weed census and prioritisation, Swan NRM Region.* Department of Environment and Conservation, Perth.

Bettink, K., Keighery, G., Swan Catchment Council (SCC) and Department of Environment and Conservation (DEC) 2008, *Environmental Weed Assessment*. Department of Environment and Conservation, Perth.

Brown, K., Bettink, K., Grazyna, P., Culity, J., French, S., Geographic Information Systems and Department of Environment and Conservation (DEC) 2011, *Standard Operating Procedure - SOP 22.1 Techniques for Mapping Weed Distribution and Cover in Bushland and Wetlands*. Department of Environment and Conservation, Perth.

Bush, B, Maryan, B., Browne-Cooper, R. and Robinson, D. 1995, *A Guide to the Reptiles and Frogs of the Perth Region.* University of Western Australia Press, Perth.

Ecoscape 1996, *Shenton Bushland Management Plan*. Unpublished report for the City of Nedlands, Perth.

Ecoscape 2002, *Western Suburbs Greening Plan*. Unpublished report for the Western Suburbs Regional Organisations of Councils, Perth.

Ecoscape 2005, *Shenton Bushland Management Plan 2005 - 2010*. Unpublished report for the City of Nedlands, Perth.

Fordyce, I. 2014, City of Nedlands Volunteer Botanist. Information provided for Geomorphology and Soils Section.

Gibson, N., Keighery, B.J., Keighery G.J., Burbidge, A.H. and Lyons, M.N. 1994, *A Floristic Survey of the Swan Southern Coastal Plain.* Unpublished Report for the Australian Heritage Commission prepared by Department of Conservation and Land Management and the Conservation Council of Western Australia Inc, Perth.

Government of Western Australia 2000, *Bush Forever, Volume 2: Directory of Bush Forever Sites.* Department of Environmental Protection, Perth.

Gozzard, J.R. 1983, *Fremantle Part Map Sheets 2033 I & 2033 IV,* Perth Metropolitan Region 1:50,000. Environmental Geology Series, Geological Survey of Western Australia.

Heddle, E.M., Loneragan, O.W. and Havel, J.J. 1980, '*Vegetation of the Darling System' in Atlas of Natural Resources, Darling System, Western Australia.* Department of Conservation and Environment, Perth.

How, R.A. and Dell, J. 1994, Zoogeographic Significance of Urban Bushland Remnants to Reptiles in the Perth Region, W.A., in *Pacific Conservation Biology* Vol 1.

Jean - Paul Orsini and Associates 2008, *Perth Biodiversity Project Natural Area Initial Assessment Template – Shenton Bushland*. Unpublished assessment template for the City of Nedlands, Perth.

Keighery, B. and Wildflower Society of Western Australia 1994, *Bushland Plant Survey: a guide to plant community survey for the community.* Wildflower Society of WA (Inc.), Nedlands, W.A.

Keighery, G.J. 2002, *The Flora of Tuart Woodlands* in *Tuart and Tuart Communities* Keighery, B.J. & Longman (ed). Perth Branch of the Wildflower Society of Western Australia, Perth.

McArthur, W.M. and Bettenay, E. 1960, *The development and distribution of soils on the Swan Coastal Plain*. CSIRO, Soil Publication No. 16, Western Australia.

Menkhorst, P. and Knight, F. 2004, *A Field Guide to Mammals of Australia*, 2nd edition. Oxford University Press, Melbourne.

Perth Biodiversity Project, South West Biodiversity Project and WALGA 2009, *Local Government Guidelines for Bushland Management in the Perth and Coastal South-West Natural Resource Management Regions*. Perth Biodiversity Project and Western Australian Local Government Association, Perth.

Perth Biodiversity Project 2009, *Pre-European Vegetation Complexes Map sourced from the Department of Environment and Conservation.* Perth Biodiversity Project and Local Government Association, Perth.

Polis, E. 1996, *The Study and Survey of Prisoner of War Facilities in Western Australia.* Unpublished report for the Australian Heritage Commission and the Heritage Council of W.A., Perth.
Western Australian Herbarium 1998 - 2013, *FloraBase—the Western Australian Flora*. Department of Parks and Wildlife. http://florabase.dpaw.wa.gov.au/. Various dates between January - November 2013.

Williams, M. 2005, Senior Research Scientist, Department of Conservation and Land Management, personal communication with Ecoscape for the 2005 – 2010 Shenton Bushland Management Plan..

Appendix 1 Flora Inventory

Native Plant Inventory

Scientific Name	Common Name	Suitable in Low Fuel Sites	Easy to Establish in Reconstruction Sites
Acacia cochlearis	Rigid Wattle		X
Acacia cyclops	Coastal Wattle		X
Acacia huegelii			
Acacia pulchella	Prickly Moses		X
Acacia saligna	Golden Wreath Wattle		X
Acacia stenoptera	Narrow Winged Wattle		
Acacia willdenowiana	Grass Wattle		
Alexgeorgea nitens			
Allocasuarina fraseriana	Sheoak		X
Allocasuarina humilis	Dwarf Sheoak		X
Anigozanthos humilis	Catspaw	X	
Astroloma pallidum	Kick Bush		
Austrostipa compressa			
Austrostipa flavescens	Spear Grass		
Banksia attenuata	Slender Banksias		
Banksia dallanneyi	Couch Honeypot		
Banksia menziesii	Firewood Banksia		
Banksia sessilis	Parrot Bush		x
Bossiaea ornata	Broad Leaved Brown Pea		
Burchardia congesta	Milkmaids		
Caesia micrantha	Pale Grass-lily		
Caladenia flava	Cowslip Orchid		
Caladenia huegelii	Grand Spider Orchid		
Caladenia latifolia	Pink Fairy Orchid		
Calandrinia corrigioloides	Strap Purslane		
Calandrinia liniflora	Parakeelya		
Centrolepis drummondiana			
Comesperma calymega	Blue-spike Milkwort		
Conostephium pendulum	Pearl Flower		
Conostephium preissii			
Conostylis aculeata	Prickly Cottonhead	X	X
Conostylis setigera	Bristly Cottonhead	X	X
Corynotheca micrantha	Tangle Lily		
Crassula colorata	Dense Stonecrop		
Daviesia decurrens	Prickly Bitter-pea		
Daviesia divaricata	Marno		
Daviesia nudiflora			
Daviesia triflora			
Desmocladus flexuosa			
Dianella revoluta var. *Divaricata*	Flax Lily		
Diuris sp	Donkey Orchid		

Scientific Name	Common Name	Suitable in Low Fuel Sites	Easy to Establish in Reconstruction Sites
Drosera erythrorhiza	Red Ink Sundew		
Drosera glanduligera	Pimpernel Sundew		
Drosera macrantha	Bridal Rainbow		
Drosera paleacea	Dwarf Sundew		
Drosera pallid	Pale Rainbow		
Drosera stolonifera	Leafy Sundew		
Eryngium pinnatifidum	Blue Devils		
Eucalyptus gomphocephala	Tuart		X
Eucalyptus marginata	Jarrah		X
Gastrolobium capitatum	Bacon And Eggs		
Gompholobium tomentosum	Hairy Yellow Pea		X
Grevillea vestita			X
Haemodorum laxum			
Haemodorum paniculatum	Mardja		
Haemodorum spicatum	Mardja		
Hakea prostrata	Harsh Hakea		X
Hardenbergia comptoniana	Native Wisteria		X
Hibbertia huegelii			
Hibbertia hypericoides	Yellow Buttercups		
Hibbertia racemosa	Stalked Guinea Flower		
Homalosciadium homalocarpum			
Hovea trisperma	Common Hovea		X
Hybanthus calycinus	Wild Violet		
Hypocalymma robustum	Swan River Myrtle		X
Isolepis marginata	Coarse Club-rush		
Isotropis cuneifolia	Granny Bonnets	X	
Jacksonia furcellata	Grey Stinkwood		X
Jacksonia sericea	Waldjumi	X	X
Kennedia prostrata	Scarlet Runner		X
Lagenophora huegelii			
Leschenaultia linarioides	Yellow Leschenaultia		
Lepidosperma leptostachyum			
Lepidosperma squamatum			
Leucopogon propinquus			
Lomandra caespitosa	Tufted Mat Rush		
Lomandra hermaphrodita			
Lomandra maritima			
Lomandra micrantha	Small Flowered Mat Rush		
Lomandra nigricans			
Lomandra preissii			
Luzula meridionalis	Field Woodrush		
Lyginia barbata			
Macrozamia riedlei	Zamia		
Mesomelaena pseudostygia	Semaphore Sedge		
Microlaena stipoides	Weeping Grass		

Scientific Name	Common Name	Suitable in Low Fuel Sites	Easy to Establish in Reconstruction Sites
Microtis media	Common Mignonette Orchid		
Monotaxis grandiflora			
Olearia elaeophila	Diamond of the Desert		X
Olearia axillaris	Coastal Daisybush		
Opercularia vaginata	Dog Weed		
Orthrosanthus laxus var. laxus	Morning Iris		x
Persoonia saccata	Snottygobble		
Petrophile brevifolia			
Petrophile linearis	Pixie Mops		
Petrophile macrostachya			
Pithocarpa cordata			x
Pheladenia deformis	Blue Fairy Orchid		
Philotheca spicata	Pepper and Salt		
Pimelea sulphurea	Yellow Banjine		
Podolepis gracilis	Slender Podolepis		
Poranthera microphylla	Small Poranthera		
Pterostylis vittata	Banded Greenhood		
Ptilotus drummondii	Narrowleaf Mulla Mulla		
Ptilotus polystachyus	Prince Of Wales Feathers		X
Pyrorchis nigricans	Red Beaks		
Quinetia urvillei			
Rhagodia baccata	Berry Saltbush		X
Scaevola canescens	Grey Scaevola	X	
Scaevola repens	Prostrate Scaevola	X	
Schoenus clandestinus			
Schoenus curvifolius			
Schoenus grandiflorus	Large Flowered Bog Rush		
Sowerbaea laxiflora	Purple Tassels		
Spyridium globulosum	Basket Bush		X
Stirlingia latifolia	Blueboy		
Stylidium brunonianum	Pink Fountain Triggerplant		
Stylidium schoenoides	Cow Kicks		
Synaphea spinulosa			
Tetraria octandra			
Thelymitra sp	Sun Orchid		
Thysanotus arenarius			
Thysanotus manglesianus	Fringed Lily		
Thysanotus sparteus			
Thysanotus triandrus			
Trachymene pilosa	Native Parsnip		
Tricoryne elatior	Yellow Autumn Lily		
Wahlenbergia preissii			
Waitzia suaveolens	Fragrant Waitzia		
Xanthorrhoea brunonis			
Xanthorrhoea preissii	Grass Tree		
Xanthosia huegelii			

Weed Inventory

Scientific Name	Common Name
Acacia iteaphylla	Flinders Range Wattle
Acacia longifolia	Sydney Wattle
Acacia podalyriifolia	Silver Wattle
Agonis flexuosa	Peppermint Tree
Aira caryophyllea	Silvery Hair Grass
Anagallis arvensis	Pimpernel
Albuca canadensis	
Arctotheca calendula	Cape Weed
Asphodelus fistulosus	Wild Onion
Avena fatua	Wild Oat
Bambusa sp.	Bamboo
Brachychiton populneus	Kurrajong
Briza maxima	Blowfly Grass
Briza minor	Shivery Grass
Bromus sp	Brome Grass
Buddleja madagascariensis	
Carpobrotus edulis	Hottentot Fig
Centranthus macrosiphon	Pretty Betsy
Chamaecytisus palmensis	Tagasaste
Chamelaucium uncinatum	Geraldton Wax
Chasmanthe floribunda	African Cornflag
Conyza sp	Fleabane
Daviesia sp	
Disa bracteata	
Dittrichia graveolens	Stinkwort
Ehrharta calycina	Perennial Veldt Grass
Ehrharta longiflora	Annual Veldt Grass
Erodium botrys	Long Storksbill
Eragrostis curvula	African Love Grass
Erodium moschatum	Musky Crowfoot
Euphorbia peplus	Petty Spurge
Euphorbia terracina	Geraldton Carnation Weed
Ferraria crispa	Black Flag
Freesia aff. leichtlinii	Freesia
Fumaria capreolata	Whiteflower Fumitory
Geranium molle	Dove's Foot Cranesbill
Gladiolus caryophyllaceus	Wild Gladiolus
Gladiolus angustus	Long Tubed Painted Lady
Gladiolus undulatus	Wild Gladiolus
Gompholobium marginatum	
Heliophila pusilla	
Hypochaeris glabra	Smooth Catsear
Ixia maculata	Yellow Ixia
Lachenalia aloides	
Lachenalia bulbifera	

Scientific Name	Common Name
Lachenalia reflexa	Yellow Soldiers
Lactuca saligna	Wild Lettuce
Lagurus ovatus	Hares Tail Grass
Leschenaultia biloba	
Leptospermum laevigatum	Coast Teatree
Lolium perenne	Perennial Rye Grass
Lupinus cosentinii	Sandplain Lupin
Medicago sp	
Moraea flaccida	One-leaf Cape Tulip
Narcissus tazetta	Jonquil
Oenothera drummondii	Coast Evening Primrose
Opuntia stricta	Common Prickly Pear
Orobanche minor	Lesser Broomrape
Osteospermum clandestinum	Stinking Roger
Oxalis corniculata	Yellow Wood Sorrel
Oxalis glabra	
Oxalis pes-caprae	Soursob
Oxalis purpurea	Large Flower Wood Sorrel
Pelargonium capitatum	Rose Pelargonium
Pennisetum clandestinum	Kikuyu Grass
Pennisetum setaceum	Fountain Grass
Petrorhagia velutina	Velvet Pink
Poa annua	Winter Grass
Polycarpon tetraphyllum	Fourleaf Allseed
Urospermum picroides	False Hawkbill
Ursinia anthemoides	Ursinia
Raphanus raphanistrum	Wild Radish
Rhynchelytrum repens	Red Natal Grass
Romulea rosea	Guildford Grass
Schinus terebinthifolius	Brazilian Pepper
Silene gallica	French Catchfly
Siloxerus humifusus	Procumbent Siloxerus
Solanum nigrum	Black Nightshade
Sonchus oleraceus	Common Sow thistle
Stellaria media	Chickweed
Vicia sativa	Common Vetch
Vulpia sp	

Appendix 2: Fungi Inventory 2000-2103

FUNGUS	HABITAT
Mycorrhizal (plant partner) Fungi	
Amanita preissii	litter/ground
Amanita sp. A "turnip base"	litter/ground
Amanita sp. B "powdery"	litter/ground
Vermillion Grisette *Amanita xanthocephala*	litter/ground
Mueller's Funnel Cap *Austropaxillus muelleri*	litter/ground
Bolete *Boletus sp.*	litter/ground
Birds Nest fungus	litter
Funnel Cap *Clitocybe sp.*	litter/ground
Ink Cap *Coprinus sp*	litter/ground
Golden Tuart Cortinarius *Cortinarius ochraceofulvus*	litter/ground
*Cortinarius sp. 1 purple tinge	litter/ground
Cortinarius sp 2 gold top	litter/ground
Cortinarius sp 3 gold top white stem	litter/ground
Gyroporus sp.	litter/ground
Fibrehead *Inocybe sp.*	litter/ground
Brick Red Laccaria *Laccaria lateritia*	litter/ground
Slimacella *Limacella pitereka*	litter/ground
Bleeding Mycena *Mycena kuurkacea*	litter/ground
Mycena sp. brown top	litter/ground
Parasol Ink Cap *Parasola plicatilis*	litter, ground, grassy areas
Golden Splash tooth *Phlebia mycoacea*	litter/ground
Cleland's Gilled Bolete *Phylloporus clelandii*	litter/ground
Dog Poo Fungus *Pisolithus sp.*	litter/ground
Slender Coral Fungus *Ramaria gracilis*	litter/ground
Coral Fungus *Ramaria sp.*	litter/ground
Rhodocollybia sp.	litter/ground
Earthball *Scleroderma sp.*	litter/ground
Tomentella sp.	dead wood (both saprotrophic & mycorrhizal)
Saprotrophic (decomposer) Fungi	
Egg Yolk Fungus *Bolbitius vitellinus*	litter/ground/dung
Scotsman's Beard *Calocera guepinoides*	dead wood
Red Fingers *Colus pusillus*	litter/sand
Eucalypt Crepidotus *Crepidotus eucalyptorum*	living eucalypt trees

Saprotrophic (decomposer) Fungi	
*Little Cups *Dasyscyphus sp.*	dead wood
Entoloma sp.	litter/ground
Witches Butter *Exidia glandulosa*	dead wood
**Galerina eucalyptorum*	dead wood
Galerina unicolor	litter/ground/moss
Galerina sp.	moss
Golden Wood Fungus *Gymnopilus allantopus*	dead wood
Psathyrella sp.	litter, ground
Scarlet Bracket Fungus*, Pycnoporus coccineus*	dead wood
Split Gill Fungus *Schizophyllum commune*	dead wood
Tubaria sp.	dead wood/litter
Strawberry Slime Mould *Tuberifera ferruginosa*	Dead, often burnt, wood
Yellow Brain Fungus *Tremella mesenterica gp.*	dead wood
Common Rosegill *Volvariella speciosa*	litter, ground
Rooting Shank *Xerula australis*	litter, ground
Parasitic Fungi	
The Bolete Eater *Sepedonium parasitising a Bolete*	other fungi (mushrooms)
Ghost Fungus *Omphalotus nidiformis*	dead or dying wood but also parasitic

List Compiled from many Fungi Forays held between June 2000 to July 2013. Identifications provided by Neale Bougher (2000 Foray and 2004 Perth Urban Bushland Fungi Foray) and Roz Hart.

*Three fungi vouchered into the WA Herbarium fungi collection

Appendix 3 Fauna Inventory

Bird Inventory

Birds	Common Name	Rob Davis 2006/07	Dani – Boase Jelinek 2004	Feral Birds
Tadorna tadornoides	Australian Shelduck	X		
Chenonetta jubata	Australian Wood Duck	X		
Columba livia	Rock Dove (Feral Pigeon)		X	*
Streptopelia senegalensis	Laughing Dove		X	*
Streptopelia chinensis	Spotted Dove		X	*
Phaps chalcoptera	Common Bronzewing	X		
Threskiornis moluccus	Australian White Ibis	X		
Elanus notatus	Black-shouldered Kite		X	
Accipiter fasciatus	Brown Goshawk		X	
Accipiter cirrocephalus	Collared Sparrowhawk	X		
Falco peregrinus	Australian Hobby		X	
Turnix varius	Painted Button-quail	X		
Calyptorhynchus banksii	Red- tailed Black Cockatoo		X	*
Calyptorhynchus latirostris	Carnaby's Black Cockatoo		X	
Cacatua roseicapilla	Galah		X	
Cacatua tenuirostris	Long-billed Corella	X		
Trichoglossus haematodus	Rainbow Lorikeet	X	X	*
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	X		
Barnardius zonarius	Australian Ringneck	X	X	
Purpureicephalus spurius	Red-capped Parrot		X	
Neophema elegans	Elegant Parrot	X		
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	X		
Chrysococcyx lucidus	Shining Bronze-Cuckoo	X		
Ninox novaeseelandiae	Southern Boobook	X		
Dacelo novaeguineae	Laughing Kookaburra		X	*
Merops ornatus	Rainbow Bee-eater		X	
Malurus lamberti	Variegated Fairy-wren	X		
White-browed Scrubwren	White-browed Scrubwren	X		
Smicrornis brevirostris	Weebill		X	
Gerygone fusca	Western Gerygone		X	
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	X		
Acanthiza apicalis	Inland Thornbill	X		
Pardalotus punctatus	Spotted Pardalote	X		
Pardalotus striatus	Striated Pardalote		X	
Acanthorhynchus superciliosus	Western Spinebill		X	
Lichenostomus virescens	Singing Honeyeater		X	
Anthochaera lunulata	Western Wattlebird	X		

Birds	Common Name	Rob Davis 2006/07	Dani – Boase Jelinek 2004	Feral Birds
Anthochaera carunculata	Red Wattlebird		X	
Epthianura albifrons	White-fronted Chat	X		
Gliciphila melanops	Tawny-crowned Honeyeater	X		
Lichmera indistincta	Brown Honeyeater		X	
Phylidonyris novaehollandiae	New Holland Honeyeater	X		
Phylidonyris niger	White-cheeked Honeyeater	X		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		X	
Lalage tricolor	White-winged Triller	X		
Pachycephala pectoralis	Golden Whistler	X		
Pachycephala rufiventris	Rufus Whistler		X	
Colluricincla harmonica	Grey Shrike-thrush	X		
Artamus cinereus	Black-faced Woodswallow	X		
Cracticus torquatus	Grey Butcherbird		X	
Gymnorhina tibicen	Australian Magpie		X	
Rhipidura albiscapa	Grey Fantail	X		
Rhipidura leucophrys	Willie Wagtail	X		
Corvus coronoides	Australian Raven		X	
Grallina cyanoleuca	Magpie-lark	X		
Zosterops lateralis	Silvereye		X	
Hirundo neoxena	Welcome Swallow		X	
Hirundo nigricans	Tree Martin		X	

Bird Surveys by Rob Davis in 2006/2007.

Other list compiled by Dani – Boase- Jelinek 2004 for the 2005 - 2010 Management Plan

Mammals, Reptiles, Amphibians and Invertebrates Inventory

Mammals		Introduced
Trichosurus vulpecula	Brushtail Possum	
Chalinolobus gouldii	Gould's Wattle Bat	
Nyctinomus australis	White Striped Mastiff or Freetail Bat	
Vulpes vulpes	Fox	*

Reptiles and Amphibians (a) Geckoes	
Diplodactylus alboguttatus	White-spotted Ground Gecko
Diplodactylus polyophthalmus	Speckled Stone Gecko
Diplodactylus spinigerus	Spiny-tailed Gecko
Phyllodactylus marmoratus	Marbled Gecko
Strophurus spinigerus	South-western Spiny-Tailed Gecko

(b) Legless Lizards	
Aprasia repens	South-western Sandplain Worm Lizard
Liasis burtonis	Burton's Snake lizard
Pletholax gracilis	Keeled Legless Lizard
(c) Dragons	
Tympanocryptis adelaidensis	Western Heath Dragon
(d) Skinks	
Cryptoblepharus plagiocephalus	Fence Skink
Ctenotus fallens	West Coast Ctenotus
Ctenotus lesueurii	Western Limestone Ctenotus
Cyclodomorphus branchialis	Western Slender Bluetongue
Hemiergis quadrilineata	Two-toed earless Skink
Lerista elegans	West Coast Four-toed Lerista
Lerista lineopunctulata	West Coast Line-spotted Lerista
Lerista praepedita	Western Worm Lerista
Menetia greyii	Common Dwarf Skink
Morethia lineoocellata	Western Pale-flecked Morethia
Morethia obscura	Southern Pale-flecked Morethia
Tiliqua rugosa	Bobtail or Shingleback
(e) Goannas	
Varanus gouldii	Gould¹s Monitor
Varanus tristis	Black-tailed Monitor
(f) Frogs	
Heleioporus eyrei	Moaning Frog
Limnodynastes dorsalis	Banjo Frog
Myobatrachus gouldii	Turtle Frog
(g) Snakes	
Pseudonaja affinis	Dugite
Ramphotyphlops australis	Southern Blind Snake

Invertebrates	
Western Grass-Dart Butterfly	*Taractrocera papyria*
Marbled Xenica Butterfly	*Geitoneura klugii*
Graceful Sun Moth	*Synemon gratiosa*
Australian Painted Lady	*Vanessa kershawi*

List compiled by Daniel Boase-Jelinek August 2004

Appendix 4 Priority Weed Management Notes (taken from Florabase)

Species Name		Common Name	Management Strategy	Timing (optimal)
1.	*Acacia iteaphylla*	Flinders Range Wattle	Hand pull seedlings. Fell mature plants.	Mar - July
2.	*Avena fatua*	Wild Oat	Spray at 3-5 leaf stage with Fusilade Forte at 16 ml/10 L and wetting agent. Repeat treatment over following 2 years. Prevent seed production and seedbank inputs each year. For small infestations hand removal may be feasible.	Aug - Nov
3.	*Asparagus asparagoides*	Bridal Creeper	Dig out juvenile seedlings in degraded areas. Spray 0.2 g metsulfuron methyl + Pulse in 15 L water (or 2.5 - 5g /ha + Pulse). Best results achieved when flowering. Biological control agents available such as the Leafhopper and the rust.	July - Aug
4.	*Brachychiton populneus*	Kurrajong	Hand pull seedlings. For mature plants try stem injection with 50-100% glyphosate or apply 250 ml Access in 15 L of diesel to basal 50 cm of trunk (basal bark) or cut and paint with 50% glyphosate.	Sept - April
5.	*Carpobrotus edulis*	Hottentot Fig	Manual methods appear to be the most effective means of control. Roll up large mats removing all roots and stem fragments and remove from site. Follow up with removal of any germinating plants. Only remove when flowering.	Sept - Nov
6.	*Chamelaucium uncinatum*	Geraldton Wax	Cut to base and paint with 50% glyphosate. Control seedlings following fire.	All Year
7.	*Centranthus macrosiphon*	Pretty Betsy	Hand remove isolated populations.	August - September
8.	*Chasmanthe floribunda*	African Cornflag	Dig out isolated plants.	June - Sept
9.	*Eragrostis curvula*	African Lovegrass	Cut out small plants or small infestations. Alternatively spray with 1-2% glyphosate when plants are green and actively growing. Following fire spray regrowth when 5-10 cm high. Always requires follow-up treatment.	Nov - May
10.	*Ehrharta calycina*	Perennial Veldt Grass	For small infestations, cut out plants ensuring crown removal. Do not slash. Alternatively spray with Fusilade Forte 13 ml/L or 3.3-6.6 L/ha + wetting agent on actively growing and unstressed plants. Use higher rate in dense undergrowth or on older less vigorous plants. Follow-up in subsequent years. Use unplanned fires to spray regrowth and seedlings within 4-6 weeks of germination.	June – Sep (herbicide) and Nov – Feb (manual)
11.	*Euphorbia terracina*	Geraldton Carnation Weed	Manually remove populations. Undertake control after any fire event.	June – Nov
12.	*Ferraria crispa*	Black Flag	Hand remove very small populations in degraded sites. Sift soil to find all corms. Spray 2,2 DPA 10 g/L + Pulse when flowering. In degraded sites try glyphosate 1% + metsulfuron methyl 0.2 g/15 L + Pulse. Takes a number of years to control populations.	Aug - Sept
13.	*Freesia alba x leichtlinii*	Freesia	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse or 2.5-5 g/ha + Pulse. Apply just on flowering at corm exhaustion.	July – Aug
14.	*Fumaria capreolata*	Climbing Fumitory	Hand remove seedlings in good bushland areas or spray selectively.	July – Aug
15.	*Gladiolus angustus*	Long Tubed Painted Lady	Spot spray metsulfuron methyl 0.2 g/15 L + glyphosate 1% + Pulse in degraded sites.	July – Aug
16.	*Gladiolus undulatus*	Wavy Gladiolus	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse or 2.5-5 g/ha + Pulse. Herbicide application should be just on corm exhaustion. Physical removal can result in spread of cormels. Once the parent corm is killed cormels in the soil tend to lose dormancy and germinate.	July
17.	*Ixia maculata*	Yellow Ixia	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse or 2.5-5 g/ha + Pulse. Apply just on flowering at corm exhaustion. Read the manufacturers' labels and material safety data sheets before using herbicides.	July - Sept
18.	*Lachenalia aloides*	Soldiers	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse or 2.5-5 g/ha + Pulse. Apply just on flowering at corm exhaustion.	July - Sept
19.	*Lachenalia bulbifera*	Soldiers	Two small patches in degraded areas – dig out making sure to remove all bulbils.	July - Aug

Species Name		Common Name	Management Strategy	Timing (optimal)
20.	*Lachenalia reflexa*	Soldiers	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse (2.5g-5 g/ha).	July - Aug
21.	*Leptospermum laevigatum*	Coast Teatree	Hand pull seedlings. Fell mature plants. Resprouting has been recorded in some areas. Where resprouting has been observed, apply 250 ml Access in 15 L of diesel to bottom 50 cm of trunk (basal bark).	July - Oct
22.	*Moraea flaccida*	One-leaf Cape Tulip	Spot spray metsulfuron methyl 0.2 g/15 L or chlorsulfuron 0.2 g/15 L + Pulse or 2.5-5 g/ha + Pulse or 2,2 DPA 55 g/10 L + Pulse.	July - Aug
23.	Melinis repens	Red natal grass.	Prevent seed set. Cut out small populations. Spray 13 ml/L (3.3-6.6 L/ha) Fusilade Forte + wetting agent. In less sensitive areas spot spray glyphosate at 1-2% solution + surfactant prior to flowering and seed set.	Nov - Dec
24.	*Olea europaea*	Olive	Hand pull or dig out seedlings and small plants ensuring removal of all roots. For mature plants cut to base and paint 50% glyphosate or apply 250 ml Access in 15 L of diesel to base 50 cm of trunk (basal bark). Monitor sites for seedling recruitment.	March – May and Oct - Dec
25.	*Pelargonium capitatum*	Rose Pelargonium	Hand pull isolated plants taking care to remove the entire stem as it can reshoot from below ground level. Spot spray metsulfuron methyl 5 g/ha + Pulse. Easily controlled after fire.	June - Oct
26.	*Pennisetum clandestinum*	Kikuyu Grass	Difficult to manually control as all rhizomes must be removed. Spray with 1% glyphosate or Fusilade Forte at 16mL/L + wetting agent. 2-3 sprays over a single growing season are often required. Use unplanned fire events to effectively control regrowth.	Nov - Jan
27..	*Schinus terebinthifolius*	Brazilian Pepper	Hand pull seedlings ensuring removal of all root material. Stem inject older plants using 50% glyphosate or basal bark with 250 ml Access in 15 L of diesel to bottom 50 cm of trunk during summer. Avoid root disturbance until trees are confirmed dead.	Dec - March
28.	Trachyandra divaricata	Dune Onion Weed	Only control when native vegetation has established. Manually remove isolated or small infestations prior to flowering. Wipe with 50% glyphosate solution before flowering. For dense infestations in degraded areas spot spray 0.4 g chlorosulfuron plus 25 ml wetting agent in 10 L of water when plants actively growing.	June - August
29.	*Vicia sativa*	Common Vetch	Hand remove small/isolated populations. Lontrel 10 mL/10 L + wetting agent provides effective control in early growth stages, otherwise apply metsulfuron methyl 0.1 g/10 L + wetting agent.	July - Sept
30.	*Watsonia meriana*	Watsonia	Dig out isolated plants	June - Sept

Appendix 5 Implementation of the 2005 – 2010 Management Plan.

	RECOMMENDATIONS	Implemented Yes/No/ Partially
MANAGEMENT BOUNDARIES		
1	Continue to manage on the basis of established zones within Shenton Bushland.	Yes
REHABILITATION		
2.	Reconstruct Very Poor condition bushland in the sites shown in Map 6, except “The Barrens”.	Partially
3.	Remove or spread 80 soil and rubbish mounds.	No
4.	Continue Monitoring of Bushland Condition, Weed distributions & abundance.	Yes
REVEGETATION		
5.	Develop Rehabilitation Plans for all sites to be intensively managed. These should include as a minimum the boundary of works, a planting list and native plants present that require protection.	Partially
6.	Use only plant species for rehabilitation if they would have naturally occurred at the sites.	Yes
7.	Continue to compile a comprehensive list of species present, including fungi.	Yes
8.	Use only forms of plants that would have naturally occurred onsite.	Yes
9.	Document all rehabilitation undertaken including weed control and tree planting.	Yes
10.	Establish a monitoring program for indigenous species, with the location and abundance of species in very low abundance recorded.	No
11.	Document any native species that are re-introduced to the site.	Yes
WEED CONTROL		
12.	Use an integrated approach to weed control including herbicides, manual removal, modifying microclimates (in terms of shade, moisture etc) and biological controls.	Yes
13.	Undertake annual informal surveys for *Chasmanthe floribunda, Gladiolus undulatus, Lachenalia bulbifera and Leptospermum laevigatum* to ensure they do not become established.	Yes
14.	Continue to control the following weeds as a high priority: *Ehrharta calycina, Euphorbia terracina; Ferraria crispa, Freesia leichtlinii, Lachenalia reflexa, Moraea flaccida, Pelargonium capitatum and Watsonia meriana.*	Yes
15.	Control Weeds in Zones A & B as a priority.	Yes
16.	Continue to liaise with the Department of Defence regarding weeds adjacent to Shenton Bushland, within Irwin Barracks.	No
DISEASE MANAGEMENT		
17.	Establish standard hygiene protocols for Council operations within bushland reserves, including monitoring.	Yes
18.	Ensure that any soil or plant material used for bushland restoration is disease free.	Yes
FIRE MANAGEMENT		
19.	Ban all open fires at all times should be instigated within the study area.	Yes
20.	Reduce fuel loads through control of weeds such as Perennial Veldt Grass.	Yes

21	Suppress and contain any wildfires within the study area as quickly as possible.	Yes
22.	Document fire history with the extent of fires mapped, and dates and causes recorded.	Yes
23.	Control access into burnt areas as soon as possible after the fire. Access to any burnt areas should be limited to management vehicles only for the first six to twelve months. Seed germination and resprouting of vegetation or regeneration should be monitored for a year following fire.	Yes
24.	Revise weed control works after any fires to ensure potential damage to resprouting and germinating plants are minimised and efficiencies are maximised.	Yes
25.	Do not establish new tracks during fire fighting operations.	Yes
ACCESS		
26.	Regularly prune along all paths to be retained.	Yes
27.	Develop standards for bushland paths.	Yes
28.	Maintain all bushland paths to satisfactory standard.	Yes
COMMUNITY INVOLVEMENT		
29.	Continue to support the activities of community groups such as the Friends of Shenton Bushland– the form of this support e.g. in terms of training or onsite assistance should be reviewed annually.	Yes
30.	Liaise with Shenton College regarding opportunities for students to be involved in the management of the reserve.	Yes
31.	Liaise with Nyoongar elders as appropriate.	Yes
CULTURAL HERITAGE, INTERPRETATION & EDUCATION		
32.	Develop Interpretation Plan for Shenton Bushland.	No
33.	Upgrade the current information shelter.	Yes
NATIVE ANIMALS		
34.	Maintain tree hollows where possible as refuges for Brushtail Possums.	Yes
35.	Search for any animals in soils mounds or rubbish being removed from the site.	No
FERAL ANIMALS		
36.	Continue to monitor and control of feral animals.	Yes