Priority Reserves Ecological Assessment Report 2018

Prepared for the Shire of Mundaring

Ref: T17027

ecological assessment
& management

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Document Control

Revision	Details	Date	Author	Reviewer
Rev 0	Draft for Internal Review	27/04/2018	J. Grehan	P. Maher
Rev A	Draft for Submission to Client	30/04/2018	J. Grehan	B. Moran
Rev B	Revision addressing client comments	7/05/2018	J. Grehan	B. Moran
Rev C	Formatting, final edit and addition of reserve outlines	31/05/2018	B. Moran	

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Executive Summary

In November 2017 the Shire of Mundaring commissioned Terratree Pty Ltd to undertake a comprehensive ecological assessment of 54 of their higher priority nature reserves. These reserves comprised close to 900ha of native vegetation within the Shire of Mundaring Local Government Area. This assessment was commissioned to gather field data on ecological and logistical variables including significant trees, weeds, *Phytophthora* Dieback and vehicle access. The overarching objective of the reserves assessment was to collect a broad spatial dataset for the selected variables to inform planning and target resources for environmental management across the reserves network within the Shire of Mundaring.

The scope of the assessment was to map and classify all tracks, undertake a Broadscale *Phytophthora* Dieback assessment, identify and map significant weed populations, and to report on evidence of feral animals and rubbish dumping. Terratree was also to provide the Shire with the spatial data resulting from the assessment and prepare a short report which presents the key findings of the assessment and the individual results for each reserve.

A desktop assessment was undertaken prior to work in the field in order to establish background information about the assessment area and surrounding landscape, and to review previous reports and data. Maps of the area were accessed through the Dieback Information Data Management System (DIDMS). DIDMS maps use data from the Vegetation Health Services Laboratory to display Dieback sample results and occurrence mapping from previous assessments.

The reserve field assessment was conducted between December 2017 and April 2018 by Terratree ecologists and DBCA registered Dieback Interpreters Joseph Grehan and Kelby Jennings. The field assessment was conducted in two phases; first all tracks within each reserve were surveyed by 4WD to capture GPS track data while carrying out an initial reconnaissance of environmental factors. Subsequently, the reserves were comprehensively assessed on foot to gather accurate data related to significant trees, weed distribution, Dieback Occurrence, evidence of feral animals and rubbish dumping. The spatial data on track maps, as well as the data on weed and disease occurrence, were recorded on hand-held Global Positioning Satellite (GPS) units.

Overall, the reserve assessment found that Dieback is having a very significant impact on species diversity and ecosystem function within most of the priority reserves assessed. While some reserves show widespread infestation, other reserves have only a small infested area and require urgent management effort if those areas are to be protected. Often in these instances the topography of the reserve is such that, while the lower slopes and gullies are infested, large uninfested protectable areas are present upslope within their boundaries.

Given the very high impact of Dieback on biodiversity and the limited number of reserves (or parts of reserves) that are protectable against Dieback, the reserve priority ranking is proposed to change. Reserves or areas that do not currently have Dieback must be managed carefully to limit access and activities that would introduce Dieback. As plant diversity declines in reserves with Dieback, these Dieback-free areas will become increasingly critical in preserving native plant species and providing a refuge for wildlife.

In many of the reserves assessed Dieback signage was outdated or absent, and in some cases when the standard protocol signage was present, it was incorrectly located. Public vehicular access is a major vector in the spread of the Dieback pathogen and this problem is compounded in reserves with inadequate signage. Accurate Dieback mapping and a significant increase in signage would be required to address this issue. Firebreak maintenance activities requiring

ground disturbance should also be planned so they are undertaken in a manner that will minimise the risk of spreading Dieback.

A total of 31 exotic (weed) species were recorded during the assessment. Of these, 8 were determined to represent a Serious Biodiversity Threat. While weeds are widespread across the priority reserves assessed, only three reserves received the 'very high' severity rating. Cookes Brook and Gilfellon Reserves have substantial populations of Blackberry which is a Declared Plant under the *BAM Act*, while Mandoon Reserve has populations of the Declared Plants Arum Lily (*Zantedeschia aethiopica)* and Bridal Creeper *(Asparagus asparagoides)*. The Declared Plant Cottonbush *(Gomphocarpus fruticosus)* was recorded in several reserves. Most of the reserves assessed received the 'low' severity rating, having few or scattered Eastern States Acacias or Tagasaste.

In some areas where the vegetation condition is 'degraded', Eastern States Acacia species are providing habitat and protecting soil from erosion. Some non-native Acacia species such as *Acacia podalyriifolia* and *A. iteaphylla* have become naturalised in the Perth Hills. In several locations Dieback has greatly decreased native vegetation cover providing an opportunity for weed species such as Perennial Veldt Grass (*Ehrharta calycina)* or Watsonia (*Watsonia meriana var. bulbillifera)* to proliferate, thus increasing the fuel load.

A total of 9253 significant trees were recorded during the assessment. Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) comprised the majority (91.6%) of trees, with Blackbutt (*Eucalyptus patens*), Flooded Gum (*Eucalyptus rudis*) and Wandoo (*Eucalyptus wandoo*) also represented.

Fox dens were observed at several reserves and a live fox was spotted at Cameron Road Reserve. A dead fox was also recorded at Gilfellon Reserve.

Rubbish dumping was not found to be a widespread issue due to controlled access in a large proportion of the reserves assessed. Asbestos dumping was recorded in Strettle Road Reserve and Hovea Conservation Park.

Controlled access has also contributed to limiting soil erosion along tracks and watercourses within the reserves. While Quail Street Reserve has some significant erosion occurring along tracks in the eastern portion of the reserve due to the steepness of some of the slopes, soil erosion in the reserves did not appear to be a significant issue.

Recommended Nature Reserve Management Strategy

It is recommended that the Shire of Mundaring adopt the following strategies for management and rehabilitation of nature reserves:

- In directing limited resources for natural area management for the best ecological outcomes, the Shire should follow the principles of the 'Bradley Method of Bush Regeneration'. This approach seeks to consolidate the reserves and areas in the best condition first and this approach can also be applied to the management of Dieback.

- Declared Plant weed populations should be eradicated as soon as possible. Areas with Blackberry populations, especially Cookes Brook, should be revegetated with appropriate wetland species after weed eradication.

- Dieback management should be considered at least as important as weed management. An integrated Dieback and Weed Management Plan and Rehabilitation Strategy, or more holistic Biodiversity Strategy, should be developed and implemented.

- A comprehensive Dieback assessment should be undertaken of those reserves that have been identified as having protectable areas. Once identified, the protectable areas should be assessed for access restrictions, and treated as environmentally sensitive areas requiring greater Dieback hygiene practices from staff and contractors.

- Standard Dieback signage developed by Project Dieback (South Coast NRM 2008) should be installed in priority reserves that have areas of protectable vegetation.

- Reserve management plans should be developed or updated for high priority reserves to integrate Dieback control, weed management, bushfire risk management and other Shire activities.

- The Shire should seek to share information and consider partnerships with tertiary institutions or organisations (such as the Dieback Working Group) to trial Dieback treatment and restoration methods.

- Shire staff should use GPS technology to record weed and Dieback treatments and maintain the usefulness of GIS information for targeting reserve management resources.

1. Introduction

In November 2017, the Shire of Mundaring (hereafter referred to as 'the Shire') commissioned Terratree Pty Ltd (Terratree) to undertake a comprehensive ecological assessment of 55 reserves, comprising 863ha of native vegetation within the Shire of Mundaring Local Government Area (LGA) (collectively referred to as the 'assessment area'). This assessment was commissioned to gather field data related to a number of ecological and logistical variables including significant trees, weeds, *Phytophthora* Dieback and vehicle access. A primary objective of the reserves assessment was to collect a comprehensive spatial dataset for the selected variables to inform planning and environmental management across the reserves network, and direct limited staff and resources to best effect. Priority management actions have been identified for each assessed reserve.

Project Location

The Shire of Mundaring LGA is located approximately 30km east of Perth, Western Australia, encompassing areas of the Darling Scarp and Northern Jarrah forest. The assessment area covers 54 separate reserves within the LGA boundary and is comprised of a variety of vegetation communities.

Scope

The scope of the assessment was to map and classify all tracks, undertake a broadscale assessment for *Phytophthora* Dieback (Dieback), identify and map significant weed populations, and to report on evidence of feral animals and rubbish dumping.

Prior to work in the field a desktop study with the following components was conducted:

- A review of existing relevant reports related to reserves and environmental characteristics present within the Shire;
- Analysis of the Dieback Information Delivery Management System (DIDMS) database for historical *Phytophthora* occurrences and probability mapping for Dieback occurrence within the Shire;
- Identification of possible disturbance impacts as a result of public access i.e. rubbish dumping and ground disturbance.

The field assessment of the nominated reserves required mapping and recording of the following:

- All vehicle tracks and firebreaks using hand-held GPS units;
- Substantial weed infestation or key weed species such as Weeds of National Significance and Western Australian Declared Plants (particularly eastern states wattles, Tagasaste, Cottonbush, Watsonia, Patterson's curse and lavender);
- Dieback (*Phytophthora cinnamomi*) infestations and significant impacts of Marri Canker (*Quambalaria coyrecup*);
- Significant fauna habitat e.g. nesting hollows suitable for Black Cockatoos and trees with a Diameter at Breast Height >500mm;
- Signs of feral animals (scats and burrows) and erosion; and
- Hazardous and green waste dumping;

Finally, Terratree was to provide the Shire with the spatial data resulting from the assessment and prepare a short report for each assessed reserve, which presents the key findings of the assessment and recommends priority management actions for each reserve.

2. Background

Phytophthora Dieback

Dieback is a soil borne pathogen with a range of hosts in the southwest of WA, predominantly from the Proteaceae, Ericaceae, Myrtaceae, Xanthorrhoeaceae and Fabaceae plant families. While some plant species are resistant, others are susceptible to the disease caused by the pathogen, which can result in chlorosis, dieback and usually death (Wills and Keighery, 1994).

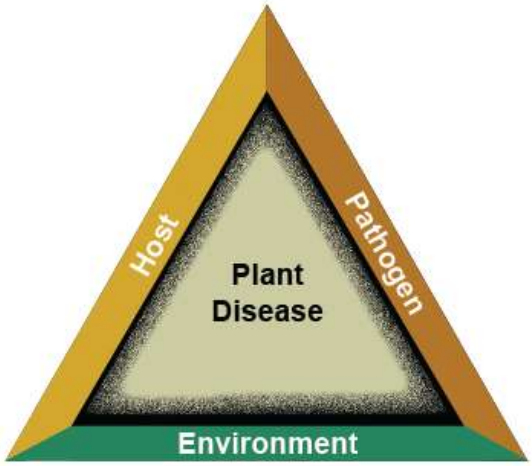
According to the most recent Western Australian State of the Environment Report, Dieback (listed as a Priority 1 threat) is the third greatest threat to biodiversity after salinity and climate change (EPA, 2007). It is considered a more serious threat than weeds, clearing of native vegetation, acid sulphate soils and soil erosion. The effect of Dieback is significant in WA because:

- Over 40% (2,300) of the native plant species, and half of endangered plant species, in the south-west of WA are susceptible to the pathogen;
- Changes in the composition and structure of floral communities as a result of Dieback have impacts throughout the ecosystem, including impacts on the indigenous fauna; and
- Dieback can lead to significant soil erosion as a result of the loss of susceptible vegetation.

Dieback is spread through the movement of water and soil within the landscape. Major vectors of Dieback include, but are not limited to, wet soil adhering to vehicle tyres/tracks and earthmoving equipment. Therefore, quarantine management procedures are an effective tool to reduce the spread of Dieback as a result of earthmoving activities.
Three variables are required to have disease expression caused by Dieback:

- **Host -** plant species present that are susceptible to *Phytophthora* spp. (i.e. *Banksia*, *Hakea*, *Leucopogon*, *Daviesia* spp.);
- **Pathogen -** The *Phytophthora* pathogen must be present either residing in susceptible or resistant species; and
- **Environment** - Soil temperatures 15-30° C and pH 5-6 (acidic) for *P. cinnamomi*. Some species including *P. multivora* can survive in alkaline soils (pH 7+).

The disease triangle below represents the three variables required for disease expression caused by Dieback.



The Dieback pathogen is widespread in areas with greater than 800mm of annual rainfall, less extensive in areas that receive between 600 – 800mm and mainly restricted to water-gaining sites in areas that receive 400 – 600mm. The pathogen very rarely occurs in areas receiving less than 400mm. In WA, Dieback is a significant environmental issue between Geraldton in the Midwest and Esperance on the South Coast and is widespread in the Southwest region.

Regulatory Context

2.1.1. Phytophthora Dieback

Phytophthora Dieback ('Dieback') management is required under several regulatory mechanisms:

- *Phytophthora* Dieback is listed as a Key Threatening Process with the Federal Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Projects being assessed under the *Environmental Protection Act* (1986); and
- *Environmental Protection Act* 1986 (EP Act) Part V S.50A "Serious Environmental Harm" provisions.

2.1.2. Introduced Flora (Weeds)

At a national level, there are 32 weed species listed as Weeds of National Significance (WONS)(DoE, 2015). *The Commonwealth National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance* (2012) describes the broad goals and objectives in managing these species.

Within Western Australia, the *Biosecurity and Agriculture Management Act 2007* (BAM Act, DAFWA, 2007) seeks to prevent serious animal and plant pests and diseases from entering the State and becoming established, and to minimise the spread and impact of any that are already present. The BAM Act (and associated regulations) replaces the *Agriculture and Related Resources Protection Act 1976* (and associated regulations). The BAM Act regulations were enacted on 1 May 2013, placing organisms into four categories:

- Permitted organism (listed under Section 11) – permitted in Western Australia subject to regulations;

- Prohibited organism (listed under Section 12) – prohibited in Western Australia subject to regulations (i.e. is a Declared Pest for the whole of State);
- Permitted organism: permit required (under regulation 73) – must not be imported unless in accordance with an import permit ; and
- Permitted organism: Declared Pests (under Section 22) – can apply to part of or the whole of the State.

The current Western Australian Organism List (WAOL), published 1 May 2013 (DAFWA, 2013), lists organisms in each of these categories. Unlisted organisms must not be imported (unless in accordance with an import permit and regulations). The BAM Act further categorises Declared Pests in one of three control categories:

- C1 – Exclusion;
- C2 – Eradication; or
- C3 – Management.

A description of the categories can be found in **Table 1** below.

Table 1: Control categories for Declared Pests

Declared Plant Category	Description
C1 - Exclusion	Pests assigned to this category are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 - Eradication	Pests assigned to this category are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 - Management	Pests assigned to this category are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

3. Existing Environment

Biogeography

The assessment area is located within the Northern Jarrah forest (JF1) subregion, in accordance with the Interim Biogeographic Regionalisation for Australia (IBRA). The IBRA system identifies 89 bioregions and 419 subregions across Australia based on climate, geology, landforms, and characteristic vegetation and fauna.

Mitchell and Williams (2002) describe the Northern Jarrah Forest Subregion in "*A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions"* (CALM 2002) as follows:

> Duricrusted plateau of Yilgarn Craton, characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by woodlands of Wandoo - Marri on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands. The climate is Warm Mediterranean. The Northern Jarrah Forest subregion incorporates the area east of the Darling Scarp, overlying Archaean granite and metamorphic rocks of an average elevation of 300 m, capped by extensive lateritic duricrust, dissected by later drainage and broken by occasional

granite hills. In the east the laterite becomes deeply dissected until it compresses isolated remnants. Rainfall is from 1300 mm on the scarp to approximately 700 mm in the east and north. Vegetation comprises Jarrah - Marri forest in the west with Bullich and Blackbutt in the valleys grading to Wandoo and Marri woodlands in the east with Powder bark on breakaways. There are extensive but localised sand sheets with *Banksia* low woodlands. Heath is found on granite rocks and as a common understorey of forests and woodlands in the north and east. The majority of the diversity in the communities occurs on the lower slopes or near granite soils where there are rapid changes in site conditions.

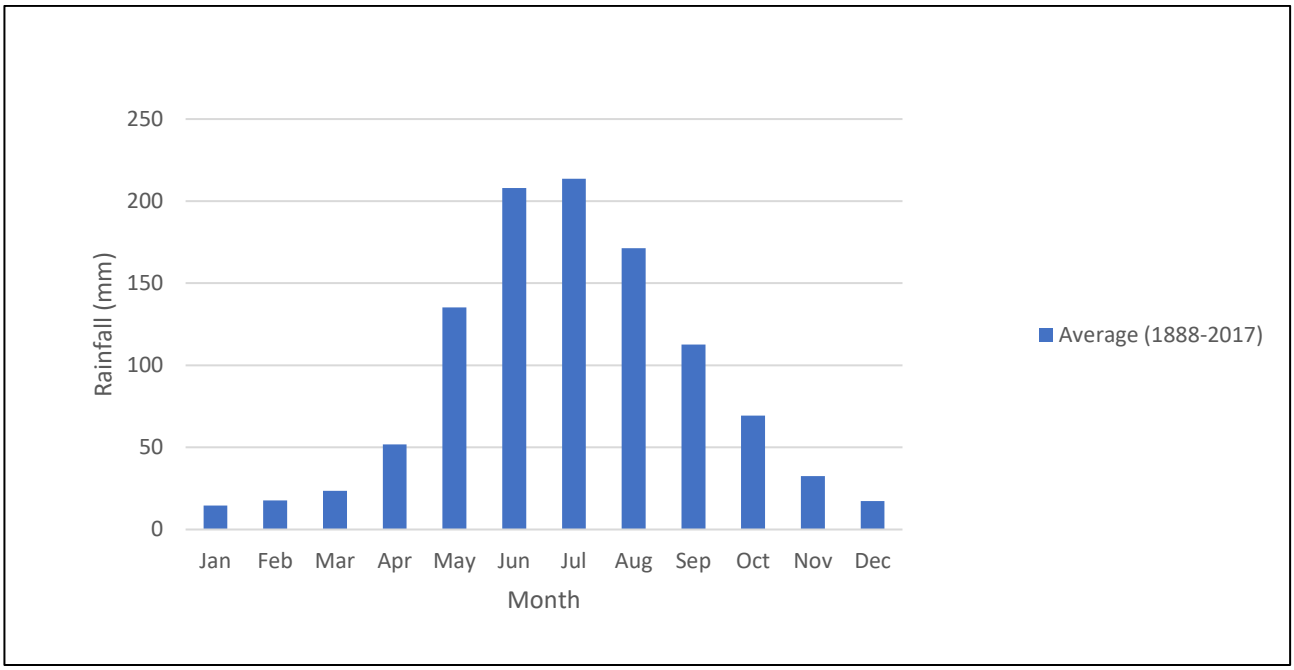
Prominent land uses within the subregion include forestry (native forests), conservation, grazing (improved pastures), cultivation (dry land agriculture), forestry (plantations), and mining. There are lesser areas of rural residential, easements for roads, power lines etc., and urban land use.

Climate

The assessment area experiences an Interior Mediterranean climate under the Köppen climate classification system, characterised as mild, with dry, hot summers, where the warmest month averages >22^{0}C, with a winter-dominant rainfall (Pidwirny, 2011).

The assessment area receives an average of 1070.1mm rainfall per annum, as recorded in the Bureau of Meteorology Climate Data (BoM, 2017), with the majority of rainfall occurring April-September (**Graph 1**). Dieback is likely to be widespread in areas receiving over 800mm of rainfall per annum.

Although climate change is expected to continue impacting on the timing and volumes of rainfall, in addition to higher average temperatures and changed bushfire behaviour, assessment of climate change impacts was beyond the scope of this study.



Graph 1: Average monthly rainfall over the assessment area (BoM, 2018)

Flora and Vegetation

The assessment area is located in the Darling Botanical District of the South-western Botanical Province and is characterised by an Open Forest of *Eucalyptus marginata* (Jarrah) with a mixture of *Corymbia calophylla* (Marri) and some areas of *E. wandoo* (Wandoo) open forest. Species richness is greater than the western Jarrah forest as the area is located at the interface between the northern Jarrah forest and Wheatbelt regions (Mattiske 2005).

Vegetation complexes within the Darling Scarp and Plateau were mapped by Mattiske and Havel (1998) as part of the Regional Forest Agreement process (RFA). In accordance with this mapping, there are four vegetation complexes occurring within the assessment area. The dominant vegetation complexes within the assessment area, Dwellingup 2 and Yarragil 1, are generally highly interpretable for Dieback, with indicator species including *Banksia grandis*, *Persoonia longifolia* and *Xanthorrhoea* sp. being dominant elements of the vegetative composition. The Murray 2 and Helena 2 complexes, which occur in small areas within the assessment area, are less interpretable due to a dominance of resistant species but may be interpretable in localised areas with sufficient numbers of *Xanthorrhoea* sp., *Hakea* sp. and *Macrozamia riedlei* present to inform diagnosis.

Table 2: Regional Vegetation Complexes (Mattiske and Havel, 1998)

	Dwellingup (D2)	Yarragil (Yg1)	Murray (My2)	Helena (He2)
Geographic region	Subhumid North, East of Armadale and Jarrahdale	Subhumid North, East of Armadale and Jarrahdale	Semiarid North, South East of Mundaring	Arid North, North of Mundaring (Avon NP)
Landform Description	Upland ridges and spurs within mildly undulating northern Darling Plateau	Slopes of a minor valley moderately incised into the northern Darling Plateau	Slopes of a major valley moderately deeply incised into the Darling Plateau	Mid slopes of a major valley deeply incised into the Darling Plateau
Soils	Pale yellow to red brown gravelly sands and sandy loams, with frequent lateritic ironstone outcrops	Pale yellow brown gravelly sands, with occasional ironstone outcrop	Dark brown gravelly loams over red brown loamy clay, occasional granitic or doleritic outcrop	Bare rock or skeletal sandy loams
Soil Hydrology	Mildly water shedding via subsoil, good infiltration and storage capacity (as deep profile)	Mildly water shedding, with good infiltration and storage capacity	Strongly water shedding, with moderate infiltration and storage capacity	Very strongly water shedding with very low infiltration and storage capacity

	Dwellingup (D2)	Yarragil (Yg1)	Murray (My2)	Helena (He2)
Over Storey	Open Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla*	Open Forest of *Eucalyptus marginata* subsp. *marginata* with some *Corymbia calophylla*	Woodland of *Eucalyptus wandoo* with some *Corymbia calophylla*	Lithic Complex, Herbfields, Heath or Open Woodland of *Eucalyptus wandoo, Corymbia calophylla* and *Allocasuarina huegeliana*
Second Storey	*Allocasuarina fraseriana Banksia grandis* and *Persoonia longifolia*	Strong development of *Allocasuarina fraseriana Banksia grandis* to a lesser degree *Persoonia longifolia*	No second storey	No second storey
Shrubs and Herbs	*Adenanthos barbiger, Hovea chorizemifolia, Hakea lissocarpha, Leucopogon capitellatus, Leucopogon propinquus, Macrozamia riedlei, Styphelia tenuiflora* and *Patersonia rudis* subsp. *rudis*	*Grevillea wilsonii, Styphelia tenuiflora, Adenanthos barbiger, Hovea chorizemifolia, Patersonia rudis subsp. rudis, Lepidosperma squamatum, Lechenaultia biloba* and *Hakea ruscifolia*	*Hakea lissocarpha, Diplolaena drummondii, Hypocalymma angustifolium, Lepidosperma squamatum, Baeckea camphorosmae, Gastrolobium calycinum* and *Macrozamia riedlei*	*Borya sphaerocephala, Grevillea bipinnatifida, Hakea undulata, Hakea elliptica, Hakea lissocarpha, Trymalium ledifolium* and *Hakea undulata*

4. Methods

The reserves assessment was conducted in a two-stage process: a desktop review of relevant information regarding site characteristics and previous relevant assessments and literature, followed by a field assessment to observe ecological values, record spatial data and collect photographs of relevant features.

Desktop Review

A desktop assessment was undertaken prior to the field assessment to gather background information about the assessment area and surrounding landscape and review previous reports and data. Maps of the area were accessed through the Dieback Information Data Management System (DIDMS). DIDMS maps use data from the Vegetation Health Services Laboratory to display Dieback sample results and occurrence mapping from previous assessments undertaken in the area. The desktop assessment also sought to:

- Identify access to the assessment area and internal tracks;
- Examine topography and drainage of the assessment area and broader landscape;
- Identify possible disease vectors e.g. tracks, utility corridors and ground disturbance;
- Determine the location of high risk areas (e.g. areas of high disturbance and water-gaining sites); and
- Review previous reports and other relevant literature.

Field Assessment

The reserve field assessment was conducted between December 2017 and April 2018 by Terratree ecologists and DBCA registered Dieback Interpreters Joseph Grehan and Kelby Jennings. The field assessment was conducted in two phases; first all tracks within each reserve were surveyed by 4WD to capture GPS track data while carrying out an initial reconnaissance of environmental factors. Subsequently, the reserves were comprehensively assessed on foot to gather accurate data related to significant trees, weed distribution, Dieback occurrence, evidence of feral animals and rubbish dumping. The spatial data on track maps, as well as the data on weed and disease occurrence, were recorded on hand-held Global Positioning Satellite (GPS) units.

4.1.1. Significant Tree Assessment

The significant tree assessment categorised significant trees in accordance with the Black Cockatoo referral guidelines for breeding trees (EPBC, 2012), which are defined as trees with a diameter at breast height (d.b.h.) of 500mm or greater, of the following species (expected to occur within the assessment area):

- Jarrah (*Eucalyptus marginata*);
- Marri (*Corymbia calophylla*);
- Wandoo (*Eucalyptus wandoo*);
- Flooded Gum (*Eucalyptus rudis*); and
- Blackbutt (*Eucalyptus patens*).

Trees which do not meet this definition of significant may still possess biodiversity values in terms of fauna habitat and foraging value, including trees with a d.b.h. of less than 500mm and introduced, non-native species such as *Pinus* spp.

Significant tree location data were captured using handheld GPS units, with tree species, estimated d.b.h. (to nearest 100mm), health (healthy, stressed or dead) and the presence of potential nesting hollow(s) also recorded.

4.1.2. Weed Assessment

Weed distribution data were captured using handheld GPS units with weed species, approximate population size and extent, growth habit and Serious Biodiversity Impact ratings recorded. The qualitative assessment of severity is based on the descriptions in **Table 3** below:

Table 3: Qualitative Weed Severity Ratings Descriptions

Weed Severity Category	Description
Low	Scattered non-invasive woody perennial weeds including some Eastern States *Acacia* spp. and Tagasaste or small populations of herbaceous perennials or annuals
Medium	Widespread perennial weeds such as Eastern States *Acacia* spp. and Tagasaste or multiple populations of herbaceous perennials or annuals
High	Dominant perennial weeds such as Eastern States *Acacia* spp. and Tagasaste or multiple populations of herbaceous perennials or annuals
Very High	Declared weeds or Serious Environmental weeds present and abundant i.e. Blackberry, Bridal Creeper, Watsonia, Cottonbush

4.1.3. Broadscale Dieback Assessment

The Broadscale Dieback assessment was implemented in accordance with the *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the Department* (FEMD, 2015).

During a Broadscale assessment, Dieback occurrence data is collected to enable a generalised review of Dieback occurrence and severity within the assessment area. Data from a Broadscale assessment has a moderate confidence level and is not suitable for operational purposes (DPaW 2015).

The *Phytophthora* occurrence categories, impacts and syndromes (FEMD, 2015) are presented in **Table 4**. Native vegetation is assessed by observing the factors described to determine the appropriate category.

The Dieback Interpreters' Manual categorises land that has been cleared of native vegetation (such as farmland) as 'excluded' from assessment. Non-vegetated areas that are 'excluded' from assessment include pasture, pits, easements, development, large roads (sealed and unsealed), permanent flooding and parkland tree stands. **Table 4** presents the *Assessability of vegetated and non-vegetated areas*, which includes the Excluded category (DPaW, 2015).

The 'temporarily uninterpretable' category is allocated to areas of native vegetation which have been disturbed, but native vegetation will recover over time and may become interpretable and therefore mappable. Examples of temporarily uninterpretable areas include vegetation that has been impacted by fire, timber harvesting, flooding or mining with subsequent rehabilitation. The recovery time for temporarily uninterpretable areas may be longer than 3 years (DPaW, 2015). Excluded areas are distinguished from 'temporarily uninterpretable' areas by the fact that excluded areas do not generally retain the ability to regenerate and eventually become mappable.

The Keighery vegetation disturbance scale (DPaW 2013) presented in **Table 5** was used to determine the interpretability of the vegetation. Areas with a vegetation condition rating of 1-3 (Pristine - Very Good) are considered to be assessable. In addition, there must be enough disease indicator species present to enable a diagnosis of the disease status. An area with a vegetation condition rating of 4 (Good) is possibly assessable; however, it is up to the Interpreter's discretion. Temporarily uninterpretable and excluded areas are given a condition rating of 5 or 6 (Degraded or Completely Degraded).

Reserve priority ranking in Table 9 is modified to reflect the very high impact of Dieback on biodiversity and the limited number of reserves (or parts of reserves) that are protectable. As plant diversity declines in reserves with Dieback, these Dieback-free areas will become increasingly critical in preserving native plant species and providing a refuge for wildlife. Reserves or part of reserves that do not currently have Dieback and are protectable must be considered high priority and managed more carefully to limit access and activities that would introduce Dieback.

Table 4: Assessability of vegetated and non-vegetated areas (as cited in DPaW, 2015)

	Phytophthora occurrence category	Typically present	May be present
Naturally vegetated areas Keighery disturbance rating of 3 or less. *Phytophthora* occurrence categorisation is possible. Small un-vegetated areas can exist and may be included in the assessment area considering total environmental context.	**INFESTED**	Dead and dying reliable indicator species	Healthy reliable indicator species. Indicator Species Deaths (ISDs) that have been killed by other agents
	UNINFESTED	Healthy reliable indicator species	ISDs that have been killed by other agents
	UNINTERPRETABLE	Very few reliable indicator species	Occasional reliable indicators, but too few for *Phytophthora* Dieback interpretation
	NOT YET RESOLVED	Usually reliable indicator species in an environment not favourable to disease development	Negative sample results for all *Phytophthora* species
Vegetation structure temporarily altered. *Phytophthora* occurrence assessment is will be possible when vegetation structure recovers. Recovery times will be variable depending on severity and type of disturbance.	**TEMPORARILY UNINTERPRETABLE**	Indicator species masked by disturbance typically from fire, harvesting, temporary flooding, poisoning.	Occasional reliable indicator species, but disturbance prevents accurate placement of *Phytophthora* occurrence
Road disturbance area	**DISEASE RISK ROAD (DRR)**	Unformed track with shoulders of interpretable vegetation	Shoulders and batters with regenerated vegetation. Incipient infestation
Vegetation structure severely altered. Keighery disturbance rating 5 or greater. Phytophthora occurrence assessment is not possible. Can be determined by desktop assessment (aerial photo). Small vegetated areas can exist and may be excluded from the assessment area considering total environmental context.	**EXCLUDED**	Pasture, pits, easements, infrastructure, large roads (sealed and unsealed) permanent flooding, plantations, parkland tree stands.	Sporadic reliable indicator species

Table 5: Keighery (1994) Vegetation Disturbance Scale and Assessability (as cited in DPaW, 2015)

Assessability	Scale		Condition
Assessable	1	Pristine	Pristine or nearly so, no obvious signs of disturbance
	2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species
	3	Very Good	Vegetation structure altered with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
Possibly assessable, discretion required	4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, Dieback and grazing.
Not assessable or excluded from assessment	5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of aggressive weeds, partial clearing, Dieback and grazing.
	6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

Protocols for Identifying Protectable Areas

According to Dieback Interpreters Guidelines (DPaW 2015), the following primary criteria are used to define 'Protectable Areas' as those that:

- Have been determined to be free of the *Phytophthora* spp. pathogen by a registered Dieback Interpreter (all susceptible indicator plant species are healthy and no plant disease symptoms normally attributed to *Phytophthora* Dieback are evident);
- Consists of areas where human vectors are controllable (e.g. not an open road, private property); and
- Are positioned in the landscape and are of sufficient size (e.g. > 4 ha with axis >100 m) such that a qualified Interpreter judges that the pathogen will not autonomously engulf them in the short term (a period of a few decades); or
- Includes areas of high conservation and/or socio-economic value (for example, a small uninfested area with a known population of a susceptible species of Threatened flora). (DPaW 2015, page 113).

5. Results

Table of Key Findings

Table 9 presents a summary of the key findings of the reserves assessment including weed severity, Dieback occurrence, whether the reserve has protectable vegetation, as well as other issues and comments. Photographs indicating management requirements and specific recommendations for reserves are included in Appendix 1.

Phytophthora Dieback

Disease indicator species observed within the assessment area include representatives of the Proteaceae, Fabaceae and Xanthorrhoeaceae families. *Banksia grandis* and *Xanthorrhoea preissii* were the most abundant disease indicator species within the assessment area, with evidence from *Banksia sessilis var. sessilis, Persoonia elliptica* and *Eucalyptus marginata* also relied upon to inform interpretation. The disease indicator species used during the Broadscale Dieback assessment are listed in **Table 6.**

Table 6: Indicator species observed during the field assessment

Family	Species
Iridaceae	*Patersonia occidentalis*
Ericaceae	*Astroloma*
	Leucopogon propinquus
Fabaceae	*Daviesia decurrens*
Myrtaceae	*Eucalyptus marginata*
Proteaceae	*Banksia dallanneyi* var. *dallanneyi*
	Banksia grandis
	Banksia littoralis
	Banksia sessilis var. sessilis
	Banksia squarrosa
	Grevillea wilsonii
	Hakea amplexicaulis
	Hakea prostrata
	Hakea ruscifolia
Xanthorrhoeaceae	*Xanthorrhoea gracilis*
	Xanthorrhoea preissii
Zamiaceae	*Macrozamia riedlei*

Significant Trees

A total of 9253 significant trees were recorded during the assessment. Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) comprised the majority (91.6%) of trees, with Blackbutt (*Eucalyptus patens*), Flooded Gum (*Eucalyptus rudis*) and Wandoo (*Eucalyptus wandoo*) also represented. Significant trees summary data is presented below in **Table 7**.

Table 7: Significant Tree Summary Data

Species	500-699mm	700-899mm	900-1099mm	1100+mm	Grand Total
Blackbutt (*Eucalypts patens*)	**32**	**10**	**10**	**5**	**57**
Hollow(s) present	0	0	0	0	0
Flooded Gum (*Eucalyptus rudis*)	**84**	**29**	**8**	**11**	**132**
Hollow(s) present		1	1	4	6
Jarrah (*Eucalyptus marginata*)	**2373**	**1134**	**446**	**491**	**4444**
Hollow(s) present	37	76	100	249	462
Marri (*Corymbia calophylla*)	**1894**	**1178**	**491**	**471**	**4034**
Hollow(s) present	17	70	103	253	443
Unknown (dead)	**45**	**126**	**41**	**21**	**233**
Hollow(s) present	2	12	12	21	47
Wandoo (*Eucalyptus wandoo*)	**179**	**112**	**32**	**30**	**353**
Hollow(s) present	8	15	20	22	65
Grand Total	**4607**	**2589**	**1028**	**1029**	**9253**

Weeds

A total of 31 exotic (weed) species were recorded during the assessment. Of these, 8 were determined to represent a Serious Biodiversity Threat . Weed species are listed below in **Table 8**.

Table 8: Weeds recorded during priority reserves assessment
(Weeds determined to represent a Serious Biodiversity Threat are marked * next to common name)

Family	Species	Common Name	Status (Declared pest by DAF)	DPAW Roadside Environment-al Weeds	Priority weed species for Shire of Mundaring	Weed of national significance
Anacardiaceae	*Schinus terebinthifolius*	Brazilian Pepper	Permitted - s11 - Whole of state			
Apocynaceae	*Gomphocarpus fruticosus*	*Cottonbush	Declared pest - s22(2)	Roadside environmental weed		
	Vinca major	Blue Periwinkle	Permitted - s11 - Whole of state			
Araceae	*Zantedeschia aethiopica*	*Arum Lily	Declared pest - s22(2)	Roadside environmental weed	6	
Asparagaceae	*Asparagus asparagoides*	*Bridal Creeper	Declared pest - s22(2)	Roadside environmental weed	6	x
	Agave	Agave	All 98 species permitted - s11			
Bignoniaceae	*Pandorea pandorana*	*Wonga Wonga Vine	Permitted - s11 - Whole of state			
Convolvulaceae	*Ipomoea indica*	Morning Glory	Permitted - s11 - Whole of state			
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart Tree	Permitted - s11 - Whole of state			

Family	Species	Common Name	Status (Declared pest by DAF)	DPAW Roadside Environment-al Weeds	Priority weed species for Shire of Mundaring	Weed of national significance
	Ricinus communis	Castor Oil Plant	Permitted - s11 - Whole of state			
Fabaceae	*Acacia pycnantha*	Golden Wattle	Permitted - s11 - Whole of state	Roadside environmental weed		
	Acacia longifolia subsp. longifolia	-	Permitted - s11 - Whole of state	Roadside environmental weed		
	Acacia iteaphylla	Flinders Range Wattle	Permitted - s11 - Whole of state	Roadside environmental weed		
	Acacia baileyana	Cootamundra Wattle	Permitted - s11 - Whole of state	Roadside environmental weed		
	Acacia decurrens	Early Black Wattle	Permitted - s11 - Whole of state			
	Acacia podalyriifolia	Queensland Silver Wattle	Permitted - s11 - Whole of state	Roadside environmental weed		
	Chamaecytisus palmensis	Tagasaste	Permitted - s11 - Whole of state			
	Robinia pseudoacacia	Robinia	Permitted - s11 - Whole of state			
Iridaceae	*Freesia alba x leichtlinii*	Freesia	Permitted - s11 - Whole of state	Roadside environmental weed	6	
	Watsonia meriana var. bulbillifera	*Watsonia	Watsonia meriana is Permitted - s11 - Whole of state	Roadside environmental weed	5	

Family	Species	Common Name	Status (Declared pest by DAF)	DPAW Roadside Environment-al Weeds	Priority weed species for Shire of Mundaring	Weed of national significance
	Gladiolus caryophyllaceus	Gladiolus	Permitted - s11 - Whole of state	Roadside environmental weed	5	
Meliaceae	*Melia azedarach*	Cape Lilac, White Cedar	Permitted - s11 - Whole of state			
Moraceae	*Ficus carica*	Edible Fig	Permitted - s11 - Whole of state		5	
Myrtaceae	*Leptospermum laevigatum*	*Victorian Tea Tree	Permitted - s11 - Whole of state	Roadside environmental weed	6	
Poaceae	*Arundo donax*	Giant Reed	Permitted - s11 - Whole of state	Roadside environmental weed		
	Cenchrus clandestinus	Kikuyu Grass	Permitted - s11 - Whole of state			
	Ehrharta calycina	*Perennial Veldt Grass	Permitted - s11 - Whole of state	Roadside environmental weed	6	
	Paspalum dilatatum	Paspalum Grass	Permitted - s11 - Whole of state			
Rosaceae	*Rubus ulmifolius*	*Blackberry	Declared pest - s22(2)		5	*Rubus fruticosus*
Solanaceae	*Solanum nigrum*	Deadly Nightshade	Permitted - s11 - Whole of state			*Solanum elaeagni-folium*
Typhaceae	*Typha orientalis*	Bulrush	Permitted - s11 - Whole of state		6	

Family	Species	Common Name	Status (Declared pest by DAF)	DPAW Roadside Environment-al Weeds	Priority weed species for Shire of Mundaring	Weed of national significance
			Status of organisms under the *Biosecurity and Agriculture Management Act 2007*.	Roadside Environmental Weeds List. Endorsed by WA's Minister for Environment. Used to prioritise and guide best practice management of weeds on road and rail reserves.	Weed Control Strategy, Shire of Mundaring. Prepared by EcoScape 2002. Ranks priority weeds on scale of 1 to 6, with 6 being highest priority.	32 weeds of national significance have been agreed on by Australian governments.

Feral Fauna

Fox dens were observed at several reserves and a live fox was spotted at Cameron Road Reserve. A dead fox was also recorded at Gilfellon Reserve.

Human Disturbance

Rubbish dumping was not found to be a widespread issue due to controlled access in a large proportion of the in the reserves assessed. Potential asbestos dumping was recorded in Strettle Road Reserve and Hovea Conservation Park.

Erosion

Controlled access has also contributed to limiting soil erosion along tracks and watercourses within the reserves. While Quail Street Reserve has some significant erosion occurring along tracks in the eastern portion of the reserve due to the steepness of some of the slopes, soil erosion in the reserves did not appear to be a significant issue.

Table of Key Findings

Table 9: Key findings of Priority Reserves assessment

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
1	**Alps Street Reserve**	34103	Mount Helena	**Low** Some Watsonia in NE corner otherwise Eastern States *Acacia* spp. scattered along tracks plus Tagasaste and Olive trees.	**Approximately 30% infested**- significant infestations in NE of reserve and along perimeter tracks	**Yes -** possibly large uninfested area in mid and upper slopes portion of reserve which requires a comprehensive Dieback assessment.	There is no Standard Protocol Dieback signage in this reserve and public vehicular access is a significant hygiene issue. Recorded what appears to be two significant Aboriginal heritage trees.
2	**Strettle Road Reserve**	32727	Mahogany Creek	**Low** Some Watsonia on eastern side of smaller reserve north of Strettle Street, Eastern States *Acacia* spp. along Eastern side of large reserve south of Strettle Street	**Smaller north-western portion – approximately 80% infested**. **Larger southern portion approx. 50% infested**,	**Yes** - possibly large uninfested in mid and upper slopes portion of southern reserve which requires a comprehensive Dieback assessment.	Standard Dieback Protocol Signage present but sometimes in the wrong place. Potential asbestos dumps located along the southern boundary of the northern reserve.
3	**Pindalup Reserve**	39853	Wooroloo	**Low** Mainly Eastern States *Acacia* spp. and Tagasaste in the western portion of the reserve adjacent to cleared areas plus	**Predominantly uninfested (5% infested)** Possible small infestation along lower slope track in the north-western portion of the reserve	**Yes** - this reserve is mostly uninfested and protectable. Small possible infestation requires sampling and mapping.	Lots of old car bodies. There is no Standard Protocol Dieback signage in this reserve

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				some scattered Gladiola.			
4	**Superblock (incl. previous wildflower seed Res 36428)**	50018	Glen Forrest	**Medium** Bridal creeper, Freesias and Watsonia prevalent along western boundary track. Otherwise scattered Eastern States *Acacia* spp. along Ryecroft Road and Tagasaste	**Approximately 30% infested**. Significant active disease along Ryecroft Rd which is an upslope infestation otherwise disease is concentrated in lower slopes and gullies. Wildflower Seed Reserve is 90% infested.	**Yes** - possibly large uninfested in mid and upper slopes portion of Superblock reserve which requires a comprehensive Dieback assessment.	There is no Standard Protocol Dieback signage in this reserve and public vehicular access is a significant hygiene issue.
5	**North Darlington Reserves (including Nan Macmillan Reserve)**	6922	Darlington	**Medium** Cottonbush, Wonga Wonga Vine, Brazilian Pepper tree and Kurrajong present along Darlington Rd near the intersection of GEH. Otherwise Eastern States *Acacia* spp. scattered in reserve area east of Darlington Rd. Paspalum grass in drain adjacent to	**Approximately 50% infested**. Nan Macmillan Reserve has very active disease and is approximately 70% infested. The portion south of Oxley Road appears to be uninfested. The area between Lionel and Darlington roads is approximately	**Yes** - the mid and upper slope areas west of Darlington Road which requires a comprehensive Dieback assessment.	Pollution from drain was evident across the road, and possibly emanating from the water treatment plan. The effluent is killing native vegetation downslope west of Darlington Rd. Nan Macmillan Reserve has a very active Dieback. It's interesting to note the species that are surviving and thriving in the infested areas. Some of these species such as *Calothamnus sp. (Either*

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				Ferguson Rd with Freesias and Gladioli present along western boundary.	60% infested. The area south of Oxley Road appears to be uninfested.		*C. quadrifidis* or C. *lateralis) and Hakea trifurcata* are providing foraging habitat that has been lost with the Banksia spp. succumbing to the pathogen. *Grevillea wilsonii* is also thriving in some areas and offers a significant seed resource from which to collect and propagate.
6	**Black Cockatoo Reserves (north)**	20990	Mundaring	**None** This reserve was found to be weed free-probably due to the diligent work of the friends group	**Approximately 70% infested.** Only the upper slope area along the western boundary and north western corner remains Dieback free.	**Yes -** there is some demarcation present but it's out of date and the area requires a comprehensive Dieback assessment.	Standard Dieback Protocol Signage present but sometimes in the wrong place. The migratory protected species the Rainbow Bee-Eater was observed in the reserve. There is a fox den in the north - western portion of the reserve. Herbicide spraying under the powerline was observed to be carless and impacting non-tree species
7	**Black Cockatoo Reserves (mid)**	12422	Mundaring	**Low** Scattered Eastern States *Acacia* spp., Gladioli and Victorian Teatree mainly along the	**Approximately 30% infested.** Infested area mostly in the northern portion of the reserve with smaller	**Yes** - there appears to be a large protectable area in the reserve which requires a comprehensive	Standard Dieback Protocol Signage present but sometimes in the wrong place.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				eastern boundary (Stevens Street).	infestations near the southern and eastern boundary.	Dieback assessment.	
8	**Falls Road Reserve**	12453	Hovea	**Low** Four small Watsonia population plus scattered Eastern States *Acacia* spp. and Freesias in lower areas.	**Approximately 25% infested.** Dieback around the perimeter of the reserve both in upland and lowland areas.	**Yes** - It looks like there is a large uninfested area in mid and upper slopes portion of the reserve, however there is an infestation encroaching from Richardson Road moving downslope. The reserve requires a comprehensive Dieback assessment	Signage is old and located incorrectly. There is no Standard Protocol Dieback signage in this reserve
9	**Hovea Conservation Park**	14163	Parkerville	**Western Reserve- Low** Two small Watsonia populations and some Gladiolas plus scattered Eastern States *Acacia* spp. **Eastern Reserve -Medium** Significant population of Victorian Teatree	**Western Reserve is approximately 50% infested.** Dieback widespread in lower slopes and mid-slope areas especially in the southern portion and along Hedges Road. There is a very active infestation in the northern	**Yes -** there are uninfested protectable areas in both reserves which require a comprehensive Dieback assessment.	There are two old potential asbestos dumps in the northern portion of the western reserve. The material is broken up into small pieces and scattered over a large area. There is no Standard Protocol Dieback signage in this reserve

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				in the south-western portion of the reserve. There are also two Watsonia populations and scattered Eastern States *Acacia* spp	portion of the reserve and along the narrow access corridor to the east. **Eastern Reserve is approximately 70% infested.** Dieback is widespread apart from an uninfested upland area in the northern portion of the reserve.		
10	**Callan Road Reserve**	38224	Hovea	**Low** Scattered Eastern States *Acacia* spp. mainly A. *iteaphylla* and Robinia or Black locust trees.	**Approximately 40% infested.** Dieback widespread in lower slopes and some mid slope areas,	**Yes -** there is a large uninfested protectable area which requires a comprehensive Dieback assessment.	There is no Standard Protocol Dieback signage in this reserve
11	**Binbrook Park**	1847	Darlington	**Low** Wong Wonga vine and Kurrajong trees along north eastern boundary. Some Watsonia and Freesias along southern boundary.	**Approximately 40% infested.** Dieback widespread in eastern portion of the reserve.	**Yes -** there is a large uninfested protectable area which requires a comprehensive Dieback assessment.	There is no Standard Protocol Dieback signage in this reserve

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
12	**Sexton Street Reserve**	10924	Mount Helena	**Low** Mainly Tagasaste along the eastern boundary of the reserve but also Wonga Wonga vine and some *Acacia iteaphylla*.	**Approximately 40% infested.** Dieback widespread in south-eastern portion of the reserve.	**Yes -** there is likely to be an uninfested upper slope area which is protectable and requires a comprehensive Dieback assessment	There is no Standard Protocol Dieback signage in this reserve
13	**Railway Reserve, Hovea - Chidlow**	32484	Hovea, Parkerville, Stoneville, Chidlow	**High** Four populations of Blackberry along with Watsonia and Bridal creeper populations. Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout along with Tagasaste.	**Unknown**- Evidence of Dieback has been recorded along the Railway Reserve but requires a comprehensive linear assessment.	**Yes -** there are likely to be an uninfested areas which are protectable requires a comprehensive linear Dieback assessment. This is especially important where the trail adjoins another reserve.	The Threatened (Declared Rare) species *Acacia aphylla* was recorded between Seaborne Street and Sexton Street. There is no Standard Protocol Dieback signage in this reserve
14	**Mathieson Road Transfer Station**	31053	Chidlow	**Medium** One Blackberry and three Watsonia populations**.** Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout along with Victorian	**Approximately 40% infested.**	**Yes -** there is likely to be an uninfested areas which are protectable in the south-western, north-western and eastern portions of the reserve which require a comprehensive	There is a potential asbestos dump near the western boundary.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				Teatree and Tagasaste. Other weeds include Lavender, Olive and Pine trees.		Dieback assessment	
15	**Rosedale Road Reserve**	22659	Chidlow	**Low** Some Watsonia along Rosedale Road and Eastern States *Acacia* spp around boundary track	**Uninfested**	**Yes -** this reserve is uninfested and protectable	There is no Standard Protocol Dieback signage in this reserve
16	**Thomas Street Reserve**	31066	Mahogany Creek	**Low** Eastern States *Acacia* spp. (predominantly *A. iteaphylla*), Lavender and Agave	**Mostly Uninterpretable** -one potential sample location identified.	Sample required	Wetland area should be revegetated
17	**Cameron Road Reserve**	37837	Stoneville	**Low** Some Gladioli and Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout.	**Approximately 90% infested.**	**Yes -** there is likely to be an uninfested upper slope area which is protectable and requires a comprehensive Dieback assessment	Soil movement associated with firebreak maintenance might be spreading Dieback. There is no Standard Protocol Dieback signage in this reserve There is no Standard Protocol Dieback signage in this reserve
18	**Chidlow Oval**	23921	Chidlow	**High** Three Watsonia populations and scattered Eastern States *Acacia* spp. (mainly *A.*	**Approximately 10-20% infested** Dieback is present in gully area, but the extent is	**Yes -** there is likely to be an uninfested upper slope area which is protectable and requires a	Uncontrolled public vehicular access is a significant issue in this reserve.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				iteaphylla and *A. longifolia*), and Tagasaste in native vegetation adjacent to oval.	unknown due to disturbance and Degraded vegetation condition.	comprehensive Dieback assessment	There is no Standard Protocol Dieback signage in this reserve
19	**Lechenaultia Park**	25433	Chidlow	**Low** Some Watsonia and Eastern States *Acacia* spp.	**Approximately 20% infested.** Infestation along interface with Railway Reserve	**Yes -** there is likely to be an uninfested areas which are protectable and require a comprehensive Dieback assessment.	Vegetation in Very Good-Excellent in uninfested area. There is no Standard Protocol Dieback signage in this reserve
20	**Southern Railway Heritage Trail, Boya - Mundaring**	31196	Boya, Darlington, Glen Forrest, Mahogany Creek, Mundaring	**High** Serious environmental weeds including Bridal creeper, Watsonia, Victorian Teatree, Giant Reed (*Arundo donax).* Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout along with Fig and Olive trees, and Tagasaste.	**Approximately 70% infested.** Evidence of Dieback recorded at regular intervals along the trail	**Yes -** there is likely to be an uninfested areas which are protectable and require a comprehensive Dieback assessment	There is no Standard Protocol Dieback signage in this reserve

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
21	**Cookes Brook**	38367	Chidlow	**Very High** Significant Blackberry populations in the riparian zone, in addition to Cotton Bush, Fig and Olive trees and Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout.	**Mostly Uninterpretable** but some evidence of possible Dieback infestation in upland vegetation – requires sampling	**Sample required**	The Blackberry populations in this reserve are significant and need urgent attention to prevent it being spread to other areas within the Shire
22	**Carawatha Road Reserve**	13766	Parkerville	**None**	**Possibly Uninfested- needs sampling**	**Yes -** there is likely to be an uninfested areas which are protectable and require a comprehensive Dieback assessment	There is no Standard Protocol Dieback signage in this reserve
23	**Glynden Reserve**	29959	Helena Valley	**Low** Small Watsonia populations and some Gladioli. Tagasaste near boundary	**Uninfested - no evidence of Dieback**	**Yes** - protectable uninfested vegetation	There is no Standard Protocol Dieback signage in this reserve
24	**Roland Road Reserve**	45986	Parkerville	**Low** *Acacia longifolia*	**Approximately 30% infested.**	**Yes –** there are likely to be protectable areas	There is no Standard Protocol Dieback signage in this reserve
25	**Old Parkerville School Site**	13214	Parkerville	**Low** Tagasaste	**Uninterpretable**	**Uninterpretable**	

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
26	**Marriott Park**	25700	Boya	**Medium** Cotton bush in the southern portion of the reserve. There are Date Palms and a Japanese Pepper tree in the middle portion and Paspalum grass in the creek in the northern portion of the reserve	**Uninterpretable**	**Uninterpretable** but creek likely to be infested.	
27	**Jane Byfield Reserve**	880	Mahogany Creek	**Low** *Acacia pycnantha* and Spotted Gum *(Corymbia maculata)*	**Uninfested**	**Yes** - protectable uninfested vegetation	There is no Standard Protocol Dieback signage in this reserve.
28	**Milligan Road Reserve**	22843	Stoneville	**Low-** Tagasaste, Victoria Teatree, *Acacia longifolia*	**Uninterpretable** (possible spot infestations)	**Uninterpretable** (possible)	Additional reserve to the north predominantly uninfested, good condition
29	**Hilltop Reserve**	41670	Mahogany Creek	**High** Cotton bush, Bridal creeper, Wonga Wonga vine, Periwinkle, Bleeding Heart Fig and Olive trees	**Approximately 20%** infested- requires sample to confirm	**Yes -** there is likely to be an uninfested areas which are protectable and require a comprehensive Dieback assessment	Serious environmental weeds need to be removed/treated. There is no Standard Protocol Dieback signage in this reserve
30	**Marloo Theatre Reserve**	36045	Greenmount	**Medium** Several Watsonia populations, as Veldt Grass,	**No evidence of Dieback in Very Good to Excellent**	**Yes -** there is likely to be an uninfested area which are	There is no Standard Protocol Dieback signage in this reserve. Forrestfield complex.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				Tagasaste, Olive and Cape Lilac trees, Agave and *Acacia pycnantha*	**condition vegetation**	protectable and requires a comprehensive Dieback assessment	
31	**Beechina Rail Reserve**	35397	Chidlow	**High** Large blackberry population plus Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) and Tagasaste	**Approximately 60%** infested- requires sample to confirm	**Yes -** there is likely to be an uninfested area which are protectable and requires a comprehensive Dieback assessment	There is a fallen tree blocking vehicle access mid-way along the southern section of the reserve. Lots of litter at the northern access to the southern section due to bus shelter-needs a bin
32	**Gilfellon Reserve**	31264	Stoneville	**Very High Creek line has extensive Blackberry population.** Also, Paspalum grass and Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia,)*	**No evidence of Dieback, creek line uninterpretable**	**Yes -** there is likely to be an uninfested area which are protectable and requires a comprehensive Dieback assessment	This reserve has a large population of *Grevillea vestita* and offers a significant seed resource from which to collect and propagate.
33	**Quail Street Reserve**	29269	Chidlow	**Low** Scattered Eastern States *Acacia* spp. and Freesias in lower areas.	**Approximately 85% infested**. Very old infestation with mid -storey species missing and evidence of active disease as Dieback moves	**No** - Remaining uninfested area is too small to be protectable in the long term due to upslope infestation.	Significant erosion along some of the track in the eastern portion of the reserves and a dangerous sinkhole in creek crossing near the southern boundary.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
					into mid and upper slope uninfested remnants.		Large number of significant trees mapped within this reserve and is adjacent to wildlife sanctuary.
34	**Burma Road Reserve**	37563	Wooroloo	**Medium** Significant populations of Bulrush and Fig tree in the creek line with some Cotton bush and *Acacia iteaphylla.*	**Approximately 90% infested.** While the riparian vegetation is Uninterpretable there is evidence of Dieback upslope which means that the creek is infested	**No -** because of infestation upslope of creek. Sampling would confirm this determination.	Rubbish dumping in open area north of Burma Road
35	**Richard Watson Hardey**	7789	Glen Forrest	**High** Significant Watsonia populations. Also, some Tagasaste, Kurrajong and Eastern States *Acacia* spp.	**Approximately 60% infested.**	**No -** Remaining uninfested area is too small to be protectable in the long term due to upslope infestation along Strettle Road	Vegetation over about 50% of the reserve is Degraded due to weeds and Dieback and ground disturbance.
36	**Bulkirra Reserve**	39034	Helena Valley	Unknown, no access	Unknown – introduction of dieback potentially limited by lack of access	Unknown	Investigate access to assess; Forrestfield veg complex has limited extent remaining and is potentially significant
37	**North Darlington Reserves (Bilgoman Pool Site)**	38155	Darlington	**Medium** Significant weed infestation at the corner of Darlington Road and GEH including Wonga	**Approximately 80% infested**.	**No -** Remaining uninfested area is too small to be protectable in the long term	There is a dump of concrete rubble at the end of the road behind the pool.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
				Wonga vine and Hawthorn. There are scattered Eastern States *Acacia* spp. throughout the reserve and some Victorian Teatree along the eastern boundary of the reserve adjacent to Lionel Road			
38	**Clifton Park**	4041	Chidlow	**Medium** Watsonia populations in lower slope and gully areas. Also, Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) along with Tagasaste, scattered throughout.	**20% - 70% infested** Dieback is present in gully area, but the extent is unknown due to disturbance and Degraded vegetation condition.	**No -** Remaining uninfested area is too small to be protectable in the long term.	Uncontrolled public vehicular access is a significant issue in this reserve.
39	**Boyamine Reserve**	40416	Parkerville	**Low** Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout.	**20-50% infested** Dieback is active in in the northern and eastern portions of the reserve, but the extent is unknown due to disturbance and Degraded	**No -** Remaining uninfested area is too small to be protectable in the long term	

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
					vegetation condition.		
40	**Chidlow Rail Reserve (Coothallie Rd)**	35396	Chidlow	**Low** Some Watsonia and Eastern States *Acacia* spp.	**At least 30% Infested**	**No -** Remaining uninfested area is too small to be protectable in the long term	
41	**Sunninghill Park Reserve**	33352	Stoneville	**Low** Some Watsonia and Eastern States *Acacia* spp.	**Infested- extent unknown**	**No -** Remaining uninfested area is too small to be protectable in the long term	
42	**Yennerdin Reserve**	22781	Parkerville	**Low** Eastern States *Acacia* spp	**Infested- extent unknown**	**No -** Remaining uninfested area is too small to be protectable in the long term	Rubbish dump present
43	**Chidlow Rail Reserve (near Onslow St)**	32482	Chidlow	**Low** Mainly Eastern States *Acacia* spp. and Tagasaste	**At least 50% Infested**	**No -** Remaining uninfested area is too small to be protectable in the long term	
44	**Mandoon Reserve**	33079	Darlington	**Very High** Significant Bridal creeper population in southern portion of the reserve. Also, Arum lily and Caster Oil Plant Olive and Fig trees present.	**No evidence of Dieback,** creek line is uninterpretable. Sample site recorded in upland area	No	One individual of the Threatened (Declared Rare) species *Acacia aphylla* was recorded in the central reserve. The reserve needs substantial revegetation.
45	**Brookside Park**	31777	Parkerville	**Low** Introduced grasses	**Excluded** due to degraded	No	No understorey-needs revegetation.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
					vegetation condition		
46	**Lilydale Road Reserve**	46376	Chidlow	**High** Large watsonia population plus Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) and Tagasaste	**Approximately 80%** infested- requires sample to confirm	**No - Infested**	
47	**Rabone Way Reserve**	31261	Darlington	**High** Large populations of Watsonia, some Bridal creeper, Periwinkle and Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*)	**Uninterpretable**	**Uninterpretable** (degraded condition)	
48	**Black Cockatoo Reserves (south)**	22848	Mundaring	**Low** *Acacia. iteaphylla*	**Approximately 90% infested.**	**No -** Remaining uninfested area is too small to be protectable in the long term	
49	**Swan View Trail**	32485	Swan View	**High** Significant populations of Watsonia, Bridal Creeper and Morning Glory.	Mostly **Excluded** due to degraded vegetation condition	**No -** Vegetation is in Degraded condition and cannot be assessed	

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
50	**Chidlow Village Green**	6276	Chidlow	**High** Bridal creeper plus large Watsonia populations. Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*), Kurrajong trees, Agave and Tagasaste and Robinia.	Mostly **Excluded** due to degraded vegetation condition	**No -** Vegetation is in Degraded condition and cannot be assessed	
51	**Noblewood Reserve**	43993	Mundaring	**Low** Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*), Kurrajong and Kikuyu	Mostly **Excluded** due to Degraded vegetation condition. Sample site recorded at the corner of Stoneville Rd and Stevens Street	No	No understorey-needs revegetation. Evidence of some past revegetation but requires significantly more.
52	**Iron Road Reserve**	44999	Parkerville	**Low** Some introduced *Acacia* spp. Including *Acacia longifolia* and *A. decurrens*.	**Predominantly uninterpretable** with evidence of Dieback adhacent to heritage trail.	**Uninterpretable**	Adjacent to Threatened (Declared Rare) species *Acacia aphylla* population
53	**Connection Reserve**	44203	Glen Forrest	**None**	**Approximately 90% infested.**	**No -** Remaining uninfested area is too small to be protectable in the long term	Narrow reserve that connects two larger, state government managed reserves.

Priority	Name of area	Reserve	Suburb	Weed Severity	Dieback Occurrence	Protectable Area(s)?	Other Issues/Comments
54	**Wandeara Cres Reserve**	41682	Mundaring	**High** Cotton bush plus Eastern States *Acacia* spp. (mainly *A. iteaphylla*, *A. longifolia and A. pycnantha*) and Cape Lilac	**Excluded** due to degraded vegetation condition	No	Eastern States *Acacia* spp. have been cut down without any rehabilitation/revegetation. Suggest that a more strategic approach be adopted for weed control such as the Bradley Method of Bush Regeneration.

6. Discussion

Phytophthora Dieback

Conducting the significant tree survey, in addition to the mapping and classifying of tracks, provided the opportunity to undertake a Broadscale Dieback assessment to determine the disease status of each reserve.

Disease expression was variable throughout the assessment area, with disease symptoms being more obvious in the lower slopes and gullies, and more cryptic in mid and upper slope areas where the impact of drought and less active disease complicated interpretation.

The Broadscale Dieback assessment reveals that most of the assessed reserves have some level of infestation. Some reserves such as Quail Street are almost completely infested, as the pathogen has been present over a long period of time. Other areas such as Pindalup Reserve have only a small infested area and therefore require urgent management attention. Many reserves with these small infestations still have large uninfested protectable areas within their boundaries.

Dieback is significantly altering the reserves within the Shire in the following ways:

- Altering vegetative structure by removing keystone mid-storey species and a large proportion of the shrub layer;
- Significantly reducing species richness and cover and providing openings for weed species including Watsonia and Veldt Grass which increase fuel loads and fire vulnerability;
- Diminishing foraging and nesting habitat for birds and small mammals through the removal of Proteaceous species including *Banksia grandis, B. sessilis and B. squarrosa;* and
- A reduction of canopy resulting in less interception of rainfall and therefore increased surface water run-off, erosion and spread of Dieback.

In many of the reserves assessed Dieback signage was outdated or absent, and in some cases when the standard protocol signage was present, it was incorrectly located. Public vehicular access is a major vector in the spread of the Dieback pathogen and this problem is compounded in reserves with inadequate signage. Firebreak maintenance activities requiring ground disturbance should also be planned so they are undertaken in a manner that will minimise the risk of spreading Dieback.

The data recorded in the Broadscale Dieback assessment cannot be used for managing Dieback during operational activities, however the information generated will be very useful in identifying the reserves that have protectable vegetation and warrant comprehensive Dieback mapping. Once comprehensive mapping has been undertaken, appropriate hygiene management measures can be applied in the conservation of these uninfested areas. The Protocol for Identifying Protectable Areas (DPaW 2015) stipulates that protectable areas *'are positioned in the landscape and are of sufficient size (e.g. > 4 ha with axis >100 m) such that a qualified Interpreter judges that the pathogen will not autonomously engulf them in the short term (a period of a few decades'.* A 4ha minimum size has been adopted for protectable areas within State Forest however, with appropriate hygiene management, the Shire should consider areas as small as 0.5ha as potentially protectable depending on their landscape position in relation to infested areas.

Weeds

Cookes Brook and Gilfellon Reserves have substantial populations of Blackberry which is a Declared Plant, while Mandoon reserve has populations of the Declared Plants Arum Lily (*Zantedeschia aethiopica)* and Bridal Creeper *(Asparagus asparagoides)*. The Declared Plant Cottonbush *(Gomphocarpus fruticosus)* was recorded in several reserves. Weed severity was only rated as 'very high' in Cookes Brook and Gilfellon Reserves. These two reserves have extensive Blackberry populations along the creek lines and require urgent treatment to avoid the Blackberries being spread to other reserves in the vicinity. Mandoon Reserve has Arum lily and abundant Bridal Creeper and is also rated as 'very high'. The Railway Reserve Parkerville, Southern Railway Heritage Trail, Chidlow Village Green, Hilltop Reserve, Rabone Way Reserve, Lilydale Road Reserve, and Beechina Reserve have all been rated as 'high' for the number of weed species present and their distribution.

It should be noted that in some areas where the vegetation condition is 'degraded' Eastern States Acacia species are providing habitat and protecting soil from erosion. Some non-native Acacia species such as *Acacia podalyriifolia* and *A. iteaphylla* have become naturalised in the Perth Hill. In the eastern states they are regarded as fire-resistant species (Australian Plants Society (Victoria), website accessed 2018). In some instances, Dieback has greatly decreased native vegetation cover providing an opportunity for weed species such as Perennial Veldt Grass (*Ehrharta calycina)* or Watsonia (*Watsonia meriana var. bulbillifera)* to proliferate, thus increasing the fuel load.

It can be argued that individuals of these species should only be removed if they are displacing native species or negatively impacting the ecosystem. If they are to be removed, then this should be done as part of a strategic rehabilitation program which prioritises reserves according to their biodiversity values and seeks to consolidate areas in better condition as a priority (Bradley, J. 1988).

Limitations

The reserves assessment encountered the following limitations:

1. Two reserves, Bulkirra Reserve and a small portion of Wandeara Crescent were inaccessible;
2. The timing of the reserves assessment was not suitable to record some ephemeral weed species; and
3. No samples were taken for laboratory testing during the Broadscale Dieback assessment to confirm the disease status of the reserves assessed as being infested.

In addition it should be noted that the scope of the project was limited by the budget and assessed reserves do not include all nature reserves managed by the Shire. Shortlisting reserves for assessment based on the 2008 priority list is likely to have missed some smaller reserves which may be dieback-free, and some ecologically significant reserves that have been vested in the Shire since those original assessments. As additional reserves are assessed the priority list in this report will require revision.

Additional reserves recommended for assessment are 47206 (Highlands Dr); 28530 (Hogan Rd); 47442 (Clutterbuck Cl); 9954 (Linley Valley Rd); 45159 (Clifton Rd & Kintore Rd); 49559 (Highlands Dr); 40690 (Lilydale Rd & Avonholme); 46517 (Riley Rd near Meelan Rise); 47314 (Mayo Rd & Needham Rd); 51520 (Melita Drive); 33279 (Cook St); 30619 (Willcox St); 43946 (Quarry Ct); 45888 (Redtail Rise); 48642 (Grand Valley Dr); 23728 (Mayo Rd near Clayden St).

7. Conclusion and Recommendations

While weeds are widespread across the priority reserves assessed, only three reserves received the 'very high' severity rating. Cookes Brook and Gilfellon Reserves have substantial populations of Blackberry which is a Declared Plant under the *BAM Act*, while Mandoon Reserve has populations of the Declared Plants Arum Lily (*Zantedeschia aethiopica)* and Bridal Creeper *(Asparagus asparagoides)*. The Declared Plant Cottonbush *(Gomphocarpus fruticosus)* was recorded in several reserves. Most of the reserves assessed received the 'low' severity rating, having few or scattered Eastern States Acacias or Tagasaste.

In some areas where the vegetation condition is 'degraded', Eastern States Acacia species are providing habitat and protecting soil from erosion. Some non-native Acacia species such as *Acacia podalyriifolia* and *A. iteaphylla* have become naturalised in the Perth Hill and are also fire-resistant species. In some instances, Dieback has greatly reduced native vegetation cover providing an opportunity for weed species such as Perennial Veldt Grass (*Ehrharta calycina)* or Watsonia (*Watsonia meriana var. bulbillifera)* to proliferate, thus increasing the fuel load.

A total of 9253 significant trees were recorded during the assessment. Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) comprised the majority (91.6%) of trees, with Blackbutt (*Eucalyptus patens*), Flooded Gum (*Eucalyptus rudis*) and Wandoo (*Eucalyptus wandoo*) also represented.

Fox dens were observed at several reserves and a live fox was spotted at Cameron Road Reserve. A dead fox was also recorded at Gilfellon Reserve.

Rubbish dumping was not found to be a widespread issue due to controlled access in a large proportion of the reserves assessed. Suspected asbestos dumping was recorded in Strettle Road Reserve and Hovea Conservation Park. Testing may be required to confirm that the material is asbestos.

Controlled access has also contributed to limiting soil erosion along tracks and watercourses within the reserves. While Quail Street Reserve has some significant erosion occurring along tracks in the eastern portion of the reserve due to the steepness of some of the slopes, soil erosion in the reserves did not appear to be a significant issue.

In many of the reserves assessed Dieback signage was outdated or absent, and in some cases when the standard protocol signage was present, it was incorrectly located. Public vehicular access is a major vector in the spread of the Dieback pathogen and this problem is compounded in reserves with inadequate signage. Firebreak maintenance activities requiring ground disturbance should also be planned so they are undertaken in a manner that will minimise the risk of spreading Dieback.

Overall, the reserve assessment found that Dieback is having a very significant impact on species diversity and ecosystem function within most of the priority reserves assessed. While some reserves show widespread infestation, other reserves have only a small infested area and require urgent management effort if they are to be protected. Often in these instances the topography of the reserve is such that, while the lower slopes and gullies are infested, large uninfested protectable areas are present upslope within their boundaries. As noted previously, Dieback is the third greatest threat to Western Australian biodiversity after salinity and climate change (EPA, 2007). It is considered a more serious threat than weeds, clearing of native vegetation, acid sulphate soils and soil erosion.

Given the very high impact of Dieback on biodiversity and the limited number of reserves (or parts of reserves) that are protectable against Dieback, the reserve priority ranking is required to change. As plant diversity declines in reserves with Dieback, these Dieback-free areas will become increasingly critical in preserving native plant species and providing a refuge for wildlife. Reserves or areas that do not currently have Dieback must be managed carefully to limit access and activities that would introduce Dieback.

It is recommended that the Shire of Mundaring adopt the following strategies for management and rehabilitation of nature reserves:

- In directing limited resources for natural area management for the best ecological outcomes, the Shire should follow the principles of the 'Bradley Method of Bush Regeneration'. This approach seeks to consolidate the reserves and areas in the best condition first and this approach can also be applied to the management of Dieback.

- Declared Plant weed populations should be eradicated as soon as possible. Areas with Blackberry populations, especially Cookes Brook, should be revegetated with appropriate wetland species after weed eradication.

- Dieback management should be considered at least as important as weed management. An integrated Dieback and Weed Management Plan and Rehabilitation Strategy, or more holistic Biodiversity Strategy should be developed and implemented.

- A comprehensive Dieback assessment should be undertaken of those reserves that have been identified as having protectable areas. Once identified, the protectable areas should be assessed for access restrictions, and treated as environmentally sensitive areas requiring greater Dieback hygiene practices from staff and contractors.

- Standard Dieback signage developed by Project Dieback (South Coast NRM 2008) should be installed in priority reserves that have areas of protectable vegetation.

- Reserve management plans should be developed or updated for high priority reserves to integrate Dieback control, weed management, bushfire risk management and other Shire activities.

- The Shire should seek to share information and consider partnerships with tertiary institutions or organisations (such as the Dieback Working Group) to trial Dieback treatment and restoration methods.

- Shire staff should use GPS technology to record weed and Dieback treatments and maintain the usefulness of GIS information for targeting reserve management resources.

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9. Glossary of Terms

Assessment – (*Phytophthora* occurrence) any combination of activities including, detection, diagnosis (interpretation), mapping and demarcation of *Phytophthora* Dieback disease in natural ecosystems.

Assessment Area – an area where *Phytophthora* occurrence assessment is possible or will be possible in the short to medium term. This area may be larger or smaller than the proponent's project area.

Disease – The combination of a pathogen, host and correct environmental conditions, which results in disease symptoms or death of a host.

Environment - The sum of all external factors which act on an individual organism during its lifetime.

Excluded Area – An area of high disturbance in which native vegetation is unlikely to recover.

Host - means the plant which is invaded by a pathogen and from which the pathogen derives its energy.

Indicator species – Plant species that area more susceptible to *Phytophthora* disease and reliably show symptoms earlier than other species.

Infection – The invasion of a host organism's bodily tissue by disease causing organisms. In relation to Dieback this refers to an individual plant and not the population.

Infested – The state of being invaded or overrun by pests or parasites. In relation to Dieback it refers to a population of plants and not individual plants.

Pathogen – Any organism or factor causing disease within a host

***Phytophthora* Dieback –** A term referring to the disease symptoms caused by *Phytophthora* species in susceptible vegetation.

Protectable area- an area of vegetation that can be protected by the application of hygiene controls to prevent infestation.

Susceptible – Likely to be influenced or able to be harmed by particular pathogen

Symptom – A phenomenon that arises from, and accompanies a particular disease or disorder and serves as an indication of it

Uninfested – An area that does not contain infected plants or show visible signs of disease

Uninterpretable – a natural area where there are inadequate visible symptoms present to make a diagnosis

Unprotectable – A disease free area that is likely to become infested within a given time

Vector – any agent that acts as a carrier or transporter

10. Appendices

Appendix 1: Individual Reserves Results, Comments and Recommendations

Alps Street Reserve

Reserve #: **34103**
Priority: **1**
Area: **55.2 ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**529**	**240**	**108**	**106**	**983**
Hollow(s) present		6	6	44	56
Marri	**178**	**103**	**37**	**40**	**358**
Hollow(s) present	1	2	2	17	22
Flooded Gum				**1**	**1**
Hollow(s) present				1	1
Unknown (dead)	**7**	**8**	**2**	**2**	**19**
Hollow(s) present		2		2	4
Wandoo	**1**				**1**
Hollow(s) present					0
Total	**715**	**351**	**147**	**149**	**1362**

Weed Severity: Low
Some Watsonia in NE corner otherwise Eastern States *Acacia* spp. scattered along tracks plus Tagasaste and Olive trees.

Dieback Occurrence: Approximately 30% infested
Significant infestations in NE of reserve and along perimeter tracks.

Other Comments/Issues: There is no Standard Protocol Dieback signage in this reserve and public vehicular access is a significant hygiene issue.
Recorded what appears to be two Aboriginal heritage trees.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Install Standard Protocol Dieback signage.
4. Eradicate Watsonia population and revegetate area.

Dead indicator species such as *Xanthorrhoea preissii* show symptoms of Dieback infestation in Alps Street Reserve.

Aboriginal Scar Trees exist within Alps Street Reserve and should not be disturbed.

Strettle Road Reserve

Reserve #: **32727**
Priority: **2**
Area: **70.7ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**278**	**128**	**56**	**88**	**550**
Hollow(s) present	1	5	9	43	58
Marri	**164**	**114**	**31**	**34**	**343**
Hollow(s) present	1	4	5	16	26
Unknown (dead)		**8**	**6**		**14**
Hollow(s) present			3		3
Total	**442**	**250**	**93**	**122**	**907**

Weed Severity: Low
Some Watsonia on eastern side of smaller reserve north of Strettle Street, Eastern States *Acacia* spp. along Eastern side of large reserve south of Strettle Street.

Dieback:
Smaller north-western portion – approximately 80% infested.
Larger southern portion approx. 50% infested

Other Comments/Issues
Likely asbestos dumps located along the southern boundary of the northern reserve.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Restrict vehicular access.
4. Eradicate Watsonia population along eastern side of smaller reserve north of Strettle Road.
5. Remove rubbish/asbestos.

Evidence of *Phytophthora* infestation within Strettle Road reserve with biomass reduction and dead *Banksia sessilis*.

Watsonia are present within the reserve and need to be removed.

Rubbish/asbestos dumping within Strettle Road Reserve

Pindalup Reserve

Reserve #: **39853**
Priority: **3**
Area: **40.3ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**191**	**67**	**21**	**23**	**302**
Hollow(s) present	1		2	7	10
Marri	**55**	**55**	**15**	**15**	**140**
Hollow(s) present			4	6	10
Unknown (dead)	**1**	**25**	**2**	**1**	**29**
Hollow(s) present		1		1	2
Wandoo	**4**	**3**			**7**
Hollow(s) present					0
Total	**251**	**150**	**38**	**39**	**478**

Weed Severity: Low
Mainly Eastern States *Acacia* spp. and Tagasaste in the western portion of the reserve adjacent to cleared areas plus some scattered Gladiola.

Dieback Occurrence: Predominantly uninfested (5% infested)
Possible small infestation along lower slope track in the north-western portion of the reserve

Other Comments/Issues
Lots of old car bodies.
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Restrict vehicular access.
3. Treat buffer surrounding uninfested area with Phosphite.
4. Install Standard Protocol Dieback signage.

Jarrah/Marri forest with reduced understorey and mid-storey

Eastern states weeds such as Queensland Silver Wattle (*Acacia podalyriifolia)* are present in Pindalup Reserve.

Superblock (incl. previous wildflower seed Res 36428)

Reserve #: **50018**
Priority: **4**
Area: **51.2ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**113**	**86**	**13**	**3**	**215**
Hollow(s) present	1	2	1	1	5
Marri	**110**	**113**	**35**	**5**	**263**
Hollow(s) present		2	2		4
Unknown (dead)	**6**	**19**	**7**	**1**	**33**
Hollow(s) present		2		1	3
Wandoo	**31**	**29**	**3**		**63**
Hollow(s) present			1		1
Total	**260**	**247**	**58**	**9**	**574**

Weed Severity: Medium
Bridal creeper, Freesias and Watsonia prevalent along western boundary track. Otherwise scattered Eastern States *Acacia* spp. along Ryecroft Road and Tagasaste

Dieback Occurrence:
Approximately 30% infested.
Significant active disease along Ryecroft Rd which is an upslope infestation otherwise disease is concentrated in lower slopes and gullies.
Wildflower Seed Reserve is 90% infested.

Other Comments/Issues:
There is no Standard Protocol Dieback signage in this reserve and public vehicular access is a significant hygiene issue.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Restrict vehicular access.
3. Treat buffer surrounding uninfested area with Phosphite- especially along Ryecroft Road.
4. Install Standard Protocol Dieback signage.

Biomass reduction in the Superblock

Death of *Banksia sessilis along* Ryecroft Rd showing symptoms of Dieback infestation

North Darlington Reserves (including Nan Macmillan)

Reserve #: **6922**
Priority: **5**
Area: **31.1ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**22**	**13**	**7**	**5**	**47**
Hollow(s) present	1	7	5	4	17
Marri	**85**	**39**	**25**	**37**	**186**
Hollow(s) present	2	5	8	26	41
Unknown (dead)		**1**	**2**	**1**	**4**
Hollow(s) present		1	2	1	4
Wandoo	**9**	**8**	**2**	**4**	**23**
Hollow(s) present	1	1	1	4	7
Total	**116**	**61**	**36**	**47**	**260**

Weed Severity: Medium
Cottonbush(DP), Wonga Wonga Wonga Vine (*Pandorea pandorea*), Brazilian Pepper tree and Kurrajong present along Darlington Rd near the intersection of Great Eastern Highway. Otherwise Eastern States *Acacia* spp. scattered in reserve area east of Darlington Rd. Paspalum grass in drain adjacent to Ferguson Rd with Freesias and Gladioli present along western boundary.

Dieback Occurrence: Approximately 50% infested.
Nan Macmillan Reserve has very active disease and is approximately 70% infested. The portion south of Oxley Road appears to be uninfested. The area between Lionel and Darlington roads is approximately 60% infested. The area south of Oxley Road appears to be uninfested.

Other Comments/Issues:
Pollution from drain was evident across the road, and possibly emanating from the water treatment plant. The effluent is killing native vegetation downslope west of Darlington Rd.
Nan Mc Millan Park has a very active Dieback. It's interesting to note the species that are surviving and thriving in the infested areas. Some of these species such as *Calothamnus sp. (Either C. quadrifidis* or C. *lateralis) and Hakea trifurcata* are providing foraging habitat that has been lost with the Banksia spp. succumbing to the pathogen. *Grevillea wilsonii* is also thriving in some areas and offers a significant seed resource from which to collect and propagate.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment of the mid and upper slope areas west of Darlington Road.
2. Treat Decaled Pest, Cottonbush, and other weeds along Darlington Road.
3. Investigate and remediate pollution emanating from the water treatment plant east of Darlington Road.

Very active disease expression at Nan Macmillan Park.

Disease expression with affected *Xanthorrhoea sp., Grevillea wilsonii and Banksia sessilis.*

Pollution in the creek is affecting native vegetation downstream east of Darlington Road

Black Cockatoo Reserves (north)

Reserve #: **20990**
Priority: **6**
Area: **20.6ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**84**	**35**	**31**	**32**	**182**
Hollow(s) present	1	3	5	23	32
Marri	**51**	**33**	**32**	**41**	**157**
Hollow(s) present			4	16	20
Unknown (dead)	**1**		**2**	**6**	**9**
Hollow(s) present	1		2	6	9
Total	**136**	**68**	**65**	**79**	**348**

Weed Severity: None
This reserve was found to be weed free-probably due to the diligent work of the friends group

Dieback Occurrence: Approximately 70% infested.
Only the upper slope area along the western boundary and north western corner remains Dieback free.

Other Comments/Issues:
Standard Dieback Protocol Signage present but some signs vandalised and located in the wrong place. The migratory protected species the Rainbow Bee-Eater was observed in the reserve. There is a fox den in the north - western portion of the reserve. Herbicide spraying under the powerline was observed to be careless and impacting non-tree species

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Review location of Standard Protocol Dieback signage and replace vandalised signs.
4. Investigate and address issue of herbicide spraying non-target species under powerline.

Disease expression at Black Cockatoo Reserves (North) showing dead *Banksia grandis* and reduced canopy.

***Xanthorrhoea preissii* death shows symptoms of *Phytophthora* Dieback.**

Black Cockatoo Reserves (mid)

Reserve #: **12422**
Priority: **7**
Area: **10.9ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**43**	**43**	**23**	**39**	**148**
Hollow(s) present		1		16	17
Marri	**23**	**12**	**8**	**19**	**62**
Hollow(s) present		1	1	7	9
Unknown (dead)				**1**	**1**
Hollow(s) present				1	1
Total	**66**	**55**	**31**	**59**	**211**

Weed Severity: Low
Scattered Eastern States *Acacia* spp., Gladioli and Victorian Teatree mainly along the eastern boundary (Stevens Street).

Dieback Occurrence: Approximately 30% infested.
Infested area mostly in the northern portion of the reserve with smaller infestations near the southern and eastern boundary.

Other Comments/Issues:
Standard Dieback Protocol Signage present but sometimes in the wrong place

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Review location of Standard Protocol Dieback signage and replace vandalised signs.

Standard Protocol Dieback signage is present at Black Cockatoo Reserves (mid)

Uninfested vegetation showing unaffected *Xanthorrhoea preissii* and *Banksia grandis* at Black Cockatoo Reserves (mid).

Falls Road Reserve

Reserve #: **12453**
Priority: **8**
Area: **21.5ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**72**	**37**	**19**	**16**	**144**
Hollow(s) present	3	11	11	12	37
Marri	**54**	**31**	**16**	**27**	**128**
Hollow(s) present		4	6	19	29
Unknown (dead)	**1**	**1**	**2**	**2**	**6**
Hollow(s) present	1		2	2	5
Total	**127**	**69**	**37**	**45**	**278**

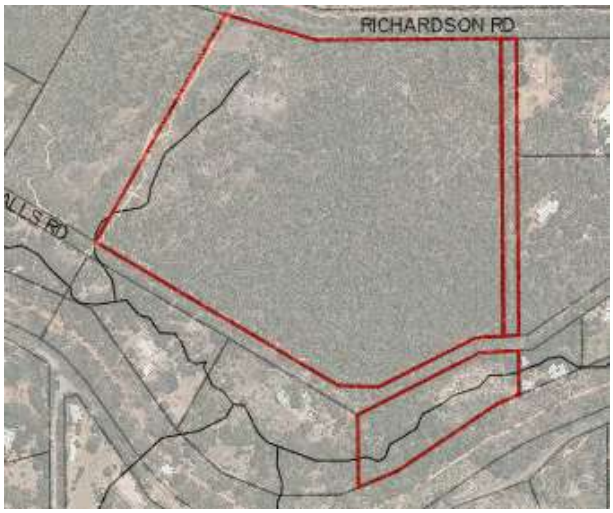
Weed Severity: Low
Four small Watsonia population plus scattered Eastern States *Acacia* spp. and Freesias in lower areas.

Dieback Occurrence: Approximately 25% infested. Dieback around the perimeter of the reserve both in upland and lowland areas.

Other Comments/Issues: Signage is old and located incorrectly.
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Install Standard Protocol Dieback signage.
4. Eradicate Watsonia population and revegetate area.



***Xanthorrhoea preissii* showing disease expression at Falls Road Reserve.**

Old Dieback signage is present in Falls Road Reserve warning that areas are infested.

Hovea Conservation Park

Reserve #: **14163**
Priority: **9**
Area: **40.9ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**72**	**28**	**10**	**18**	**128**
Hollow(s) present	2	8	5	12	27
Marri	**112**	**71**	**29**	**60**	**272**
Hollow(s) present	3	9	13	50	75
Wandoo	**1**				**1**
Hollow(s) present	1				1
Total	**185**	**99**	**39**	**78**	**401**

Weed Severity: Western Reserve - Low
Two small Watsonia populations and some Gladiolas plus scattered Eastern States *Acacia* spp.
Eastern Reserve - Medium
Significant population of Victorian Teatree in the south-western portion of the reserve. There are also two Watsonia populations and scattered Eastern States *Acacia* spp.

Dieback Occurrence:
Western Reserve is approximately 50% infested. Dieback widespread in lower slopes and mid-slope areas especially in the southern portion and along Hedges Road. There is a very active infestation in the northern portion of the reserve and along the narrow access corridor to the east.
Eastern Reserve is approximately 70% infested. Dieback is widespread apart from an uninfested upland area in the northern portion of the reserve.

Other Comments/Issues: There are two old asbestos dumps in the northern portion of the western reserve. The asbestos is broken up into small pieces and scattered over a large area. There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Install Standard Protocol Dieback signage.
4. Eradicate Watsonia population and revegetate area.
5. Eradicate Victorian Teatree along the eastern boundary of the reserve adjacent to Lionel Road and revegetate with upland Dieback resistant species such as *Calothamnus* spp.
6. Remove asbestos.

***Xanthorrhoea preissii* deaths in Hovea Conservation Park.**

Asbestos dumping in Hovea Conservation Park needs to be resolved.

Callan Road Reserve

Reserve #: **38224**
Priority: **10**
Area: **7.0ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**14**	**1**	**1**	**1**	**17**
Hollow(s) present	2	1	1	1	5
Marri	**33**	**22**	**20**	**9**	**84**
Hollow(s) present	3	6	10	8	27
Unknown (dead)		**1**	**1**	**1**	**3**
Hollow(s) present		1	1	1	3
Wandoo	**10**	**3**	**2**		**15**
Hollow(s) present	3	3	1		7
Total	**57**	**27**	**24**	**11**	**119**

Weed Severity: Low
Scattered Eastern States *Acacia* spp. mainly A*. iteaphylla* and Robinia or Black locust trees.

Dieback Occurrence: Approximately 40% infested.
Dieback widespread in lower slopes and some mid-slope areas.

Other Comments/Issues:
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Install Standard Protocol Dieback signage.

Dead *Banksia sessilis* showing symptoms of Dieback disease at Callan Road Reserve

Dead *Banksia grandis* showing symptoms of Dieback disease at Callan Road Reserve

Binbrook Park

Reserve #: **1847**
Priority: **11**
Area: **7.5ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**36**	**15**	**2**	**2**	**55**
Hollow(s) present	14	11	1	2	28
Marri	**27**	**21**	**4**	**4**	**56**
Hollow(s) present	2	5	3	3	13
Wandoo	**9**	**6**	**4**	**2**	**21**
Hollow(s) present	3	4	4	2	13
Total	**72**	**42**	**10**	**8**	**132**

Weed Severity: Low
Wong Wonga vine and Kurrajong trees along north-eastern boundary. Some Watsonia and Freesias along southern boundary.

Dieback Occurrence: Approximately 40% infested.
Dieback widespread in eastern portion of the reserve.

Other Comments/Issues:
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Install Standard Protocol Dieback signage.
4. Eradicate Watsonia populations and revegetate area.

Uninfested area at Binbrook Park

***Xanthorrhoea preissii* death showing symptoms of Dieback within Binbrook Park.**

Sexton Street Reserve (Riley Rd)

Reserve #: **10924**
Priority: **12**
Area: **3.0ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**29**	**20**	**6**	**10**	**65**
Hollow(s) present	1	2	3	8	14
Marri	**17**	**6**	**5**	**3**	**31**
Hollow(s) present	1	2	2	2	7
Unknown (dead)		**1**		**1**	**2**
Hollow(s) present				1	1
Total	**46**	**27**	**11**	**14**	**98**

Weed Severity: Low
Mainly Tagasaste along the eastern boundary of the reserve but also Wonga Wonga vine and some *Acacia iteaphylla*.

Dieback Occurrence: Approximately 40% infested.
Dieback widespread in south-eastern portion of the reserve.

Other Comments/Issues:
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.

***Acacia iteaphylla* at Sexton Street Reserve.**

Tagasaste at Sexton Street Reserve

Railway Reserve, Hovea - Chidlow

Reserve #: **32484**
Priority: **13**
Area: **81ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**17**	**7**			**24**
Hollow(s) present					
Marri	**51**	**31**	**7**	**3**	**92**
Hollow(s) present	1	1			**2**
Wandoo	**2**	**2**			**4**
Hollow(s) present		**1**			**1**
Unknown (dead)					
Hollow(s) present					
Total	**71**	**42**	**7**	**3**	**123**

Weed Severity: High
Four populations of Blackberry along with Watsonia and Bridal creeper populations. Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout along with Tagasaste.

Dieback Occurrence: Unknown
Evidence of Dieback has been recorded along the Railway Reserve Parkerville but requires a comprehensive linear assessment

Other Comments/Issues:
The Threatened (Declared Rare) species *Acacia aphylla* was recorded between Seaborne Street and Sexton Street.
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Undertake a detailed census of *A. aphylla* and monitor the population.
3. Treat serious environmental weeds.

***Acacia aphylla* (DRF) found between Seaborne Street and Sexton Street**

Blackberry infestation at Railway Reserve Parkerville to be managed

Mathieson Road Transfer Station

Reserve #: **31053**
Priority: **14**
Area: **51.7ha**

Significant Trees:

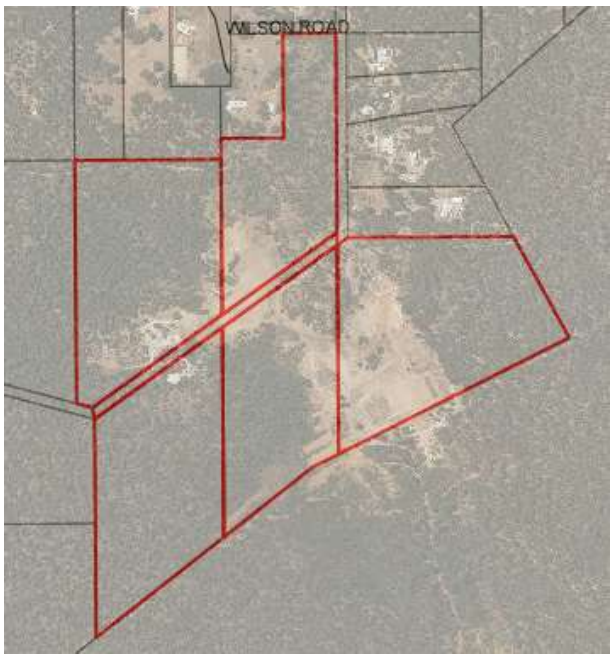
Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**118**	**63**	**24**	**21**	**226**
Hollow(s) present	**2**	11	**17**	**25**	55
Marri	**64**	**32**	**14**	**2**	**112**
Hollow(s) present	2	**9**	**10**	**7**	**28**
Total	**186**	**115**	**65**	**55**	**421**

Weed Severity: Medium
One Blackberry and three Watsonia populations**.** Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout along with Victorian Teatree and Tagasaste. Other weeds include Lavender, Olive and Pine trees.

Dieback Occurrence: Approximately 40% infested.

Other Comments/Issues:
There is a potential asbestos dump near the western boundary.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat serious environmental weeds.
3. Clean up the rubbish/asbestos dump in the reserve.



Dead *Banksia sessilis* near Mathieson Road Transfer Station at site of active Dieback site

***Acacia iteaphylla* present at Mathieson Road Transfer Station site**

Rosedale Road Reserve

Reserve #: **22659**
Priority: **15**
Area: **1.01ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**6**	**1**			**7**
Hollow(s) present	**1**	1	**2**		**4**
Marri	**4**		**2**	**3**	**9**
Hollow(s) present		**1**	**1**	**1**	**3**
Total	**11**	**3**	**5**	**4**	**23**

Weed Severity: Low
Some Watsonia along Rosedale Road and Eastern States *Acacia* spp around boundary track.

Dieback Occurrence: Uninfested
There is no Standard Protocol Dieback signage in this reserve.

Recommended Management Actions:
1. Install Standard Protocol Dieback signage.
2. Treat Watsonia along Rosedale Road.

Uninfested vegetation at Rosedale Reserve

***Acacia iteaphylla* in Rosedale Reserve**

Thomas Street Reserve

Reserve #: **31066**
Priority: **16**
Area: **1.85ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Wandoo	**4**				**4**
Hollow(s) present					
Marri	**1**				**1**
Hollow(s) present					
Total	**5**				

Weed Severity: Low

Dieback Occurrence: Mostly uninterpretable – one area can potentially be assessed. There is no Standard Protocol Dieback signage in this reserve.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.

Cameron Road Reserve

Reserve #: **37837**
Priority: **17**
Area: **6.4ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**28**	**23**	**7**	**5**	**63**
Hollow(s) present	**1**		**2**	**6**	9
Marri	**41**	**13**	**7**	**8**	**69**
Hollow(s) present		**1**		**6**	**7**
Unknown (dead)					
Hollow(s) present					
Total	**70**	**37**	**16**	**25**	**147**

Weed Severity: Low
Some Gladioli and Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout.

Dieback Occurrence: Approximately 90% infested.

Other Comments/Issues:
Soil movement associated with firebreak maintenance might be spreading Dieback.
There is likely to be an uninfested upper slope area which is protectable and requires a comprehensive Dieback assessment

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat serious environmental weeds.

Active disease expression at Cameron Road Reserve.

***Acacia iteaphylla* seedlings at Cameron Road Reserve.**

Chidlow Oval

Reserve #: **23921**
Priority: **18**
Area: **5.7ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**8**	**8**	**5**	**1**	**22**
Hollow(s) present			1	1	2
Marri	**13**	**6**	**7**	**5**	**31**
Hollow(s) present					0
Total	**21**	**14**	**12**	**6**	**53**

Weed Severity: High
Three Watsonia populations and scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*), and Tagasaste in native vegetation adjacent to oval.

Dieback Occurrence: Approximately10-20% infested
Dieback is present in gully area, but the extent is unknown due to disturbance and Degraded vegetation condition.

Other Comments/Issues:
Uncontrolled public vehicular access is a significant issue in this reserve.
There is no Standard Protocol Dieback signage in this reserve

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Treat buffer surrounding uninfested area with Phosphite.
3. Install Standard Protocol Dieback signage.
4. Eradicate Watsonia populations and revegetate areas.
5. Restrict public vehicular access.

Active disease expression at Chidlow Oval showing biomass reduction.

Healthy *Banksia grandis* stands at Jarrah/Marri forest in uninfested area of Chidlow Oval.

Lechenaultia Park

Reserve #: **25433**
Priority: **19**
Area: **4ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**4**	**3**			**7**
Hollow(s) present			**1**	**1**	**2**
Marri	**11**	**11**	**4**	**2**	**28**
Hollow(s) present					
Total	**15**	**14**	**5**	**3**	**37**

Weed Severity: Low
Some Watsonia and Eastern States *Acacia* spp.

Dieback Occurrence: Approximately 20% infested.
Vegetation in Very Good-Excellent in uninfested area.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat serious environmental weeds.
3. Install Standard Protocol Dieback signage.

Uninfested vegetation in Leschenaultia Park

Recent deaths of *Xanthorrhoea preissii* and *Banksia dallanneyi* in Leschenaultia Park

Recent death of *Xanthorrhoea preissii* in Leschenaultia Park

Southern Railway Heritage Trail, Boya - Mundaring

Reserve #: **31196**
Priority: **20**
Area: **101.51ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**16**	**9**	**3**	**2**	**30**
Hollow(s) present		2		**1**	**3**
Marri	**82**	**27**	**8**	**5**	**122**
Hollow(s) present		**1**		**3**	**4**
Total	**98**	**39**	**11**	**11**	**159**

Weed Severity: High
Serious environmental weeds including Bridal Creeper, Watsonia, Victorian Teatree, Giant Reed (*Arundo donax*). Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout along with Fig and Olive Trees, and Tagasaste.

Dieback Occurrence: Approximately 70% infested.
Evidence of Dieback recorded at regular intervals along the trail. There is no Standard Protocol Dieback signage in this reserve.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat serious environmental weeds.
3. Install Standard Protocol Dieback signage.

Significant weed infestations along the Southern Railway Heritage Trail

Blackberry infestation along the Southern Railway Heritage Trail

Evidence of a possible Dieback infestation with *Banksia sessilis* deaths

Cookes Brook

Reserve #: **38367**
Priority: **21**
Area: **9.01ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Blackbutt	**9**	**7**	**7**	**4**	**27**
Hollow(s) present					
Flooded Gum	**52**	**13**	**5**	**7**	**77**
Hollow(s) present		**1**	**1**	**1**	**3**
Marri	**2**			**1**	**3**
Hollow(s) present		1			**1**
Wandoo	27	**2**			**29**
Hollow(s) present		**1**			**1**
Unknown (Dead)					
Hollow(s) present		**1**			**1**
Total	**90**	**26**	**13**	**13**	**142**

Weed Severity: Very High
Significant Blackberry populations in the riparian zone, in addition to Cotton Bush, Fig and Olive trees and Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout. The Blackberry populations in this reserve are significant and need urgent attention to prevent it being spread to other areas within the Shire.

Dieback Occurrence: Mostly Uninterpretable
Some evidence of possible Dieback infestation in upland vegetation – requires sampling.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat serious environmental weeds.
3. Install Standard Protocol Dieback signage.

Significant Blackberry infestation at Cookes Brook

Cottonbush fruiting at Cookes Brook Reserve

Evidence of a possible Dieback Infestation at Cookes Brook Reserve

Carawatha Road Reserve

Reserve #: **13766**
Priority: **22**
Area: **0.43ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**1**	**1**			**2**
Hollow(s) present					
Marri	**1**				**1**
Hollow(s) present					
Total	**2**	**1**			**3**

Weed Severity: None

Dieback Occurrence: Possibly uninfested – Needs sampling
There is no Standard Protocol Dieback signage in this reserve.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Install Standard Protocol Dieback signage.

Uninfested vegetation at Carawatha Road Reserve

Glynden Reserve

Reserve #: **29959**
Priority: **23**
Area: **1.34ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri					
Hollow(s) present	1				**1**
Total	**1**				**1**

Weed Severity: Low
Small Watsonia populations and some Gladioli. Tagasaste near boundary.

Dieback Occurrence: Uninfested – No evidence of Dieback
Protectable uninfested vegetation. There is no Standard Protocol Dieback signage in the reserve.

Recommended Management Actions:
1. Install Standard Protocol Dieback signage.
2. Treat the Wastonia, Gladioli and Tagasaste in the reserve.

Significant annual weed population at Glynden Park

Gladioli population at Glynden Park

Roland Road Reserve

Reserve #: **45986**
Priority: **24**
Area: **1.49ha**

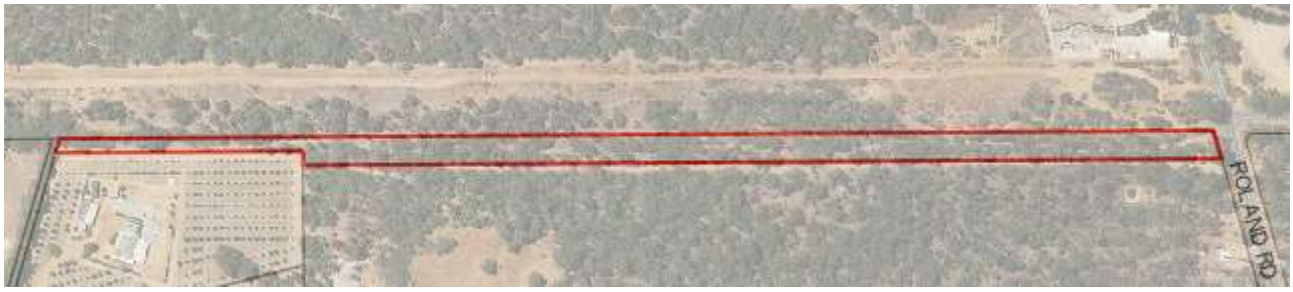
Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**11**	**6**	**1**	**1**	**19**
Hollow(s) present				**2**	**2**
Marri	**4**	**6**		**1**	**11**
Hollow(s) present				**1**	**1**
Flooded Gum	**4**				**4**
Hollow(s) present					
Total	**19**	**12**	**1**	**5**	**36**

Weed Severity: Low
Acacia longifolia

Dieback Occurrence: Approximately 30% Uninfested
There is likely to be an uninfested area which is protectable and requires a comprehensive Dieback assessment. There is no Standard Protocol Dieback signage in this reserve.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Install Standard Protocol Dieback signage.



Uninfested vegetation in Roland Road Reserve

***Xanthorrhoea gracilis* deaths as a result of potential dieback within Roland Road Reserve.**

Old Parkerville School Site

Reserve #: **13214**
Priority: **25**
Area: **1.59ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**1**	**1**	**1**	**1**	**4**
Hollow(s) present					
Marri	**15**	**7**	**2**		**24**
Hollow(s) present					
Unknown (Dead)		**1**			**1**
Hollow(s) present					
Total	**16**	**9**	**3**	**1**	**29**

Weed Severity: Low
Tagasaste weeds present.

Dieback Occurrence: Uninterpretable.
Creek likely to be infested.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Install Standard Protocol Dieback signage.

Acacia longifolia, Acacia decurrens **and Tagasaste are present at the Old Parkerville School Site.**

Acacia iteaphylla **at Old Parkerville School Site**

Revegetation has restored understory and midstory to the Old Parkerville School Site

Marriott Park

Reserve #: **25700**
Priority: **26**
Area: **1.15ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Flooded Gum	**7**	**3**	**1**		**11**
Hollow(s) present					
Total	**7**	**3**	**1**		**11**

Weed Severity: Medium
Cottonbush in the southern portion of the reserve. There are Date Palms and a Japanese Pepper tree in the middle portion and Paspalum grass in the creek in the northern portion of the reserve.

Dieback Occurrence: Uninterpretable
Creek likely to be infested.

Recommended Management Actions:
1. Install Standard Protocol Dieback signage
2. Treat the Cotton Bush, Date Palms, Japanese Pepper Trees and Papsalum grass in the reserve.

Date Palm (*Phoenix dactylifera)* in the Marriot Park Reserve

Uninterpretable vegetation in creek area of Marriot Park, with Paspalum grass and Watsonia present.

Jane Byfield Reserve

Reserve #: **880**
Priority: **27**
Area: **0.63ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**4**	**1**			**5**
Hollow(s) present					
Marri	**14**	**12**	**2**		**28**
Hollow(s) present					
Total	**18**	**13**	**2**		**33**

Weed Severity: Low
Acacia pycnantha and Spotted Gum (*Corymbia maculata)*.

Dieback Occurrence: Uninfested with one recommended sample site
Protectable Uninfested Vegetation. There is no Standard Protocol Dieback signage.

Recommended Management Actions:
1. Install Standard Protocol Dieback signage.
2. Restrict vehicular access.

Uninfested vegetation at Jane Byfield Reserve

Recommended Dieback sample site at Jane Byfield Reserve

Milligan Road Reserve

Reserve #: **22843**
Priority: **28**
Area: **2.43ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**2**	**5**	**1**		**8**
Hollow(s) present					
Marri	**10**	**4**	**1**		**15**
Hollow(s) present					
Dead (Unknown)			**1**		
Hollow(s) present					
Total	**12**	**9**	**3**		**24**

Weed Severity: Low
Tagasaste present, Victorian Teatree and *Acacia longifolia*. Another acacia species noted by Friends Group as dominant in the mid-storey is a native species, *Acacia celastrifolia.*

Dieback Occurrence: Uninterpretable
Possible infestation on the eastern side at lowest elevation and possibly a spot infestation on the western side at the intersection of the assessed area and the areas not vested in the Shire. Additional reserve to the north (not currently vested in the Shire) is predominantly uninfested and overall in Very Good condition.

Recommended Management Actions:
1. Install Standard Protocol Dieback signage.
2. Remove Tagasaste, Victorian Teatree and *Acacia longifolia*.

***Acacia longifolia* in Milligan Road Reserve**

Tagasaste and *Acacia podalyrifolia* present in Milligan Road Reserve

Dead of *Xanthorrhoea preissii* in Milligan Road Reserve as an indicator of the presence of Dieback within the reserve.

Hilltop Reserve

Reserve #: **41670**
Priority: **29**
Area: **1.14ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah					
Hollow(s) present				**3**	**3**
Marri	**14**	**3**	**1**	**1**	**19**
Hollow(s) present				**1**	**1**
Blackbutt	**1**			**1**	**2**
Hollow(s) present					
Total	**15**	**3**	**1**	**6**	**25**

Weed Severity: High
Cotton bush, Bridal creeper, Wonga Wonga vine, Periwinkle, Bleeding Heart Fig and Olive trees

Dieback Occurrence: Approximately 20% infested
Needs sample to confirm. There is likely to be an uninfested area which is protectable and require a comprehensive Dieback assessment.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat serious environmental weeds.
3. Spray buffer around protectable areas with phosphite.
4. Install Standard Protocol Dieback signage.

Recommended sample site at Hilltop Reserve

Paspalum grass in the creek at Hilltop Reserve

Marloo Theatre Reserve

Reserve #: **36045**
Priority: **30**
Area: **3ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**1**	**1**			**2**
Hollow(s) present		**2**			**2**
Wandoo	**6**	**2**		**3**	**11**
Hollow(s) present					
Flooded Gum		**2**			**2**
Hollow(s) present					
Total	**7**	**7**		**3**	**17**

Weed Severity: Medium
Several Watsonia populations, as Veldt Grass, Tagasaste, Olive and Cape Lilac trees, Agave and *Acacia pycnantha*

Dieback Occurrence: No evidence of Dieback in Very Good to Excellent condition vegetation
There are likely to be uninfested areas which are protectable and require a comprehensive Dieback assessment. There is not Standard Protocol Dieback signage in this reserve

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat environmental weeds within the reserve.
3. Install Standard Protocol Dieback signage.

Agave population at Marloo Theatre Reserve

Uninfested protectable vegetation at Marloo Theatre Reserve

Beechina Rail Reserve

Reserve #: **35397**
Priority: **31**
Area: **6.68ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah	**3**	**2**	**1**	**2**	**8**
Hollow(s) present			**1**	**2**	**3**
Marri	**9**	**8**	**1**		**18**
Hollow(s) present					
Wandoo	**1**				**1**
Hollow(s) present					
Blackbutt	**4**				**4**
Hollow(s) present					
Total	**17**	**10**	**3**	**4**	**34**

Weed Severity: High
Large blackberry population plus Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) and Tagasaste**.**

Dieback Occurrence: Approximately 60%
Requires sample to confirm. There is likely to be uninfested areas which are protectable and require a comprehensive Dieback assessment.

Other Observations:
There is a fallen tree blocking vehicle access mid-way along the southern section of the reserve. Lots of litter at the northern access to the southern section due to bus shelter - needs a bin.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Treat environmental weeds within the reserve.
3. Install a bin near the bus shelter.
4. Remove fallen tree blocking vehicle access along southern section of reserve.
5. Install Standard Protocol Dieback signage.

Evidence of Dieback at Beechina Rail Reserve

Blackberry infestation at along Beechina Rail Reserve

Gilfellon Reserve

Reserve #: **31264**
Priority: **32**
Area: **2.96ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Jarrah					
Hollow(s) present			**1**		**1**
Marri	**12**	**5**	**2**		**19**
Hollow(s) present			**1**		**1**
Total	**12**	**5**	**4**		**21**

Weed Severity: Very High.
Creek line has extensive Blackberry population. Also, Paspalum grass and Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*).

Dieback Occurrence: No evidence of Dieback, creek line uninterpretable.
There is likely to be an uninfested area which is protectable and requires a comprehensive Dieback assessment.

Other Observations:
The reserve has a large population of *Grevillea vestita* and offers a significant seed resource from which to collect and propagate.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback**.**
2. Treat Blackberry within the reserve in order to stop the spread further.
3. Install Standard Protocol Dieback signage**.**

Recommended Dieback Sample site at Gilfellon Reserve

Blackberry at Gilfellon Park

Quail Street Reserve

Reserve #: **29269**
Priority: **33**
Area: **105.22ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**289**	**215**	**75**	**19**	598
Hollow(s) present		8	23	24	**55**
Jarrah	**596**	**247**	**48**	**22**	913
Hollow(s) present	6	4	24	28	**62**
Unknown (dead)	**6**	**23**	**12**		41
Hollow(s) present		1	2		**3**
Wandoo	**36**	**13**	**2**		51
Hollow(s) present		1	6	1	**8**
Blackbutt			**1**		1
Hollow(s) present					
Total	**933**	**512**	**193**	**94**	**1732**

Weed Severity: Low
Scattered Eastern States *Acacia* spp. And Freesias in lower areas.

Dieback Occurrence: Approximately 85% infested
Very old infestation with mid-storey species missing and evidence of active disease as Dieback moves into mid and upper slope Uninfested remnants. No protectable areas. Remaining Uninfested area is too small to be protectable in the long term due to upslope infestation.

Other Observations:
Significant erosion along some of the track in the eastern portion of the reserves and a dangerous sinkhole in creek crossing near the southern boundary.
Large number of significant trees and connected to other large reserves / wildlife sanctuary.

Recommended Management Actions:

1. Undertake sampling program to confirm widespread distribution of the pathogen within the reserve.
2. Address erosion issue in the eastern portion of the reserve.
3. Seek to develop a partnership with Australian Wildlife Conservancy, who own the adjacent infested property, to undertake a research project to investigate rehabilitation of infested area to restore ecological function using resist and moderately-low susceptibility species.

Recent *Xanthorrhoea preissii death in Quail Street Reserve.*

Significant erosion exists in the eastern portion of Quail Street Reserve.

Burma Road Reserve

Reserve #: **37563**
Priority: **34**
Area: **19.49ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**6**	**7**	**1**	**1**	**15**
Hollow(s) present					
Jarrah	**1**	**2**	**1**		**4**
Hollow(s) present				1	1
Unknown (dead)	**21**	**28**	**2**		**51**
Hollow(s) present					
Wandoo	**26**	**31**	**6**	**4**	**67**
Hollow(s) present			5	14	19
Total	**54**	**68**	**15**	**20**	**157**

Weed Severity: Medium
Significant populations of Bulrush and Fig tree in the creek line with some Cotton bush and *Acacia iteaphylla.*

Dieback Occurrence: Approximately 90% infested
While the riparian vegetation is Uninterpretable there is evidence of Dieback upslope which means that the creek is infested. No protectable areas due to infestation being upslope of creek. Sampling would confirm this determination.

Other Observations:
Rubbish dumping in open area north of Burma Road.

Recommended Management Actions:
1. Treat Declared Pest, Cottonbush, and other weeds along watercourse.
2. Undertake revegetation of treated area with native wetland and riparian species.
3. Restrict access and remove rubbish.

Rubbish dumping in Burma Road Reserve

Degraded vegetation in Burma Road Reserve

Richard Watson Hardey

Reserve #: **7789**
Priority: **35**
Area: **6.77ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**19**	**6**	**22**	**19**	**66**
Hollow(s) present		1	2	7	10
Jarrah	**3**	**2**	**1**		**6**
Hollow(s) present				1	1
Unknown (dead)					
Hollow(s) present				5	5
Wandoo	**2**	**1**			**3**
Hollow(s) present					
Total	**24**	**10**	**25**	**32**	**91**

Weed Severity: High
Significant Watsonia populations. Also, some Tagasaste, Kurrajong and Eastern States *Acacia* spp.

Dieback Occurrence: Approximately 60% infested
Remaining uninfested area is too small to be protectable in the long term due to upslope infestation along Strettle Road.

Other Observations:
Vegetation over about 50% of the reserve is Degraded due to weeds, Dieback and ground disturbance.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas.
2. Eradicate Watsonia populations and revegetate areas.
3. Install Standard Protocol Dieback signage.

Significant Watsonia populations exist in Richard Watson Hardey Reserve.

Recent death of *Banksia sessilis* shows disease expression is active in Richard Watson Hardey reserve.

Bulkirra Reserve

Reserve #: **39034**
Priority: **36**
Area: **3.97ha**
No Access

Weed Severity:
-

Dieback Occurrence:
Unknown (possible that restricted access may prevent introduction or spread)

Other Observations:
Ranked #33 in 2008 report with the following recommendations for management: “Manage weed control from private properties. Undertake weed control and revegetation in creekline. Undertake detailed flora survey of under-represented vegetation complex. Undertake detailed flora survey of potential PEC.”

Recommended Management Actions:

1. Investigate access in order to undertake assessment and review priority. This reserve is associated with Bush Forever site and mapped as ‘Forrestfield Complex’ vegetation’ which has a limited extent remaining and is potentially significant.

North Darlington Reserves (Bilgoman Pool Site)

Reserve #: **38155**
Priority: **37**
Area: **5.66ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**33**	**12**	**8**	**9**	**62**
Hollow(s) present		1		5	6
Jarrah	**3**				**3**
Hollow(s) present					
Wandoo					
Hollow(s) present			2		2
Total	**36**	**13**	**10**	**14**	**73**

Weed Severity: Medium
Significant weeds infestation at the corner of Darlington Road and GEH including Wonga Wonga vine and Hawthorn. There are scattered Eastern States *Acacia* spp. throughout the reserve and some Victorian Teatree along the eastern boundary of the reserve adjacent to Lionel Road.

Dieback Occurrence: Approximately 80% infested
Remaining uninfested area is too small to be protectable in the long term.

Other Observations:
There is a dump of concrete rubble at the end of the pool reserve.

Recommended Management Actions:
1. Restrict vehicular access.
2. Eradicate serious weed populations east of Darlington Road especially near the intersection of GEH and revegetate using dampland Dieback resistant species.
3. Eradicate Victorian Teatree along the eastern boundary of the reserve adjacent to Lionel Road and revegetate using Dieback resistant or low susceptibility species.
4. Remove rubbish.

Brazillian pepper tree (*Schinus terebinthifolius*) in North Darlington Reserves (Bilgoman Pool Site).

Wonga Wonga Vine infestations present in North Darlington Reserves.

Clifton Park

Reserve #: **4041**
Priority: **38**
Area: **5.68ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**29**	**11**	**6**	**7**	**53**
Hollow(s) present		2	1	4	**7**
Jarrah	**11**	**1**			**12**
Hollow(s) present			1		**1**
Wandoo	**6**	**2**			**8**
Hollow(s) present		3	2	1	**6**
Blackbutt	**17**	**3**	**1**		**21**
Hollow(s) present					
Total	**63**	**22**	**11**	**12**	**108**

Weed Severity: Medium

Dieback Occurrence: 20-70% infested
Dieback is present in gully area, but the extent is unknown due to disturbance and Degraded vegetation condition.
Site is not protectable. Remaining uninfested area is too small to be protectable in the long term.

Other Observations:
Uncontrolled public vehicular access is a significant issue in this reserve.

Recommended Management Actions:
1. Eradicate Watsonia populations and revegetate areas.
2. Revegetate with upland Dieback resistant species such as *Calothamnus* spp. and *Acacia* spp. and riparian species such as *Melaleuca* spp. and sedges in lower slopes and gullies.
3. Restrict public vehicular access.

Significant *Watsonia* populations in Clifton Park Reserve.

Uncontrolled public vehicular access is a major issue in Clifton Park Reserve.

Boyamine Reserve

Reserve #: **40416**
Priority: **39**
Area: **5.65ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**42**	**23**	**5**	**2**	**72**
Hollow(s) present		3	3	6	**12**
Jarrah	**39**	**12**	**3**	**4**	**58**
Hollow(s) present				4	**4**
Total	**81**	**38**	**11**	**16**	**146**

Weed Severity: Low
Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) throughout.

Dieback Occurrence: 20-50% infested
No protectable areas. Remaining uninfested area is too small to be protectable in the long term.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Install Standard Protocol Signage.
3. Revegetate with upland Dieback resistant species such as *Calothamnus* spp. and *Acacia* spp.

Habitat and biomass reduction is present within Boyamine Reserve.

Many dead *Banksia grandis* are present within Boyamine Reserve which are indicating Dieback activity within the reserve.

***Acacia iteaphylla* in front of dead *Banksia grandis.* Weeds such as Eastern States Wattles can potentially invade the degraded areas left by dieback in the reserve.**

Chidlow Rail Reserve (Coothallie Rd)

Reserve #: **35396**
Priority: **40**
Area: **15.07ha**

Significant Trees:

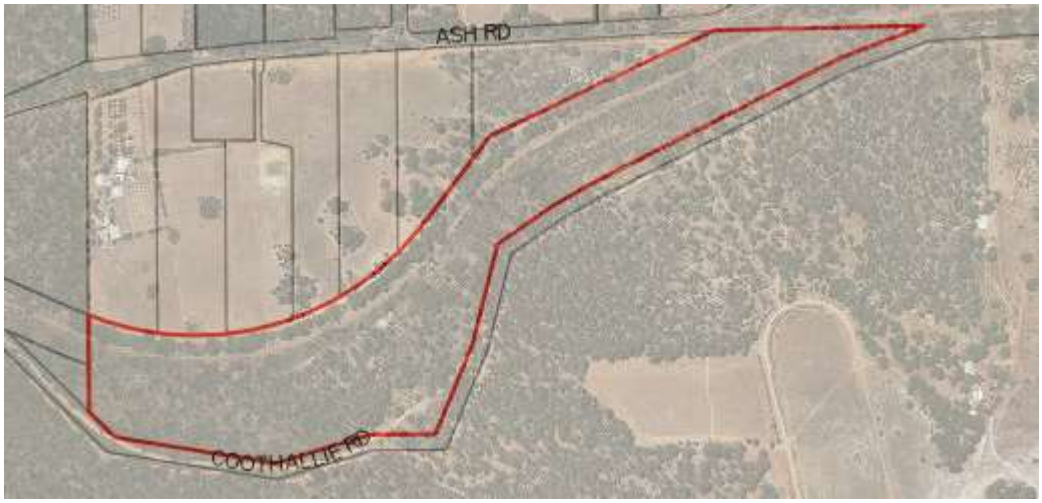
Species	500-699	700-899	900-1099	1100+	Total
Marri	**13**	**11**	**3**		**27**
Hollow(s) present					
Jarrah	**5**	**3**			**8**
Hollow(s) present					
Wandoo		**2**			**2**
Hollow(s) present		1			**1**
Unknown (Dead)		**2**			**2**
Hollow(s) present					
Total	**18**	**19**	**3**		**40**

Weed Severity: Low
Some Watsonia and Eastern States *Acacia* spp.

Dieback Occurrence: At least 30% infested
No protectable areas. Remaining uninfested area is too small to be protectable in the long term.

Recommended Management Actions:

1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback
2. Control Watsonia species in the reserve
3. Install Standard Protocol Signage



***Acacia iteaphylla* are present in Chidlow Rail Reserve.**

Dead *Banksia sessilis* indicating Dieback activity within Chidlow Rail Reserve.

Sunninghill Park Reserve

Reserve #: **33352**
Priority: **41**
Area: **2.74ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**12**	**1**			**13**
Hollow(s) present					
Jarrah	**1**	**1**			**2**
Hollow(s) present					
Unknown (Dead)		**1**			**1**
Hollow(s) present					
Total	**13**	**3**			**16**

Weed Severity: Low
Some Watsonia and Eastern States *Acacia* spp.

Dieback Occurrence: Infested – extent unknown
No protectable areas. Remaining uninfested area is too small to be protectable in the long term.

Recommended Management Actions:
1. Control Watsonia species in the reserve.
2. Revegetate using Dieback resistant or low susceptibility species.

Eastern States wattles such as *Acacia podalyriifolia* are present in Sunninghill Park Reserve

Older death (foreground) and fresh death (background) of *Xanthorrhoea preissii* showing disease chronology of Dieback within Sunninghill Park Reserve

Yennerdin Reserve

Reserve #: **22781**
Priority: **42**
Area: **2.81ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**15**	**2**			**17**
Hollow(s) present					
Jarrah	**1**				**1**
Hollow(s) present					
Total	**16**	**2**			**18**

Weed Severity: Low
Some Watsonia and Eastern States *Acacia* spp.

Dieback Occurrence:
Infested, it is unlikely that there will be protectable areas within the reserve.

Other Observations:
Rubbish Dump noted.

Recommended Management Actions:
1. Control Watsonia in the reserve.
2. Remove rubbish from reserve.
3. Sampling to confirm dieback infested status of the reserve.
4. Install Standard Protocol Signage.

***Acacia iteaphylla* are present within Yennerdin Reserve**

***Acacia podalyriifolia* and *Acacia decurrens* are present within Yennerdin Reserve.**

Dead *Xanthorrhoea preissii* is an indicator of the presence of Dieback within Yennerdin Reserve.

Chidlow Rail Reserve (near Onslow St)

Reserve #: **32482**
Priority: **43**
Area: **13.45ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**11**	**6**			**17**
Hollow(s) present					
Jarrah	**9**	**3**			**12**
Hollow(s) present					
Wandoo	**2**				**2**
Hollow(s) present					
Total	**22**	**9**			**31**

Weed Severity: Low
Mainly Eastern States *Acacia* spp. and Tagasaste.

Dieback Occurrence: At least 50% infested
No protectable areas. Remaining uninfested area is too small to be protectable in the long term.

Recommended Management Actions:
1. Undertake a comprehensive Dieback assessment to map and demarcate protectable areas and install signage to raise public awareness of Dieback.
2. Install Standard Protocol Signage.
3. Control environmental weed species in the reserve.

***Acacia longifolia* are present within Chidlow Rail Reserve**

Deaths of *Banksia sessilis* along a cleared firebreak showing disease chronology with both younger and older deaths, a sign of Dieback within Chidlow Rail Reserve.

Dead *Banksia sessilis* next to flowering *Acacia iteaphylla* in Chidlow Rail Reserve.

Mandoon Reserve

Reserve #: **33079**
Priority: **44**
Area: **2ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**17**	**1**			**18**
Hollow(s) present				1	**1**
Flooded Gum	**21**	**5**	**1**		**27**
Hollow(s) present				2	**2**
Total	**38**	**6**	**1**	**3**	**48**

Weed Severity: Very High
Significant Bridal Creeper population in southern portion of the reserve. Also, Arum lily and Caster Oil Plant Olive and Fig trees present.

Dieback Occurrence: No evidence of Dieback
Creek line is uninterpretable. Sample site recorded in upland area.

Other Observations:
One individual of the Threatened (Declared Rare) species *Acacia aphylla* was recorded in the central reserve. The reserve needs substantial revegetation.

Recommended Management Actions:
1. Control environmental weeds within the reserve
2. Revegetate using Dieback resistant or low susceptibility species.
3. Plant more *Acacia aphylla* (DRF) as the reserve has suitable habitat for this species.

Erosion along creek bed in Mandoon Park

Threatened (Declared rare) species *Acacia aphylla* at Mandoon Park

Brookside Park

Reserve #: **31777**
Priority: **45**
Area: **1.77ha**

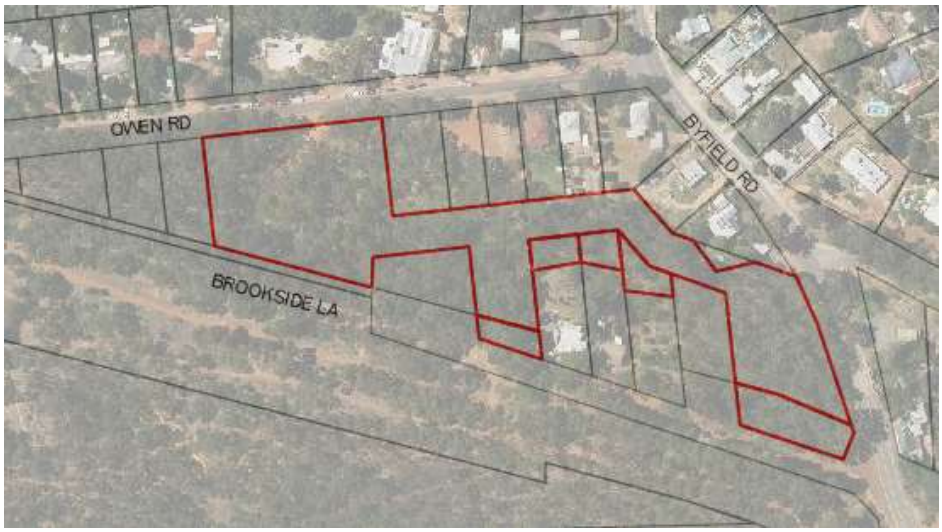
Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**3**	**2**			**5**
Hollow(s) present					
Flooded Gum		**2**			**2**
Hollow(s) present					
Total	**3**	**4**			**7**

Weed Severity: Low
Introduced grasses.

Dieback Occurrence: Excluded due to degraded vegetation condition
No understorey – Needs revegetation.

Recommended Management Actions:
1. Revegetate using riparian species.
2. Eradicate paspalum grass along watercourse.



Introduced grasses such as Paspalum grass are present in Brookside Park.

Paspalum grass along the banks of creek in Brookside Park.

Lilydale Road Reserve

Reserve #: **46376**
Priority: **46**
Area: **1.04ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**24**	**14**	**7**	**12**	**57**
Hollow(s) present				1	**1**
Jarrah	**4**	**3**	**3**	**2**	**12**
Hollow(s) present					
Total	**28**	**17**	**10**	**15**	**70**

Weed Severity: High
Large watsonia population plus Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*) and Tagasaste.

Dieback Occurrence: Approximately 80%
Requires sample to confirm

Recommended Management Actions:

1. Control environmental weed species in the reserve.
2. Revegetate using Dieback resistant or low susceptibility species.

Eastern States Acacia are an issue within Lilydale Reserve.

Recent and older deaths of *Xanthorrhoea preissii* indicating the presence of dieback within Lilydale Road Reserve.

Biomass reduction within Lilydale Road Reserve as a result of Dieback within the reserve.

Rabone Way Reserve

Reserve #: **31261**
Priority: **47**
Area: **1.03ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Flooded Gum		**2**			**2**
Hollow(s) present					
Total		**2**			**2**

Weed Severity: High
Large populations of Watsonia, some Bridal Creeper, Periwinkle and Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*).

Dieback Occurrence: Uninterpretable

Recommended Management Actions:
1. Treat environmental weeds within the reserve.
2. Install Standard Protocol Dieback signage.

Significant population of Periwinkle and Watsonia at Rabone Park

Annual grasses and Agave at Rabone Park

Black Cockatoo Reserves (South)

Reserve #: **22848**
Priority: **48**
Area: **1.32ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**5**	**2**	**2**	**3**	**12**
Hollow(s) present		1	1		**2**
Jarrah	**4**				**4**
Hollow(s) present					
Total	**9**	**3**	**3**	**3**	**18**

Weed Severity: Low
Some *Acacia iteaphylla*

Dieback Occurrence: At least 90% infested
No protectable areas. Remaining uninfested area is too small to be protectable in the long term.

Other Comments/Issues:
There is a dangerous tree which could fall over at any time, near the entrance at Darkan Street that needs to be felled.

Recommended Management Actions:
1. Remove dangerous tree.
2. Revegetate with upland Dieback resistant and low susceptibility species.

Recent *Xanthorrhoea preissii* death indicates dieback activity in Black Cockatoo Reserve (South)

Reduced biomass in reserve and invasive *Acacia iteaphylla* in background.

Swan View Trail

Reserve #: **32485**
Priority: **49**
Area: **17.32ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**11**	**4**			**15**
Hollow(s) present					
Jarrah					
Hollow(s) present					
Wandoo	**2**			**1**	**3**
Hollow(s) present					
Unknown (Dead)					
Hollow(s) present					
Total	**13**	**4**		**1**	**18**

Weed Severity: High
Significant populations of Watsonia, Bridal Creeper and Morning Glory

Dieback Occurrence: Mostly Excluded due to degraded vegetation condition.

Recommended Management Actions:
1. Control Watsonia species in the reserve.
2. Revegetate using Dieback resistant or low susceptibility species.

Morning Glory along embankment at Swan View Trail

Bridal Creeper along Swan View Trail

Chidlow Village Green

Reserve #: **6276**
Priority: **50**
Area: **4.31ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**24**	**14**	**7**	**12**	**57**
Hollow(s) present				1	**1**
Jarrah	**4**	**3**	**3**	**2**	**12**
Hollow(s) present					
Total	**28**	**17**	**10**	**15**	**70**

Weed Severity: High
Bridal creeper plus large Watsonia populations. Scattered Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*), Kurrajong trees, Agave and Tagasaste. and Robinia.

Dieback Occurrence: Mostly Excluded due to degraded vegetation condition.

Recommended Management Actions:
1. Control environmental weed species in the reserve.
2. Revegetate using Dieback resistant or low susceptibility species.

Noblewood Reserve

Reserve #: **43993**
Priority: **51**
Area: **1.95ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**37**	**11**	**3**	**5**	**56**
Hollow(s) present	1			1	**2**
Jarrah	**1**			**6**	**7**
Hollow(s) present		1		6	**7**
Total	**39**	**12**	**3**	**18**	**72**

Weed Severity: Low
Eastern States *Acacia* spp. (mainly *A. iteaphylla* and *A. longifolia*), Kurrajong and Kikuyu.

Dieback Occurrence: Mostly Excluded due to degraded vegetation.

Other Observations:
No understorey – Needs revegetation. Evidence of some past revegetation but requires significantly more.

Recommended Management Actions:
1. Revegetate using Dieback resistant or low susceptibility species.
2. Install Standard Protocol Signage.

Revegetation would benefit the degraded nature of Noblewood Reserve.

Iron Road Reserve

Reserve #: **44999**
Priority: **52**
Area: **1.02ha**

Weed Severity: Low
Some introduced Acacia species including *Acacia longifolia* and *A. decurrens*

Dieback Occurrence:
Predominantly uninterpretable with evidence of Dieback adjacent to the heritage trail

Other Observations:
Adjacent to Threatened (Declared Rare) species *Acacia aphylla* population.

Recommended Management Actions:
1. Undertake a Dieback sampling in area adjacent to the heritage trail.
2. Control introduced Acacia species.

***Acacia aphylla* (Declared Rare) near Iron Road Reserve**

***Acacia longifolia* within Iron Road Reserve**

Connection Reserve

Reserve #: **44203 (between two larger state government managed reserves)**
Priority: **53**
Area: **0.93ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**8**	**1**	**1**		**10**
Hollow(s) present			1	1	2
Jarrah		**2**		**1**	**3**
Hollow(s) present					
Unknown (Dead)					
Hollow(s) present		1			1
Total	**8**	**4**	**2**	**2**	**16**

Weed Severity: None

Dieback Occurrence: Approximately 90% infested
No protectable areas. Remaining uninfested area is too small to be protectable in the long term.

Recommended Management Actions:

1. Revegetate using Dieback resistant or low susceptibility species.

Wandeara Crescent Reserve

Reserve #: **41682**
Priority: **54**
Area: **0.57ha**

Significant Trees:

Species	500-699	700-899	900-1099	1100+	Total
Marri	**4**	**1**			**5**
Hollow(s) present					
Jarrah	**1**	**3**	**1**		**5**
Hollow(s) present					
Total	**5**	**4**	**1**		**10**

Weed Severity: High
Cottonbush plus Eastern States *Acacia* spp. (mainly *A. iteaphylla, A. longifolia and A. pycnantha*) and Cape Lilac.

Dieback Occurrence: Excluded
Due to Degraded Vegetation Condition.

Other Observations:
Eastern States *Acacia* spp. Have been cut down without any rehabilitation/revegetation. Suggest that a more strategic approach be adopted for weed control such as the Bradley Method of Bush Regeneration.

Recommended Management Actions:
1. Revegetate using Dieback resistant or low susceptibility species.
2. Eradicate Cottonbush.

***Acacia iteaphylla* seedlings within Wandeara Crescent Reserve**

Degraded Bushland in Wandeara Crescent Reserve

Turfed areas present within parts of Wandeara Crescent Reserve