

LAKE CLAREMONT MANAGEMENT PLAN 2016 - 21

FLORA & VEGETATION VALUES - APPENDIX 2



Development

Natural Area Holdings Pty Ltd, trading as Natural Area Consulting Management Services (Natural Area), wrote the first four drafts of this management plan with guidance and assistance from officers of the Town. The Lake Claremont Advisory Committee, Friends of Lake Claremont and the Claremont Council revised those drafts.

Officers of the Town of Claremont completed subsequent drafts of this management plan and appendices.

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Contents

1.0	Flora Values	1
1.1	Native Flora Species	1
1.2	Vegetation Type	2
1.3	Vegetation Condition.....	3
1.4	Conservation Significant Flora	4
1.5	Environmental Weeds	4
1.5.1	Introduced Trees (Potential Woody Weeds).....	6
1.5.2	Garden Wastes	8
1.6	Weed Management.....	9
1.6.1	Manual Weed Control	9
1.6.2	Herbicide Application in Natural Areas	10
1.6.3	Weed Mapping	11
1.6.4	Weed Control Training	11
1.7	Revegetation and Rehabilitation	11
1.7.1	Seed Collection and Plant Propagation	12
1.7.2	Revegetation Protocols	12
1.8	Fungi	13
1.9	Pathogen Management.....	13
1.9.1	<i>Phytophthora</i> Dieback.....	13
1.9.2	Honey Fungus (<i>Armillaria luteobubalina</i>).....	14
1.9.3	Marri Canker (<i>Quambalaria sp.</i>).....	14
1.9.4	Myrtle Rust (<i>Uredo rangelii</i>).....	14
1.10	Fire.....	15
2.0	Supplementary Information	16
2.1	Example Flora Species of Lake Claremont.....	16
2.2	Example Weed Species at Lake Claremont	17
2.3	Geographical Information and Maps.....	18
2.4	Combined Flora Species List	21
2.5	Lake Claremont Significant Weeds.....	39
2.5.1	Woody Weed Species	39
2.5.1	Other Weed Species	40
2.6	Example Fungi at Lake Claremont	43
3.0	Assessment Reference Information	44

3.1	Vegetation Type Assessment Methodology.....	44
3.2	Vegetation Condition.....	45
3.3	Conservation Code Descriptions	46
4.0	References	48

1.0 Flora Values

The flora present at the Lake Claremont is closely associated with its geology and position within the landscape as a brackish coastal wetland at the intersection of the Spearwood and Quindalup Dune Systems on the western edge of the Swan Coastal Plain and the historical land use of the area. In turn, the vegetation present at the site influences the fauna species that utilise the Lake Claremont site (Appendix 3).

1.1 Native Flora Species

Flora within remnant vegetation at Lake Claremont includes native and introduced dryland and wetland species. Revegetation of the wetland buffer and northern portion of the site has utilised local native species that are typically associated with the Karrakatta Complex – Central and South Vegetation Complex of the Swan Coastal Plain.

A review of species listed by NatureMap (2014), listed in Town of Claremont (TOC) records of restoration plantings and observed by Natural Area indicates that 346 flora species could occur with the Lake Claremont site. The composition of the flora by life form is summarised in Table 1 and comprehensive species lists appear in Section 2.4. The species present are a reflection of the indigenous vegetation, disturbance events and recent revegetation activities.

Note: NatureMap lists species that could occur at the site and is not necessarily a reflection of what is currently growing at the site. Observations by Natural Area reflect those species presenting at the time of their site assessment activities. Photographs of selected flora species observed during site inspection appear in Section 2.1.

Table 1: Potential composition of flora of the Lake Claremont by life form.

Life Form	Total Number of Species	Native	Introduced
Bryopsid (Moss)	6	6	
Conifer	2	1	1
Cycad	1	1	
Dicotyledon	236	156	80
Gymnosperm	1	1	
Monocotyledon	98	70	28
Pteridophyte (Fern)	2	2	
Totals	346	237	109

1.2 Vegetation Type

Vegetation types around the Lake Claremont include woodland and grassed areas. The woodland areas are primarily associated with remnant and revegetated nature space in the northern and western portion of the site. Major revegetation has occurred since the long nine hole golf course closed in June 2009. Five vegetation types occur within the nature space of the Lake Claremont and surrounds (Table 2), namely *Agonis flexuosa* Woodland, Marri – Jarrah mixed Woodland, *Melaleuca raphiophylla* Woodland, Tuart Woodland over mixed Shrubs and *Banksia attenuata* – Tuart Woodland. The vegetation types are summarised in Table 2 and locations of each type appear in Section 2.3. Vegetation types were determined using the methodology provided in Bush Forever: Volume 2 (Government of Western Australia 2000), which lists dominant over storey species, then middle and understorey species (Section 3.1). Bush Forever also indicates that the *Agonis flexuosa* Woodland is regionally significant vegetation. While assessment criteria published by Western Australian Local Government Association (WALGA 2004) suggest the Tuart Woodland is not regionally significant, as the only remnant of this type within the Town of Claremont it is locally significant.

Table 2a: Lake Claremont vegetation types



Vegetation Type	Description	Photograph
<i>Agonis flexuosa</i> Woodland	<p><i>Agonis flexuosa</i> Woodland over mixed Shrubland and sparse Herbland</p> <p>Note: Palm in the top centre of photograph is an exotic species planted when the golf course was operating.</p>	
<i>Banksia attenuata</i> – Tuart Woodland	<p><i>Banksia attenuata</i> Woodland over <i>Acacia saligna</i> mixed Shrubland and <i>Conostylis candicans</i> Herbland</p>	

Table 2b: Lake Claremont vegetation types

Marri – Jarrah mixed Woodland	Marri – Jarrah Woodland over mixed Shrubland and <i>Anigozanthos manglesii</i> Herbland	 A photograph showing a gravel path leading through a dense woodland. The trees are tall and thin, with green foliage. A wire fence runs along the path.
<i>Melaleuca raphiophylla</i> Woodland	<i>Melaleuca raphiophylla</i> Woodland over mixed Shrubland and <i>Juncus kraussii</i> Sedgeland	 A photograph of a wetland area with a small pond. The vegetation is dense and green, with a prominent clump of sedges in the foreground.
Tuart Woodland over mixed Shrubs	<i>Eucalyptus gomphocephala</i> Woodland over mixed shrubland	 A photograph of a paved path winding through a woodland. The trees are tall and thin, with green foliage. A wire fence runs along the path.

1.3 Vegetation Condition

Vegetation condition at Lake Claremont is a reflection of remnant vegetation, past disturbances and recent restoration/revegetation activities. Natural Area assessed the condition using the methodology attributed to Keighery in Bush Forever Volume 2 (Government of Western Australia 2000). Outcomes of this assessment are summarised in Table 3 with a graphical representation provide in Section 2.3. The vegetation is in ‘Very Good’ where revegetation has occurred in the northern portion of the site with the presence of a range of over storey, middle and understorey species. There is some weed presence, particularly around the periphery of the vegetated areas. Areas of ‘Good’ condition vegetation occur along the narrow western boundary and an area to the northeast. ‘Degraded’ areas include locations where weed species dominate the vegetation. Aquatic vegetation of the lakebed and grassed areas were not classified for vegetation type and were not assessed for condition.

Table 3: Vegetation condition assessment categories, Lake Claremont

Condition Rating	Excellent	Very Good	Good	Degraded
Area (ha)	0.50	13.88	1.14	1.04
Percentage	3.1	83.9	6.8	6.2

1.4 Conservation Significant Flora

Three conservation significant flora species appear on the NatureMap report as having the potential to occur within the Lake Claremont site. These are the Priority 2-listed fern *Adiantum capillus-veneris*, the Priority 4-listed *Dodonaea hackettiana* and the Priority 4-listed *Jacksonia sericea*. The the *Dodonaea hackettiana* (Figure 1) and *Jacksonia sericea* populations have been enhanced by restoration plantings at the site. An explanation of conservation codes appear in Section 3.3.



Figure 1: *Dodonaea hackettiana*

1.5 Environmental Weeds

Following the arrival of Eurocentric concepts of agriculture and urbanisation in the middle of the 19th century, over 70% of the original habitat has been lost in the southwest of Western Australia and more that 85% of the Banksia woodlands of the Swan Coastal Plains cleared (Hercocck 1997; Gole 2006; WADEP 2004). In addition to the loss of indigenous biodiversity, many exotic and invasive species of plants have been introduced from all around the world (Gole 2006). However, by the opening of the 21st century greater understanding of the need to maintain local biodiversity saw a shift in community perspective (Ecoscape 2002). This shift has created a number of sensitivities as to how to manage exotic/ introduced/weed species, especially in public open space that include nature space.

In early development of this management plan, Natural Area reported that the Department of Parks and Wildlife (2014c) defines an environmental weed as being a plant species that establishes in an ecosystem and modifies natural processes, usually to the detriment of natural plant forms. All forms of plant life can become a weed if conditions allow, with potential adverse effects from their presence including:

- competition for resources including nutrients, space and water;
- preventing the growth of native species, including understorey species;

- spreading prolific amounts of seed that readily germinate, in contrast to many native species that require mechanical processes such as the presence of smoke or abrasion before they will germinate;
- decreasing the availability of suitable habitat for fauna species; and
- increasing fire fuel loads at a given location.

However, the pragmatic definition of a weed from the nationally agreed Australian Weeds Strategy is more applicable for modified mixed-use areas such as the Lake Claremont site. That strategy defines a weed to be ‘a plant that requires some form of action to reduce its harmful effects on the economy, the environment, human health and amenity’ (Australia. NRM Ministerial Council 2007). This pragmatic definition allows significantly different approaches to the management of exotic species growing at the site. Under this pragmatic definition, the Moreton Bay Figs (*Ficus macrophylla*) at the southern end of the lake can be heritage listed as cultural icons of the recreational history of the site. The contrast is a Hill's Weeping Fig (*Ficus microcarpa* var. *Hillii*) that is growing in the northern revegetation zone is negatively impacting a local native Sheoak (*Allocasuarina fraseriana*) and near dead the Rottnest Island Tea Tree (*Melaleuca lanceolata*), this ficus could be removed to enhance the conservation values of the site. Figure 2 provides a graphic illustration these two very different scenarios. Such an approach also provides a balance between retaining mature trees within the site and the documented request by the Noongar traditional custodians for the removal of Ficus trees at the site because their evapotranspirative effects on the water table changing the natural hydraulic cycle of the lake (Fisher 2010).



Figure 2: Contrast between the established Moreton Bay Figs at the southern end of Lake Claremont (left) and a weedy Hill's Fig (*Ficus microcarpa* var. *hillii*) that is out competing a local native Sheoak (*Allocasuarina fraseriana*) and in the background a near dead Rottnest Island Tea Tree (*Melaleuca lanceolata*) in a northern revegetation zone near Alfred Road (right).

Uncontrolled, weeds have the potential to negatively impact the indigenous biodiversity and to diminish the aesthetic values of the Lake Claremont. The presence of weeds at the site can significantly affect the local biodiversity through a range of mechanisms. These include changes to the vegetation structure, reduction of species diversity and altered fire regimes because of increased fuel loads. Natural Area site survey activities included an assessment of significant weeds present. In this context, a significant weed is a species that appears in the following lists:

- DPaW Swan Rankings Summary of the Invasive Plant Prioritisation Process (Department of Parks and Wildlife 2013).
- Weed of National Significance (WoNS) designated by the Australian government (Department of Environment 2014b).
- National Environmental Alert List (Department of Environment 2014c).
- Declared plant under the *Biosecurity and Agriculture Management Act 2007* (WA).
- Lake Claremont Advisory Committee endorsed Weed Priority Matrix.

Site assessment activities by Natural Area identified 31 weed species growing at the site. These include woody weeds such as Cape Lilac (*Melia azedarach*), Lemon-scented Gum (*Eucalyptus citriodora*) and Date Palm (*Phoenix dactylifera*). Grassy weeds and herbs included Whiteflower Fumitory (*Fumaria capreolata*), Couch (*Cynodon dactylon*), Nasturtium (*Tropaeolum majus*) and Dove's Foot Cranesbill (*Geranium molle*). Four weeds of national significance (WoNS) observed at the site are the Athel Pine or Tamarisk tree (*Tamarisk aphylla*), Lantana (*Lantana camara*) and Chilean and Weeping Willows (*Salix spp.*). Natural Area site assessments did not locate any weeds listed on the National Environmental Alert List. Natural Area found a number of weeds listed on the Swan Rankings Summary including Cape Lilacs (*Melia azedarach*) and the Lemon-scented Gums (*Corymbia citriodora*). Photographic examples of weeds appear in Section 2.2. Section 2.5 provides a list of the significant weeds of the site and an indication of their treatment priority based on rankings of the Lake Claremont Advisory Committee Priority Matrix and the Swan Rankings Summary (Department of Parks and Wildlife 2013).

1.5.1 Introduced Trees (Potential Woody Weeds)

Introduced tree species planted within the Lake Claremont site over many years include Moreton Bay Figs (*Ficus macrophylla*), Lemon-scented Gums (*Eucalyptus citriodora*) and Cape Lilacs (*Melia azedarach*). These species do not enhance the environmental values. Natural Area recommended the staged removal and replacement of weedy specimens (see National Weeds Strategy definition in Section 1.5) with local native species in accordance with the recommendations of previous management plans. The Lake Claremont Advisory Committee Priority Matrix provides a guide for the staged removal of weedy exotic trees identified in Section 2.5. Current management of woody weeds at the site focuses on preventing the germination/propagation of seedlings of exotic species (including 'Eastern States natives').

The council endorsed TOC policy 'EN306: Tree Preservation' provides guidance for management of trees within the site. In line with that that policy, mature local native and introduced trees growing within the Lake Claremont and surrounds are managed for public safety, location of the tree, condition of the surrounding vegetation and weed potential of the tree. The following three case studies provide examples for introduced Australian Eucalypts/Melaleuca/Sheoaks, Ficus trees in the site and the four most invasive tree species.

Introduced Eucalypts/Melaleuca/Sheoaks

Development of the long nine-hole golf course in the early 1970s coincided with high level of nationalism and an embracing of all things Australian, including the spread of invasive 'Australian natives' in landscape and garden plantings across the country (Robin et al. 2011). As a result, many eastern states varieties of Eucalypt, Melaleuca and Sheoak were planted in the Lake Claremont surrounds. These trees pose several management challenges within the site, including:

- Healthy mature trees look good, provide shade, enhance the microclimate of the area and provide an over-storey.
- Planted when the golf course was operating; these trees established under wetter climatic conditions and were highly irrigated. Under the drier conditions and lower aquifer levels that now exist in Perth, these trees are easily water stressed and a number have died. In the nature space, the Dead trees are retained for habitat. In recreation spaces, they are pruned or removed to minimise public risk with statutory approvals where required.
- In the revegetation areas of the wetland buffer and around the northern end of the lake, these trees provide a good quality of over storey, which is retained until planted local native tree species (Jarrah/Marri/Tuart) have matured.
- Management of planted and naturalised non-local species of Eucalypt, Melaleuca and Sheoak is a higher priority in the remnant bushland as they often out compete and hybridised with established local species.

There will be limited need to remove any healthy mature introduced Eucalypt, Melaleuca or Sheoak from the site in the five-year life of this plan. No removal of a healthy mature introduced Eucalypt, Melaleuca or Sheoak will occur without a resolution from an ordinary council meeting (OCM).

Ficus Trees

While the mix of Ficus species occurring at the site have been planted since the 1970's (Head 2015 pers comm), their rapid growth habit in the absence of natural wind pruning by cyclones makes them appear much older, even iconic. Many people visiting or living near Lake Claremont mistakenly believe these trees to be hundreds of years old. Management issues associated with these trees include:

- High levels of evapotranspiration from their leaves results in lower water levels in the lake and unconfined aquifer, especially in the dry period from spring to autumn.
- Rapid growth, dense canopy and high leaf drop allows Ficus trees to outcompete all other vegetation. This includes other established trees, native plant species and turf of the recreational space.
- Fruit from these trees attracts pest bird species (e.g. Little Corella, Long-billed Corella, Ravens and Rainbow Lorikeets) and feral foxes.
- A secondary impact of providing food for foxes and supporting an artificial large Raven population, especially over the difficult summer period, is the increased predation of adult water and bush birds, their eggs and chicks and adult Long or Snake Necked Turtles (*Chelodina colliei*) and their eggs and hatchlings. Nesting female birds and turtles are especially vulnerable to predation.
- Seedlings rapidly establish around the base and in the trunks of mature trees where pest birds roost.
- Ficus species provide little to no benefit for natural ecological processes in southwest Western Australia.
- They are iconic trees that are loved by many people in the general community.
- Ficus trees in revegetated nature space (i.e. northern end of the site) and the southern end of the site have vastly different priorities for removal/retention because of the difference level of impact they have on the ecological processes around them.

Currently, there is minimal ecological imperative to remove the Ficus trees at the southern end of the lake. Such removals would be likely to create strong division in the Claremont community. For those reasons, it is highly unlikely that those mature Ficus would be removed in the near future. However, Ficus hillii trees

remaining in the revegetated natural area at the north of the site are/will outcompete replanted natural vegetation and negatively affect natural ecosystem processes. A program of staged removal with an OCM resolution for each removal would be implemented for those trees.

Highly Invasive Woody Weed Species

The Lake Claremont site contains a number of highly invasive woody weeds that were planted by the Town and Golf Course operators were introduced through bird dispersal or were transported to the site in stormwater runoff. As with the other examples, there are several management considerations for these trees as well. Some of these are:

- Practically eliminated from the site, Victorian Tea Tree (*Leptospermum laevigatum*) is an aggressive coloniser species with a dense spreading canopy and wind dispersed seed that should be removed as soon as it is identified.
- Norfolk Island Hibiscus were planted at the site as ornamental trees, but similar to the Victorian Tea Tree its wind dispersed seed rapidly establish in wetland nature spaces.
- The small red 'berries' of the Brazilian Pepper (*Schinus terebinthifolius*) are a favourite with many seed eating birds and these tough and fast growing woody weeds are often seen choking vegetation or sprouting from paving and walls under roosting trees in Perth's established suburbs.
- Chilean and Weeping Willows (*Salix species*) are aggressive woody weeds of wetland environments that the Australia Government has declared to be Weeds of National Significance.
- Athel Pines or Tamarix Trees (*Tamrix aphylla*) are another difficult to control WoNS that are widely distributed across the northern section of the Lake Claremont. There is a large stand of this weed south of the old turf shed in a nature space that requires revegetation. After suitable notification to the community, control of Athel Pine in that area should be a priority.

Seedling and saplings of Victorian Tea Tree, Norfolk Island Hibiscus, Brazilian Pepper, Chilean and Weeping Willows and Athel Pines will be removed as soon as they are detected in the Lake Claremont site. Approval from Chief Executive Officer will be sort prior to the removal of any Norfolk Island Hibiscus that were intentionally planted. No removal of intentionally planted Weeping Willows from the wetland buffer or Athel Pines will occur without an OCM resolution.

1.5.2 Garden Wastes

The presence of garden wastes in or near Lake Claremont have the potential to introduce weeds to the site, either through vegetative regrowth or through the movement of viable seeds. Regular monitoring for the presence of garden wastes will assist with ensuring impacts within the park are minimised.

1.6 Weed Management

Weed management strategies involve removal or control of weeds from a designated area by manual, chemical or biological treatment methods, with manual and chemical treatments being the most common. A combination of both chemical and manual control methods will usually have the best environmental outcomes across a broad range of weed species. The control technique for a particular target species will depend on the characteristics of the plant including its rate of growth, regenerative capacity, and the presence of non-target species or other sensitive areas, such as threatened and/or priority flora and/or fauna.

TOC staff and contractors, FOLC members and other volunteers who are performing hand weeding activities in the natural areas without the direct supervision of a TOC approved person must have completed a training program that covers the following aspects of hand weeding:

- Do not pull out any plants where the identification of the species is uncertain. Leave the plant to grow large enough to confirm the species to avoid the potential of inadvertently removing native seedlings. An example for the site is the native Variable Groundsel (*Senecio latus*), which can be easily confused with the common Groundsel (*S. vulgaris*) and the Thistle species. Ask FOLC or TOC weed specialists for help to identify the weed.
- Consider the life history of a weed as hand weeding is most effective if removal occurs prior to flowering and/or seed set.
- Consider the growth habit of each weed to ensure that removal technique(s) are appropriate. For example:
 - Geophytes such as Watsonia, Gladiolus, One-leaf Cape Tulip and the Freesia produce numerous bulbs that left in the soil can reinfest an area when conditions become favourable.
 - Flowering Sonchus/Thistles are an example of weed species that retain enough energy after removal to ensure that any immature seed will continue to develop if not disposed of appropriately (i.e. Bag and Bin).
 - Flat weeds and Thistles will grow back from vegetative material left in or on the ground.
- For hand weeding activities, concentrate on a small number of priority species each season.
- Consider the number of people involved with manual weed control. Large numbers of unskilled, untrained and/or poorly supervised people in an area of bushland are likely to trample native species. This can:
 - kill naturally regenerating native seedlings
 - change the structure of the vegetation;
 - degrade fauna habitat;
 - cause the death of mature vegetation; and
 - contribute to erosion.
- Promptly remove weeds from the area to prevent sprouting of vegetative material, wind dispersal of seeds and nutrient loading near nitrogen and phosphate sensitive native species.

1.6.1 Manual Weed Control

Manual control typically involves the removal of the nominated weed either mechanically (by machine or tool) or by hand. Removal of woody weeds (trees, shrubs with woody stems), will often involve:

- Manual ('hand') removal of plant – physically removing weeds by hand or by hand-operated tools.

- Cut and paint – trimming and then cutting the trunk at the base followed by painting of the stump with an herbicide to kill the weed and leaving the stump will break down over time.
- Brush cutting/slashing – using a line trimmer or cutting disk to reduce the height of invasive plants to control rather than remove the weeds, which is particularly effective on long or grassy weeds.
- stump removal – if required, a stump grinder can be used to remove the large woody trunk mass left behind, encouraging faster break down of plant remains.

Advantages of manual weed control are:

- Particular species can be targeted rather than ‘blanket’ control.
- Significantly reduces the soil seed bank when weeds, flowers and/or seeds are removed.
- Plants will not develop a ‘resistance’ to the control method.
- Can be used effectively in conjunction with other methods to maximise efficacy of weed control program by minimising application of herbicides and risk non-target species being sprayed.

Disadvantages of manual weed control are:

- Implementation can be laborious and time-consuming, meaning that it is not economical for many weed types or very large infestations.
- Seed crops of plants and propagules can be left behind, for example bulbs or corms that can regrow under favourable conditions.
- The seeds of some species can still mature and disperse after removal if the plant is not disposed of appropriately.
- Large numbers of people hand weeding can result in trampling of sensitive bushland areas, which may be more environmentally destructive and impact for longer than any chemical control.

1.6.2 Herbicide Application in Natural Areas

The use of herbicides is the most common and cost effective method of controlling many environmental weeds, because it can be targeted at particular species or weed classes and large areas being treated in a cost effective manner. While there is range of herbicides in common usage, with differing active ingredient(s) that target different weed types, only Bioactive (‘Amphibian Friendly’) Glyphosate and Fusilade style herbicides are used for weed control in nature areas of the Lake Claremont site. No surfactants or sticking agents are added to herbicide mixes applied anywhere in the site.

Advantages of chemical weed control include:

- Results are apparent in a short time frame.
- Effective in killing the entire weed, this stops propagules like corms or roots being left in the soil.
- Large areas can be treated quickly and in a cost effective manner.
- Minimal impact to the environment when applied in accordance with legislative guidelines by correctly trained and licensed technicians specialising in bushland weed control.

Disadvantages of chemical control methods include:

- Weeds that have tuberous or rhizomatous root systems and those that reshoot from epicormic growth, are likely to require follow up treatments to ensure effective control of the target species.
- Some weeds can develop a resistance to a particular herbicide where in appropriate application rates and/or techniques are used for extended periods.
- Herbicides have the potential to result in impacts to non-target flora and fauna species.

- Potential health effects on operators and personal protective clothing and equipment for operators need to be considered and managed.
- The use of herbicides by contractors must comply with:
 - Permits for use in bushland areas (Department of Agriculture and Food WA)
 - Operator licence requirements by the Department of Health WA.

1.6.3 Weed Mapping

Determining the density of weeds is a useful activity that assists with setting control priorities. A rating scale to describe the density with 3, 4 or 5 divisions according to preferences should be used. The Department of Environment and Conservation (2011) have developed a standard operating procedure for the mapping of weeds in bushland and wetland areas that uses three categories (< 5%, 6 – 75%, and 76 – 100%).

Useful weed resources include:

- Bushland Weeds – A Practical Guide to their Management (Brown and Brooks, 2002)
- Southern Weeds and their Control (Moore and Wheeler, 2008)
- Western Weeds (Hussey, Keighery, Dodd, Lloyd and Cousens (2nd Edition, 2007)
- Weed Species of Western Australia listed on FloraBase.
- Weed information sheets in Section 2.6

1.6.4 Weed Control Training

The Friends of Lake Claremont play an important role in the management of Lake Claremont, with one of those roles relating to the hand removal of weeds. Weeding days often involve additional volunteers. Hence, the importance of knowing what is and is not a weed. Appropriate reference materials for use in the field are a useful tool for volunteers. To this end, the Town of Claremont have developed a weed identification guide to assist.

In addition to identification, the appropriate removal method is an important consideration. Tips for the hand removal of weeds include:

- Consider the weed to ensure removal technique(s) are appropriate:
 - Geophytes such as Watsonia, Gladiolus, One-leaf Cape Tulip and the Freesia produce numerous bulbs that left in the soil will produce new plants.
 - Some species retain enough energy after removal that immature seed can continue to develop if not disposed of appropriately (e.g. Thistle).
 - Others weeds will grow back from vegetative material left in or on the ground.
- Consider the timing of hand control as removal is most effective prior to the species setting seed.
- When hand weeding, concentrate on a small number of species per season.
- Do not pull out any plants where the identification is uncertain. If in doubt, leave the plant to grow to a stage when the species can be confirmed to avoid inadvertent removal native seedlings.
- Consider the number of people involved with manual weed control as large numbers of people in a location can contribute to trampling of other species, which can promote additional weed growth and/or contribute to erosion around the site.
- Promptly remove weeds from the area to prevent reshooting or the wind dispersal of seeds.

1.7 Revegetation and Rehabilitation

Since the closure of the long nine hole golf course in June 2009, significant areas of the Lake Claremont wetland buffer (riparian zone) and adjoining nature space have been undergoing restoration and revegetation. These activities have significantly increased the coverage, condition and indigenous biodiversity in the nature space of the site. Approximately four hectares of the site still needs to be revegetated under the mixed-use management model to provide nature, recreation and sport spaces for the Claremont community. Infill planting will occur beyond the life of this management plan. It will take several years more for a self-supporting naturally regenerating soil seed bank to establish for local native species reintroduced to the site. Restoration and replanting of the floristically rich herb and shrub understorey is yet to commence as the over storey vegetation of revegetated areas is not sufficiently mature to allow the understorey to establish. When required, revegetation activities will consider the location of the work to be carried out, the height and form of the species to be planted, and the usage within that area. Weed control will be carried out in areas to be planted ahead of revegetation activities to minimise competition and maximise the established success of tube stock establishment.

1.7.1 Seed Collection and Plant Propagation

Some restoration purists promote the collection of local provenance seed as restoration 'best practice' in order to maintain localised genetic diversity of seed used in revegetation and rehabilitation projects. A secondary argument is that strict local provenance seed is better suited to local conditions. However, there is a counter argument that in an urban remnant fragmented from other natural areas, by the loss of biodiversity linkages, the introduction of new material mimics historical genetic flow that strengthens populations and prevent extinctions through genetic bottlenecks. Due to the extensive clearing and degradation of indigenous vegetation at the Lake Claremont site, the extensive revegetation already carried out with widely sourced plant stock and the small area of the remnant vegetation on the site, the opportunity for collecting and using local provenance seed in restoration activities is limited. Propagation of sedges and the locally significant Wembley Wax phenotype of *Chamelaucium uncinatum* have occurred at local schools and by the Friends of Lake Claremont for planting within nature spaces of the site.

1.7.2 Revegetation Protocols

The aim of revegetation activities is to restore and/or enhance indigenous biodiversity values at a particular location. This includes considering the preferred habitat requirements of a species, such as tolerance of vegetation to permanent inundation in the wetland buffer and the food and shelter requirements of native fauna. The planting of riparian sedges at Lake Claremont will take consideration of winter water depths, transition zone species such as Paperbark (*Melaleuca rhaphiophylla*) and Flooded Gum (*Eucalyptus rudis*) occur at increasing distances from the lakes edge.

Revegetation programs are typically designed to achieve a final planting density of one plant per m² for dryland species, with sedges and rushes at a density of 4-6 plants per m². A typical ratio for planting is one over storey species to 10 middle storey and 100 understorey species (plants). This ratio takes into consideration the final canopy spread of the trees, along with the mix of middle and understorey species in their vicinity. Over planting at a rate of 3-4 plants per m² will allow for natural attrition during the establishment phase, as well as reducing the weed load. At present many of the trees natural regenerating across the site are feral 'eastern states' natives. These weed species are controlled by the methods outlined in Section 1.6.

In light of the unexpectedly high survival rates of species revegetated into the northern wetland buffer, low plantings and establishment of view corridors to provide park users with visual connections to the waterbody of the lake are now a major consideration in the selection of species for revegetation close to Lake Claremont.

1.8 Fungi

Fungi are an important component of natural ecosystems as they play a major role in decomposing organic material and recycling the nutrients present back into the environment to sustain the ecological communities present. Some species have a beneficial symbiotic relationship with vascular plants, while others are pathogenic or parasitic, resulting in disease or harm to the host plant. There are a number of different forms of fungi known within the Perth metropolitan region, including the more common mushrooms, toadstools, and puffballs. Other forms include the jelly fungus and flat-type fungus (resupinate). The most common time to see the fruiting bodies of fungi are after autumn or winter rains, however some fungi will also be obvious at other times of the year.

A number of fungi species were observed during Natural Area site assessment activities at Lake Claremont, all were decomposers and all were present in mulched areas or in proximity to areas revegetated with native flora. Additional species are expected at other locations within the site.

Fungi Observation and Surveys

Surveying of fungi by observing the development of fruiting bodies, such as mushrooms, toadstools, and puffballs, is an activity suited to volunteers and school groups. Fungi can be observed all year round when humid days coincide with rainfall events. However, it is more common for the fruiting bodies to appear during autumn and winter (May to July). Features used to identify fungi species include their form, colour and width of the cap, gill colour (underside) and stem height. An additional feature is the spore print, which involves the placing of the area of the fungus that contains the spores (i.e. the underside of mushrooms and toadstools) on white paper and leaving it to sit for several hours for the spores to adhere to the paper.

Many fungi are readily identifiable from photographs and using an appropriate reference, such as:

- Fungi of the Perth Region and Beyond: A Self-managed Field Book and Bougher (2009).
- A Field Guide to Australian Fungi by Fuhrer (2011). This reference includes a section on the collection of spore prints and a field observation template.
- Examples of fungi sighted at Lake Claremont in Section 2.6.

1.9 Pathogen Management

Vegetation can be subject to diseases that result in a decline in their vigour or death in the longer term. Common plant pathogens include *Phytophthora* dieback, *Armillaria*, *Quambalaria* (Marri Canker) and Myrtle Rust. Activities that impact directly on trees, such as the installation of nesting boxes, can result in wounds that make them more susceptible to infection from pathogens. A range of stressors on plants contribute to the spiral of decline and death of plants.

1.9.1 *Phytophthora* Dieback

The most common plant disease encountered on the Swan Coastal Plain is dieback caused by the more than 300 forms the water-borne fungus *Phytophthora*. While *Phytophthora cinnamomi* is considered the most

destructive, other varieties have been identified which may have similar impacts. One of these species is *Phytophthora multivora*, which previous testing has shown to be in the park, attack Tuarts (*Eucalyptus gomphocephala*), Jarrah (*E. marginata*), Peppermints (*Agonis flexuosa*) and a range of Banksia species. *Phytophthora multivora* is tolerant of alkaline conditions and has spores that are wind-borne in addition to being dispersed by raindrops and splash (Scott et al. 2009).

Sampling for *Phytophthora cinnamomi* Dieback was carried out at various locations around the Lake Claremont site, the results of which were negative (Head 2014, pers comm.). *Phytophthora multivora* was isolated from a tissue sample collected from an *Agonis flexuosa* tree in Strickland Street to the west of Lake Claremont (Simpson 2014 pers comm). If *P. multivora* is suspected within the site or other natural areas, it should be treated in the same manner as *P. cinnamomi*.

1.9.2 Honey Fungus (*Armillaria luteobubalina*)

Armillaria luteobubalina (Figure 3) is a parasitic fungus that causes root rot of infected plants. Infections may be identified through analysis of aerial photography or the presence of fruiting bodies. It has been observed within the Lake Claremont site and has the potential to be spread through changes to site conditions and movement of spores.



Figure 3: *Armillaria luteobubalina*

1.9.3 Marri Canker (*Quambalaria sp.*)

Quambalaria is a genus of fungus introduced from the eastern states that is known to infect *Corymbia* trees, with the species *Quambalaria coyrecup* associated with the Marri (*Corymbia calophylla*) in Western Australia. Marri Canker will:

- blight leaves and shoots, causing deformed growth;
- produce lesions in various parts of the plant, including the trunk and branches; and
- will deform affect buds and abort immature fruit (Paap et al. 2013).

Short-term impacts of Marri Canker include reduced flower production, which reduces availability of nectar and pollen being available for native birds and honeybees and reduced seed development. Longer term impacts include reduced habitat for fauna, loss of canopy and impacts on understorey species. Symptoms of what could be *Quambalaria* was observed in *Corymbia calophylla* that have had the nesting boxes installed, but it has not been tested for at the site (Head 2014, pers comm). Other locations where *Quambalaria* may be present within the Town of Claremont include some road verges.

1.9.4 Myrtle Rust (*Uredo rangelii*)

Myrtle Rust (*Uredo rangelii*) is a fungus related to *Eucalyptus* and *Guava* rusts, but only targets Myrtaceae species. It is a major new threat to biodiversity within Australia since its introduction to eastern Australia in 2010 (Australian Network for Plant Conservation 2013). Myrtle Rust is yet to be recorded in Western Australia and spread will most likely be via infected nursery stock. The Nursery and Garden Industry has developed a Myrtle Rust Management Plan for the Australian Nursery Industry, with a view to limiting spread.

In susceptible plants, the rust spores enter the tissue, probably through the waxy cuticle, causing damage including lesions (sores), after which bright yolk-yellow or orange pustules appear. When pustules appear wind, humans or animals can readily disperse the spores, with infection potentially occurring in other nearby Myrtaceae species. Outcomes of the infection include damage to leaves and tissues, defoliation, diseased fruits and plants, susceptibility to secondary infection by other plant pathogens and plant mortality. Secondary outcomes include impact on fauna through loss of habitat, canopy decline, replacement species, promotion of weed species and increased fire impacts.

1.10 Fire

A review of archive material from the Claremont Museum and a search of newspapers in TROVE online database provided only one report of fire at Lake Claremont that started on one of the islands and moved quickly towards the bank in 1994 (Post 1994). Anecdotal information indicates that *Typha spp.* within the lake burned regularly/annually until it was removed (Haynes 2014, pers comm; Friends of Lake Claremont 2015 pers comm). With revegetation activities within the northern portion of the reserve, the increased presence of native vegetation will result in an increased fire risk as the various species mature and contribute leaf litter, twigs, bark and branches to the fire fuel load. The vegetation type present within the revegetated areas along with the close-canopy mean the risk of fire is rated as moderate-extreme. Turf areas have a low fire hazard and act as low fuel zones.

The Claremont Station of the Department of Fire and Emergency Services has prepared a Fire Pre-plan for Lake Claremont site. The Department of Fire and Emergency Services update the plan annually prior to 31 October.

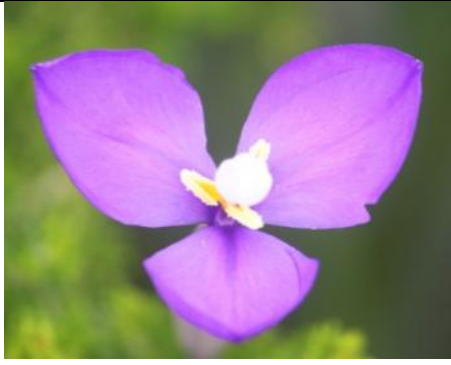











This plan includes the following risk management strategies that are the responsibility of the TOC Claremont:

- Weed control
- Monitoring fire fuel loads.
- Selectively removing dead branches and other material from nature spaces as required to reduce fire load without affecting fauna habitat.
- Maintaining firebreaks and protection buffers between nature spaces and properties.

Prescribed burns are not recommended unless necessary for habitat maintenance of flora species or where fuel loads need to be reduced to 8 tonnes per hectare.

2.0 Supplementary Information

2.1 Example Flora Species of Lake Claremont

		
<i>Patersonia occidentalis</i> (Purple Flag)	<i>Hardenbergia comptoniana</i> (Native Wisteria)	<i>Melaleuca systena</i> (Coastal Honeymyrtle)
		
<i>Jacksonia sternbergiana</i> (Stinkwood)	<i>Calothamnus quadrifidus</i> (One-sided Bottlebrush)	<i>Conostylis candicans</i> subsp. <i>candicans</i>
		
<i>Anthocercis ilicifolia</i> subsp. <i>ilicifolia</i>	<i>Billardiera fusiformis</i> (Australian Bluebell)	<i>Eremophila glabra</i> subsp. <i>albicans</i>
		
<i>Schoenoplectus validus</i> (Lake Club-rush)	<i>Baumea articulata</i> (Jointed Twig Rush)	<i>Bolboschoenus caldwellii</i> (Marsh Club-rush)

2.2 Example Weed Species at Lake Claremont

		
<p><i>Erodium cicutarium</i> (Common Storksbill)</p>	<p><i>Phoenix dactylifera</i> (Date Palm)</p>	<p><i>Tropaeolum majus</i> (Nasturtium)</p>
		
<p><i>Salix</i> sp. (Weeping Willow)</p>	<p><i>Bacopa monnieri</i> (Bacopa)</p>	<p><i>Melia azedarach</i> (Cape Lilac)</p>

2.3 Geographical Information and Maps

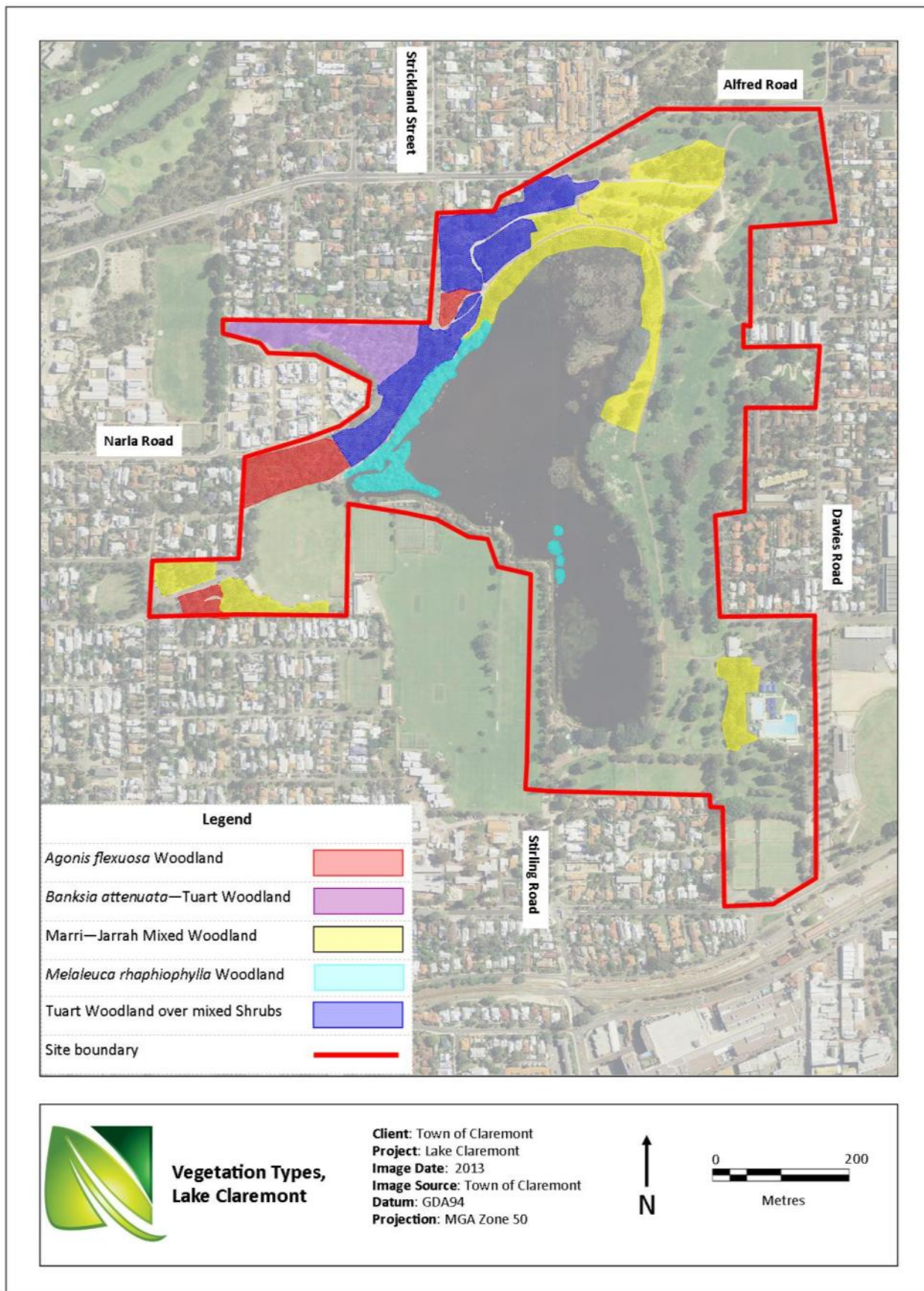


Figure 4: Vegetation types, Lake Claremont

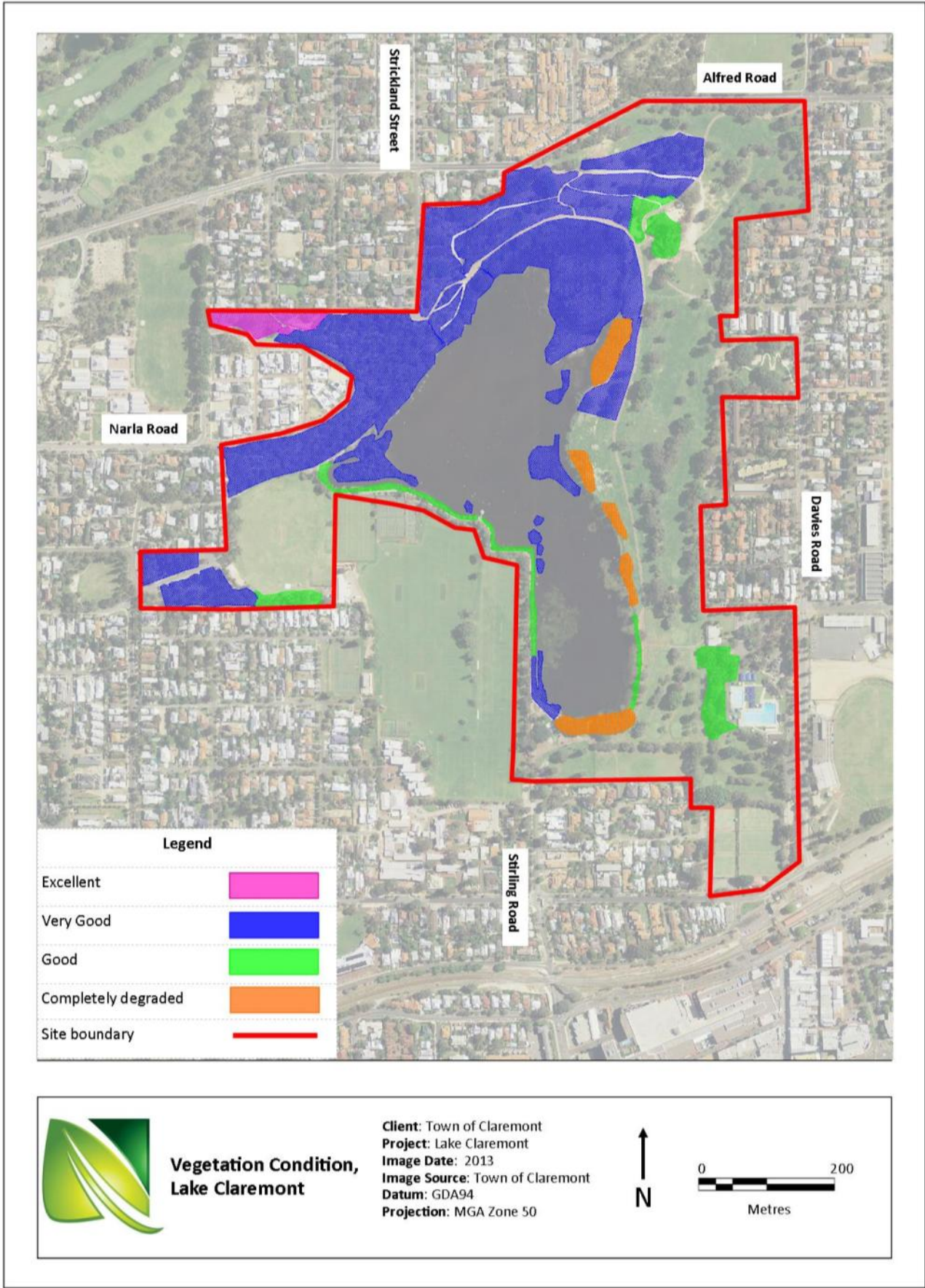


Figure 5: Vegetation condition, Lake Claremont

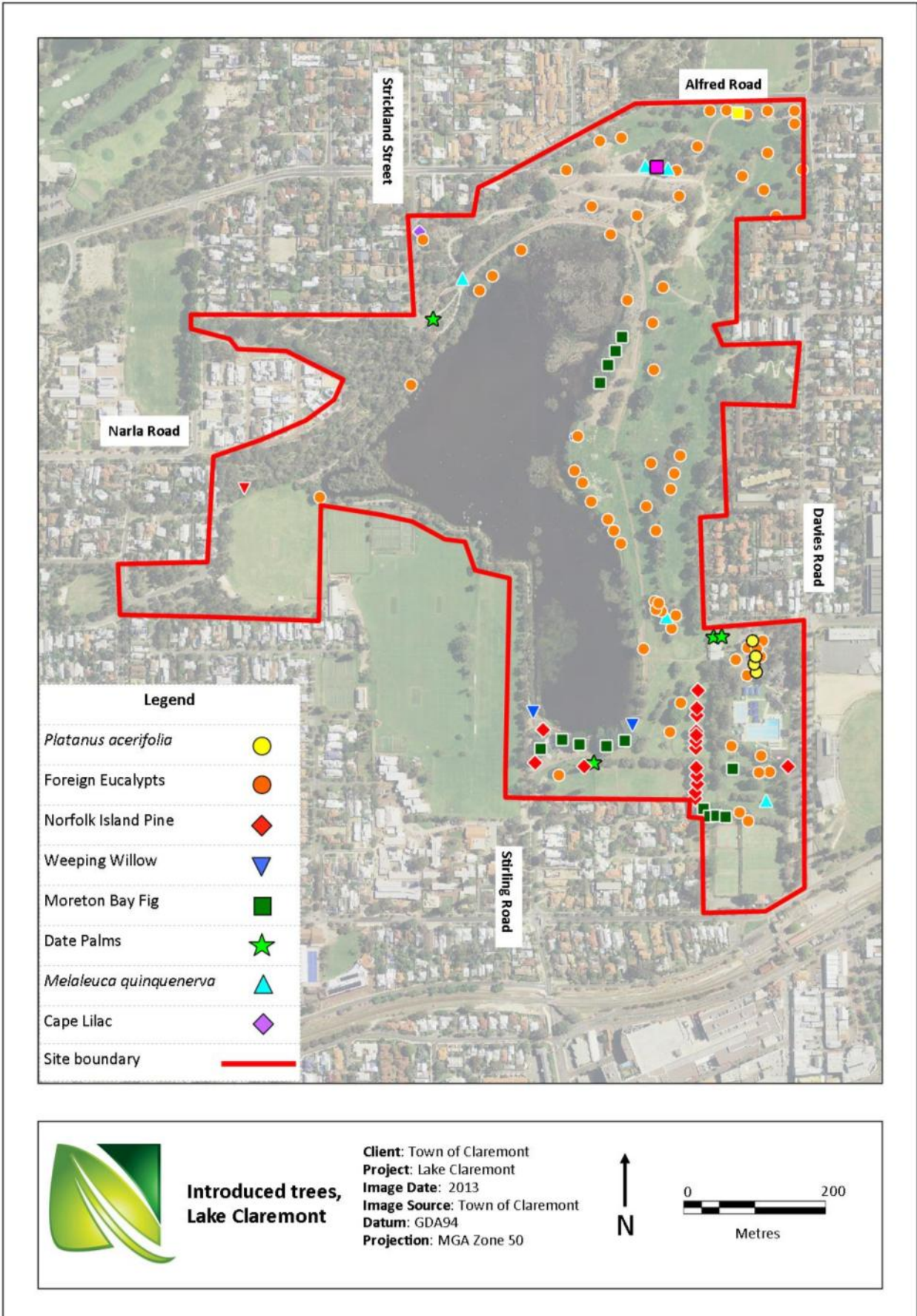


Figure 6: Introduced Trees, Lake Claremont

2.4 Combined Flora Species List

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
Algae					
<i>Chaetomorpha aerea</i>			X		
<i>Cladophora albida</i>			X		
<i>Cladophoropsis herpestica</i>			X		
<i>Cystoseira trinodis</i>			X		
<i>Gelidium pusillum</i>			X		
<i>Gracilaria verrucosa</i>			X		
<i>Grateloupia filicina</i>			X		
<i>Grateloupia filicina var. luxurians</i>			X		
<i>Grateloupia subpectinata</i>			X		
<i>Phacelocarpus sessilis</i>			X		
<i>Plocamium preissianum</i>			X		
<i>Ulva intestinalis</i>			X		
<i>Ulva lactuca</i>			X		
<i>Ulva linza</i>			X		
Bryopsid (Moss)					
<i>Gemmabryum preissianum</i>			X		
<i>Gymnostomum calcareum</i>			X		
<i>Racopilum cuspidigerum var. convolutaceum</i>			X		
<i>Rosulabryum billarderi</i>			X		
<i>Rosulabryum torquescens</i>			X		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Trichostomum eckelianum</i>			x		
Conifer					
<i>Araucaria heterophylla*</i>	Norfolk Island Pine			x	x
<i>Callitris preissii</i>	Rottneest Island Pine			x	x
Cycad					
<i>Macrozamia fraseri</i>				x	x
Dicotyledon					
<i>Acacia applanata</i>			x		
<i>Acacia cochlearis</i>	Rigid Wattle		x	x	x
<i>Acacia cyclops</i>	Coastal Wattle		x	x	x
<i>Acacia lasiocarpa var. lasiocarpa</i>			x	x	x
<i>Acacia pulchella var. glaberrima</i>			x	x	x
<i>Acacia rostellifera</i>	Summer-scented Wattle			x	x
<i>Acacia saligna subsp. saligna</i>			x	x	x
<i>Acacia truncata</i>			x	x	x
<i>Acacia willdenowiana</i>	Grass Wattle		x		
<i>Acacia xanthina</i>	White-stemmed Wattle		x	x	x
<i>Acetosa sagittata*</i>			x		
<i>Achillea millefolium*</i>	Yarrow		x		
<i>Agonis flexuosa</i>	Peppermint		x	x	x
<i>Agonis flexuosa var. flexuosa</i>			x	x	
<i>Ailanthus altissima*</i>	Tree of Heaven		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Allocasuarina fraseriana</i>	Sheoak			x	x
<i>Allocasuarina humilis</i>	Dwarf Sheoak		x	x	x
<i>Allocasuarina lehmanniana</i> subsp. <i>lehmanniana</i>			x	x	
<i>Ambrosia psilostachya</i> *	Perennial Ragweed		x		
<i>Amyema miquelii</i>	Stalked Mistletoe		x		
<i>Angianthus cunninghamii</i>	Coast Angianthus		x		
<i>Anthocercis ilicifolia</i> subsp. <i>ilicifolia</i>			x	x	
<i>Anthocercis littorea</i>	Yellow Tailflower		x	x	x
<i>Arctotheca calendula</i> *	Cape Weed		x	x	x
<i>Arctotis stoechadifolia</i> *	White Arctotis		x		
<i>Argyranthemum frutescens</i> subsp. <i>foeniculaceum</i> *	Marguerite Daisy		x		
<i>Astartea scoparia</i>				x	x
<i>Asteridea pulverulenta</i>	Common Bristle Daisy		x		
<i>Atriplex hypoleuca</i>			x		
<i>Bacopa monnieri</i> *	Bacopa			X	x
<i>Banksia attenuata</i>	Slender Banksia, Piara		x	x	x
<i>Banksia dallanneyi</i>	Couch Honeypot			x	
<i>Banksia grandis</i>	Bull Banksia			x	
<i>Banksia littoralis</i>	Swamp Banksia			x	
<i>Banksia menziesii</i>	Firewood Banksia			x	x
<i>Banksia nivea</i>	Honeypot Dryandra			x	x
<i>Banksia prionotes</i>	Acorn Banksia			x	x

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Banksia sessilis</i> var. <i>cygnorum</i>			x	x	x
<i>Beaufortia elegans</i>				x	
<i>Billardiera fusiformis</i>	Australian Bluebell				x
<i>Brachyscome iberidifolia</i>				x	
<i>Buglossoides arvensis</i> *	Corn Gromwell		x		
<i>Cakile maritima</i> *	Sea Rocket		x		
<i>Calandrinia brevipedata</i>	Short-stalked Purslane		x		
<i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i>			x	x	x
<i>Calothamnus sanguineus</i>	Silky-leaved Blood Flower				x
<i>Cardamine hirsuta</i> *	Common Bittercress		x		
<i>Carduus pycnocephalus</i> *	Slender Thistle		x		
<i>Carpobrotus edulis</i> *	Hottentot Fig		x		
<i>Cassytha flava</i>	Dodder Laurel		x		
<i>Cassytha racemosa</i>	Dodder Laurel		x		
<i>Casuarina obesa</i>	Swamp Sheoak			x	x
<i>Centella asiatica</i>				x	x
<i>Centranthus macrosiphon</i> *			x		
<i>Cerastium glomeratum</i> *	Mouse Ear Chickweed		x	x	x
<i>Chamelaucium uncinatum</i> *	Geraldton Wax		x		
<i>Chenopodium glaucum</i> *	Glaucus Goosefoot		x	x	
<i>Chenopodium murale</i> *	Nettle-leaf Goosefoot		x		
<i>Chrysanthemum coronarium</i> *	Crown Daisy		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Clematis linearifolia</i>			x	x	
<i>Comesperma integerrimum</i>			x		
<i>Conospermum triplinervium</i>	Tree Smokebush		x		
<i>Conyza bonariensis*</i>	Flaxleaf Fleabane			x	x
<i>Corymbia calophylla</i>	Marri			x	x
<i>Crassula thunbergiana*</i>	Stonecrop		x		
<i>Cryptandra arbutiflora</i> var. <i>arbutiflora</i>			x		
<i>Cryptandra arbutiflora</i> var. <i>tubulosa</i>			x		
<i>Cymbalaria muralis</i> subsp. <i>muralis*</i>	Ivy-leafed Toadflax		x		
<i>Daviesia decurrens</i>	Prickly Bitter-pea		x		
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>			x		
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>			x		
<i>Daviesia triflora</i>			x		
<i>Diplopeltis huegelii</i> subsp. <i>huegelii</i>			x		
<i>Diplotaxis muralis*</i>	Wall Rocket		x		
<i>Diplotaxis tenuifolia*</i>	Sand Rocket		x		
<i>Dodonaea aptera</i>	Coast Hop-bush		x		
<i>Dodonaea hackettiana</i>	Hackett's Hopbush	P4		x	x
<i>Drosera stolonifera</i>	Leafy Sundew		x		
<i>Emex australis*</i>	Doublegee		x		
<i>Epilobium billardioreanum</i> subsp. <i>cinereum</i>	Variable Willow Herb		x		
<i>Eremophila glabra</i>	Tar Bush			x	x

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Eremophila glabra subsp. albicans</i>			x		
<i>Erodium cicutarium</i> *	Common Storksbill		x	x	
<i>Eucalyptus citriodora</i> *	Lemon-scented Gum			x	x
<i>Eucalyptus gomphocephala</i>	Tuart, Duart		x	x	x
<i>Eucalyptus marginata subsp. marginata</i>	Jarrah		x	x	x
<i>Eucalyptus rudis</i>	Flooded Gum, Kulurda		x	x	
<i>Eucalyptus todtiana</i>	Coastal Blackbutt			x	x
<i>Euphorbia peplus</i> *	Petty Spurge			x	x
<i>Euphorbia terracina</i> *	Geraldton Carnation Weed			x	
<i>Exocarpos sparteus</i>	Broom Ballart, Djuk		x		
<i>Ficus macrophylla</i> *	Moreton Bay Fig			x	x
<i>Foeniculum vulgare</i> *	Fennel		x		
<i>Fumaria bastardii</i> *			x		
<i>Fumaria capreolata</i> *	Whiteflower Fumitory		x	x	x
<i>Gamochaeta coarctata</i> *			x		
<i>Gastrolobium capitatum</i>				x	x
<i>Gastrolobium linearifolium</i>			x		
<i>Geranium molle</i> *	Dove's Foot Cranesbill			x	x
<i>Glischrocaryon angustifolium</i>			x		
<i>Gnephosis angianthoides</i>			x		
<i>Gompholobium aristatum</i>			x	x	
<i>Gompholobium tomentosum</i>	Hairy Yellow Pea			x	

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Grevillea crithmifolia</i>			x	x	x
<i>Grevillea preissii subsp. preissii</i>			x	x	
<i>Grevillea vestita</i>				x	x
<i>Hakea lissocarpa</i>	Honey Bush			x	x
<i>Hakea prostrata</i>	Harsh Hakea		x	x	x
<i>Hakea trifurcata</i>	Two-leaf Hakea			x	x
<i>Hardenbergia comptoniana</i>	Native Wisteria		x	x	x
<i>Heliophila pusilla*</i>			x		
<i>Hemiandra pungens</i>	Snakebush			x	
<i>Hibbertia racemosa</i>	Stalked Guinea Flower		x		
<i>Hibiscus tridactylites*</i>	Bladder Ketmia		x		
<i>Hovea pungens</i>	Devil's Pins, Puyenak		x		
<i>Hybanthus calycinus</i>	Wild Violet		x		
<i>Hydrocotyle pilifera var. glabrata</i>			x		
<i>Hydrocotyle tetragonocarpa</i>			x		
<i>Hypocalymma angustifolium</i>	White Myrtle, Kudjid		x	x	
<i>Hypocalymma robustum</i>	Swan River Myrtle		x		
<i>Hypochaeris radicata*</i>	Flat Weed		x	x	
<i>Isotropis cuneifolia subsp. cuneifolia</i>			x		
<i>Jacksonia furcellata</i>	Grey Stinkwood		x	x	x
<i>Jacksonia sericea</i>	Waldjumi	P4	x	x	
<i>Jacksonia sternbergiana</i>	Stinkwood, Kapur		x	x	x

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Kennedia prostrata</i>	Scarlet Runner			x	x
<i>Kunzea glabrescens</i>	Spearwood			x	x
<i>Lactuca serriola*</i>	Prickly Lettuce			x	x
<i>Lantana camara*</i>	Common Lantana		x		
<i>Lavandula dentata var. candicans*</i>	French Lavender		x		
<i>Lawrenzia spicata</i>			x		
<i>Lechenaultia linarioides</i>	Yellow Leschenaultia		x		
<i>Lepidium rotundum</i>	Veined Peppergrass		x		
<i>Leptospermum spinescens</i>			x		
<i>Leucopogon parviflorus</i>	Coast Beard-heath		x		
<i>Leucopogon propinquus</i>			x		
<i>Limonium hyblaenum*</i>			x		
<i>Lobelia anceps</i>	Angled Lobelia			x	x
<i>Lobularia maritima*</i>	Sweet Alyssum		x		x
<i>Logania vaginalis</i>	White Spray		x	x	
<i>Lupinus cosentinii*</i>	West Australian Blue Lupin		x	x	x
<i>Lysimachia arvensis*</i>	Pimpernel		x		x
<i>Malva parviflora*</i>	Marshmallow			x	x
<i>Medicago polymorpha*</i>	Burr Medic			x	x
<i>Melaleuca huegelii</i>	Chenille Honey Myrtle			x	x
<i>Melaleuca lanceolata</i>	Rottneest Teatree			x	x
<i>Melaleuca quinquenervia*</i>	Broad-leaved Paperbark			x	x

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Melaleuca raphiophylla</i>	Swamp Paperbark			x	x
<i>Melaleuca scabra</i>	Rough Honeymyrtle			x	x
<i>Melaleuca seriata</i>				x	x
<i>Melaleuca systema</i>			x	x	x
<i>Melaleuca teretifolia</i>	Banbar			x	x
<i>Melaleuca thymoides</i>			x	x	
<i>Melaleuca trichophylla</i>				x	
<i>Melia azedarach</i> *	Cape Lilac, White Cedar			x	x
<i>Melilotus indicus</i> *	Common Melilot				x
<i>Misopates orontium</i> *	Lesser Snapdragon		x		
<i>Monoculus monstrosus</i> *	Stinking Roger		x		
<i>Myoporum insulare</i>	Blueberry Tree, Boobialla		x		
<i>Nerium oleander</i> *	Oleander		x	x	
<i>Oenothera drummondii subsp. drummondii</i> *	Coastal Evening Primrose, Beach Evening Primrose		x		
<i>Oenothera speciosa</i> *	White Evening Primrose		x		
<i>Oenothera stricta subsp. stricta</i> *			x		
<i>Olax benthamiana</i>			x		
<i>Olearia axillaris</i>	Coastal Daisybush		x	x	x
<i>Olearia rudis</i>	Rough Daisybush		x		
<i>Opercularia vaginata</i>	Dog Weed		x		
<i>Oxalis pes-caprae</i> *	Soursob		x	x	x
<i>Oxalis purpurea</i> *	Largeflower Wood Sorrel		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Parietaria debilis</i>	Pellitory		x		
<i>Pelargonium capitatum</i> *	Rose Pelargonium		x	x	
<i>Persoonia saccata</i>	Snottygobble		x		
<i>Petrophile axillaris</i>			x		
<i>Petrophile linearis</i>	Pixie Mops		x		
<i>Petrophile macrostachya</i>			x		
<i>Phyllanthus calycinus</i>	False Boronia		x		
<i>Phyllanthus tenellus</i> *			x		
<i>Pimelea rosea</i> subsp. <i>rosea</i>			x		
<i>Pimelea sulphurea</i>	Yellow Banjine		x		
<i>Pittosporum ligustrifolium</i>			x		
<i>Podotheca angustifolia</i>	Sticky Longheads		x		
<i>Polycarpon tetraphyllum</i> *	Fourleaf Allseed		x		
<i>Poranthera drummondii</i>			x		
<i>Ptilotus polystachyus</i>	Prince of Wales Feather		x		
<i>Ptilotus sericostachyus</i> subsp. <i>sericostachyus</i>			x		
<i>Ranunculus colonorum</i>	Common Buttercup		x		
<i>Ranunculus sessiliflorus</i> var. <i>sessiliflorus</i>			x		
<i>Raphanus raphanistrum</i> *	Wild Radish		x		
<i>Regelia inops</i>				x	x
<i>Rhagodia baccata</i> subsp. <i>baccata</i>			x	x	x
<i>Rhagodia baccata</i> subsp. <i>dioica</i>	Sea Berry Saltbush		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Rhagodia candolleana subsp. candolleana</i>			x		
<i>Rhamnus alaternus*</i>	Buckthorn		x		
<i>Rhodanthe citrina</i>			x		
<i>Ricinus communis*</i>	Castor Oil Plant		x	x	x
<i>Rumex crispus*</i>	Curled Dock		x		
<i>Sagina apetala*</i>	Annual Pearlwort		x		
<i>Sagina procumbens*</i>	Spreading Pearlwort		x		
<i>Samolus repens</i>	Creeping Brookweed		x		
<i>Samolus repens var. paucifolius</i>			x		
<i>Santalum acuminatum</i>	Quandong, Warnga		x		
<i>Scabiosa atropurpurea*</i>	Purple Pincushion		x		
<i>Scaevola canescens</i>	Grey Scaevola		x		
<i>Scaevola crassifolia</i>	Thick-leaved Fanflower			x	x
<i>Scaevola nitida</i>	Shining Fanflower				x
<i>Schinus terebinthifolius*</i>	Brazilian Pepper, Japanese Pepper		x		
<i>Senecio condylus</i>			x		
<i>Senecio elegans*</i>	Purple Groundsel		x		
<i>Senecio pinnatifolius var. latilobus</i>			x		
<i>Silene gallica var. gallica*</i>	French Catchfly		x		
<i>Silene gallica var. quinquevulnera*</i>	French Catchfly		x		
<i>Silene nocturna*</i>	Mediterranean Catchfly		x		
<i>Solanum linnaeanum*</i>	Apple of Sodom		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Solanum nigrum</i>	Nightshade			x	
<i>Solanum symonii</i>			x	x	
<i>Sonchus oleraceus*</i>	Common Sowthistle			x	x
<i>Spergularia diandra*</i>	Lesser Sand Spurry		x		
<i>Spyridium globulosum</i>	Basket Bush		x	x	x
<i>Stellaria media*</i>	Chickweed		x		
<i>Stenanthemum notiale subsp. chamelum</i>			x		
<i>Stenopetalum gracile</i>			x		
<i>Stylidium inundatum</i>	Hundreds and Thousands		x		
<i>Stylidium rigidulum</i>			x		
<i>Stylidium roseoalatum</i>	Pink-wing Triggerplant		x		
<i>Tamarix aphylla*</i>	Athel Tree, Athel Pine				
<i>Templetonia retusa</i>	Cockies Tongues		x	x	x
<i>Thomasia cognata</i>				x	x
<i>Thomasia triphylla</i>			x		
<i>Threlkeldia diffusa</i>	Coast Bonefruit		x		
<i>Trachymene coerulea</i>	Blue Lace Flower			x	x
<i>Trachymene pilosa</i>	Native Parsnip		x		
<i>Tribulus terrestris*</i>	Caltrop			x	
<i>Trifolium campestre var. campestre*</i>	Hop Clover		x		x
<i>Trifolium dubium*</i>	Suckling Clover		x		
<i>Trifolium glomeratum*</i>	Cluster Clover		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Trifolium incarnatum</i> var. <i>incarnatum</i> *	Crimson Clover		x		
<i>Trifolium pratense</i> var. <i>sativum</i> *			x		
<i>Tropaeolum majus</i> *	Garden Nasturtium		x		
<i>Urtica urens</i> *	Small Nettle		x		
<i>Vicia sativa</i> *	Common Vetch			x	x
<i>Viminaria juncea</i>	Swishbush			x	x
<i>Xanthosia ciliata</i>			x		
<i>Zygophyllum fruticosum</i>	Shrubby Twinleaf		x		
Gymnosperm					
<i>Callitris preissii</i>	Rottneest Island Pine, Maro		x		x
Monocotyledon					
<i>Acanthocarpus preissii</i>			x	x	
<i>Agave americana</i> *	Century Plant		x		
<i>Albuca flaccida</i> *			x		
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	Cat's Paw		x	x	
<i>Anigozanthos manglesii</i>	Mangles Kangaroo Paw			x	x
<i>Anigozanthos viridis</i>	Green Kangaroo Paw			x	x
<i>Arundo donax</i> *	Giant Reed		x		x
<i>Asparagus asparagoides</i> *	Bridal Creeper		x		
<i>Asphodelus fistulosus</i> *	Onion Weed		x		
<i>Austrostipa compressa</i>			x		
<i>Austrostipa flavescens</i>			x	x	x

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Avena barbata*</i>	Bearded Oat			x	x
<i>Baumea articulata</i>	Jointed Rush			x	x
<i>Baumea juncea</i>	Bare Twigrush			x	x
<i>Baumea preissii</i>				x	x
<i>Bolboschoenus caldwellii</i>	Marsh Club-rush			x	x
<i>Bromus arenarius</i>	Sand Brome		x		
<i>Bromus diandrus*</i>	Great Brome		x		x
<i>Burchardia congesta</i>				x	
<i>Caladenia flava subsp. flava</i>			x		
<i>Caladenia latifolia</i>	Pink Fairy Orchid		x		
<i>Carex divisa*</i>	Divided Sedge				x
<i>Carex thecata</i>			x		
<i>Catapodium rigidum*</i>	Rigid Fescue		x		
<i>Cenchrus clandestinus*</i>	Kikuyu Grass		x	x	x
<i>Cenchrus purpureus*</i>	Elephant Grass		x		
<i>Cenchrus setaceus*</i>	Fountain Grass		x		
<i>Centrolepis drummondiana</i>			x		
<i>Conostylis aculeata subsp. cygnorum</i>			x	x	
<i>Conostylis candicans subsp. candicans</i>			x	x	x
<i>Corynotheca micrantha var. micrantha</i>			x		
<i>Cyanicula gemmata</i>			x		
<i>Cynodon dactylon*</i>	Couch		x	x	x

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Cyperus brevifolius</i> *	Kyllinga Weed		x		
<i>Cyperus gymnocaulos</i>	Spiny Flat-sedge		x		
<i>Cyperus tenuiflorus</i> *	Scaly Sedge		x		
<i>Cyrtostylis huegelii</i>			x		
<i>Cyrtostylis robusta</i>			x		
<i>Desmocladius asper</i>			x		
<i>Dianella revoluta</i>	Blueberry Lily			x	x
<i>Dichelachne crinita</i>	Longhair Plumegrass		x		
<i>Dichopogon preissii</i>			x		
<i>Dielsia stenostachya</i>				x	x
<i>Digitaria sanguinalis</i> *	Crab Grass		x		
<i>Echinochloa crus-pavonis</i> *	South American Barnyard Grass		x		
<i>Ehrharta brevifolia</i> var. <i>cuspidata</i> *			x		
<i>Ehrharta longiflora</i> *	Annual Veldt Grass		x	x	x
<i>Elythranthera brunonis</i>	Purple Enamel Orchid		x		
<i>Elythranthera emarginata</i>	Pink Enamel Orchid			x	
<i>Enchylaena tomentosa</i>	Barrier Saltbush			x	
<i>Eriachne ovata</i>			x		
<i>Eriochilus dilatatus</i> subsp. <i>multiflorus</i>			x		
<i>Ficinia nodosa</i>	Knotted Club Rush		x	x	x
<i>Gladiolus angustus</i> *	Long-tubed Painted Lady		x		
<i>Haemodorum paniculatum</i>	Mardja			x	

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Hordeum leporinum</i> *	Barley Grass		x	x	
<i>Hypolaena fastigiata</i>			x		
<i>Isolepis cernua</i>	Nodding Club-rush			x	
<i>Isolepis marginata</i> *	Coarse Club-rush		x		
<i>Juncus kraussii subsp. australiensis</i>			x	x	x
<i>Juncus pallidus</i>	Pale Rush		x	x	x
<i>Lepidosperma calcicola</i>			x		
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			x	x
<i>Lepidosperma scabrum</i>			x		
<i>Leporella fimbriata</i>	Hare Orchid		x		
<i>Lolium rigidum</i>	Rye Grass				x
<i>Lolium temulentum forma temulentum</i> *			x		
<i>Lomandra caespitosa</i>	Tufted Mat Rush		x		
<i>Lomandra hermaphrodita</i>			x		
<i>Lomandra micrantha subsp. micrantha</i>			x		
<i>Lomandra nigricans</i>			x		
<i>Lomandra preissii</i>			x		
<i>Meeboldina scariosa</i>				x	x
<i>Neurachne alopecuroidea</i>	Foxtail Mulga Grass			x	x
<i>Orthrosanthus laxus var. laxus</i>	Morning Iris		x	x	
<i>Patersonia occidentalis</i>	Purple Flag			x	x
<i>Phalaris minor</i> *	Lesser Canary Grass		x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Pheladenia deformis</i>			x		
<i>Phoenix dactylifera</i> *	Date Palm			x	x
<i>Poa drummondiana</i>	Knotted Poa		x		
<i>Poa porphyroclados</i>			x		
<i>Posidonia australis</i>	Fibreball Weed		x		
<i>Pterostylis vittata</i>	Banded Greenhood		x		
<i>Pyrorchis nigricans</i>	Red Beaks, Elephants Ears		x		
<i>Rostraria cristata</i> *			x		
<i>Rytidosperma caespitosum</i>				x	
<i>Rytidosperma occidentale</i>			x		
<i>Schoenoplectus validus</i>	Lake Club-rush			x	x
<i>Schoenus curvifolius</i>			x		
<i>Schoenus grandiflorus</i>	Large Flowered Bogrush		x		
<i>Sowerbaea laxiflora</i>	Purple Tassels		x		
<i>Spinifex longifolius</i>	Beach Spinifex		x		
<i>Sporobolus virginicus</i>	Marine Couch		x		
<i>Stenotaphrum secundatum</i> *	Buffalo Grass		x		
<i>Thelymitra campanulata</i>	Shirt Orchid		x		
<i>Thysanotus arenarius</i>			x		
<i>Triglochin isingiana</i>			x		
<i>Triglochin striata</i>			x		
<i>Triglochin trichophora</i>			x		

Scientific Name	Common Name	Conservation Code	NatureMap	Town of Claremont	Natural Area
<i>Typha orientalis</i> *				x	x
<i>Vulpia myuros forma myuros</i> *			x		
<i>Xanthorrhoea preissii</i>	Grass Tree, Balga			x	x
Pteridophyte (Fern)					
<i>Adiantum capillus-veneris</i>	Maidenhair	P2	x		
<i>Anogramma leptophylla</i>	Annual Fern		x		

(Sources: NatureMap, Town of Claremont revegetation species, Natural Area)

* Denotes introduced species

2.5 Lake Claremont Significant Weeds

Swan Region Ranking legend: **N** = negligible (no action), **L** = low (containment at key sites), **M** = medium (control to reduce or contain), **H** = high (eradication or control to reduce), **VH** = very high (eradication)

Town of Claremont removal priorities: low, moderate, high, very high

Abbreviations: **WoNS** = Weed of National Significance

2.5.1 Woody Weed Species

Scientific Name	Common Name	Swan Region Ranking	ToC Ranking	WoNS	Timing
<i>Brachychiton populneus</i>	Kurrajong	M	6		5+ years
<i>Eucalyptus botryoides</i>	Swamp Mahogany	M	11		5+ years
<i>Eucalyptus camaldulensis</i>	River Red Gum	L	11		5+ years
<i>Eucalyptus citriodora</i>	Lemon Scented Gum	M	11		5+ years
<i>Eucalyptus cladocalyx</i>	Sugar Gum	M	11		5+ years
<i>Eucalyptus globulus</i>	Tasmanian Blue Gum	N	11		5+ years
<i>Eucalyptus maculata</i>	Spotted Gum	M	11		5+ years
<i>Eucalyptus saligna</i>	Sydney Blue Gum	N	11		5+ years
<i>Ficus macrophylla</i> (Except Stirling Road Park)	Moreton Bay Fig		8		*T.B.A.
<i>Ficus microcarpa</i>	Hills Weeping Fig		12		Next 5 Years
<i>Lagunaria patersonii</i>	Norfolk Island Hibiscus	N	11		Next 5 Years
<i>Leptospermum laevigatum</i>	Victorian Tea Tree	H	12		Next 5 Years
<i>Melaleuca quinquenervia</i>	Broadleaf Paperbark		12		5+ years
<i>Melia azedarach</i>	Cape Lilac	N	11		Next 5 Years
<i>Nerium oleander</i>	Oleander	L	11		Next 5 Years
<i>Populus sp.</i>	White and Lombard's Poplar	N	9		Next 5 Years
<i>Schinus terebinthifolius</i>	Brazilian Pepper	M	9		Next 5 Years
<i>Tamarix aphylla</i>	Athel Tree, Athel Pine or Tamerix Tree	H	9	Y	Next 5 Years
<i>Willow sp.</i>	Weeping, Chilean Willow	L	11		Next 5 Years

* Subject to consideration by Council, following independent assessment and LCAC recommendation


2.5.1 Other Weed Species

Scientific Name	Common Name	Swan Region Ranking	ToC Ranking	WoNS
<i>Achillea millefolium</i>	Yarrow	N		
<i>Agave americana</i>	Century Plant	L		
<i>Ailanthus altissima</i>	Tree of Heaven	N		
<i>Ambrosia psilostachya</i>	Perennial Ragweed	N		
<i>Arctotheca calendula</i>	Cape Weed	L		
<i>Argyranthemum frutescens subsp. foeniculaceum</i>	Marguerite Daisy	N		
<i>Arundo donax</i>	Giant Reed	L		
<i>Asparagus asparagoides</i>	Bridal Creeper	L		Y
<i>Asphodelus fistulosus</i>	Onion Weed	L		
<i>Avena barbata</i>	Bearded Oat	L		
<i>Bacopa monnieri</i>	Bacopa	L		
<i>Bromus diandrus</i>	Great Brome	L		
<i>Cakile maritima</i>	Sea Rocket	L		
<i>Carex divisa</i>	Divided Sedge	L		
<i>Carpobrotus edulis</i>	Hottentot Fig	N		
<i>Catapodium rigidum</i>	Rigid Fescue	L		
<i>Cerastium glomeratum</i>	Mouse Ear Chickweed	L		
<i>Chenopodium murale</i>	Green Fat Hen, Nettle-leaf Goosefoot	L		
<i>Chrysanthemum coronarium</i>	Crown Daisy	N		
<i>Crassula thunbergiana</i>	Stonecrop	N		
<i>Cymbalaria muralis subsp. muralis</i>	Ivy-leafed Toadflax	L		
<i>Cynodon dactylon</i>	Couch	L		
<i>Cyperus brevifolius</i>	Kyllinga Weed, Mullumbimby Couch	N		
<i>Cyperus tenuiflorus</i>	Scaly Sedge	N		
<i>Diplotaxis muralis</i>	Wall Rocket	N		
<i>Diplotaxis tenuifolia</i>	Lincoln Weed, Sand Rocket	N		
<i>Echinochloa crus-pavonis</i>	South American Barnyard Grass	N		
<i>Ehrharta brevifolia var. cuspidata</i>	Veldt Grass	N		
<i>Ehrharta longiflora</i>	Annual Veldt Grass	L		

Scientific Name	Common Name	Swan Region Ranking	ToC Ranking	WoNS
<i>Emex australis</i>	Double Gee	L		
<i>Erodium cicutarium</i>	Common Storksbill	N		
<i>Euphorbia peplus</i>	Petty Spurge	N		
<i>Ferraria crispa</i>	Black Flag	M		
<i>Foeniculum vulgare</i>	Fennel	N		
<i>Fumaria capreolata</i>	Whiteflower Fumitory	L		
<i>Gamochaeta coarctata</i>	Spiked Cudweed	N		
<i>Geranium molle</i>	Dove's Foot Cranesbill	N		
<i>Gladiolus angustus</i>	Long-tubed Painted Lady	L		
<i>Heliophila pusilla</i>	Heliophila	N		
<i>Hordeum leporinum</i>	Barley Grass	N		
<i>Isolepis marginata</i>	Coarse Club-rush	N		
<i>Lactuca serriola</i>	Prickly Lettuce	M		
<i>Lantana camara</i>	Lantana	L		Y
<i>Lavandula dentata var. candicans</i>	French Lavender	N		
<i>Lobularia maritima</i>	Alyssum, Sweet Alyssum	L		
<i>Lupinus cosentinii</i>	West Australian Blue Lupin	H		
<i>Lysimachia arvensis</i>	Scarlet Pimpernel, Blue Pimpernel	N		
<i>Malva parviflora</i>	Marshmallow, Small-flowered Mallow	N		
<i>Melilotus indicus</i>	Common Melilot	M		
<i>Misopates orontium</i>	Lesser Snapdragon	L		
<i>Monoculus monstrosus</i>	Stinking Roger	L		
<i>Nerium oleander</i>	Oleander	L		
<i>Oenothera drummondii subsp. drummondii</i>	Coastal Evening Primrose, Beach Evening Primrose	M		
<i>Oxalis pes-caprae</i>	Soursob	L		
<i>Oxalis purpurea</i>	Purple Oxalis, Largeflower Wood Sorrel	L		
<i>Pelargonium capitatum</i>	Rose Pelargonium	L		
<i>Phalaris minor</i>	Lesser Canary Grass	L		
<i>Polycarpon tetraphyllum</i>	Fourleaf Allseed	L		
<i>Raphanus raphanistrum</i>	Wild Radish	N		

Scientific Name	Common Name	Swan Region Ranking	ToC Ranking	WoNS
<i>Rhamnus alaternus</i>	Buckthorn	H		
<i>Rumex crispus</i>	Curled Dock	L		
<i>Sagina apetala</i>	Common Pearlwort	N		
<i>Sagina procumbens</i>	Spreading Pearlwort	N		
<i>Scabiosa atropurpurea</i>	Purple Pincushion	M		
<i>Senecio elegans</i>	Purple Groundsel	L		
<i>Silene gallica var. gallica</i>	French Catchfly	N		
<i>Silene gallica var. quinquevulnera</i>	French Catchfly	N		
<i>Silene nocturna</i>	Mediterranean Catchfly	N		
<i>Solanum linnaeanum</i>	Apple of Sodom	M		
<i>Sonchus oleraceus</i>	Common Sowthistle	N		
<i>Stenotaphrum secundatum</i>	Buffalo Grass	L		
<i>Tribulus terrestris</i>	Caltrop	M		
<i>Trifolium incarnatum var. incarnatum</i>	Crimson Clover	L		
<i>Tropaeolum majus</i>	Nasturtium	N		
<i>Urtica urens</i>	Stinging Nettle, Small Nettle	L		
<i>Vicia sativa</i>	Common Vetch	N		
<i>Watsonia borbonica</i>	Watsonia	H		

2.6 Example Fungi at Lake Claremont

		
<p>Egg-yolk Fungus (<i>Bolbitius vitellinus</i>) Cap 10 – 50 mm wide, pale yellow stem. Found in grassy areas, woodchips and rich organic areas.</p>	<p>Shaggy Parasol (<i>Chlorophyllum brunneum</i>) Cap to 200 mm, coarsely scaly. Found in garden beds, compost and soil.</p>	<p>Impatient Ink Cap (<i>Coprinellus impatiens</i>) Smooth cap 3 – 25 mm. Found in woodchips, rich litter and/or soil.</p>
		
<p>Hairy Ink Cap (<i>Coprinopsis lagopus</i>) Cap 5 – 35 mm. Found in woodchips, rich litter and/or soil and lawn.</p>	<p><i>Crepidotus prostratus</i> Cap to 70 mm, short stem. Found in litter and/or soil attached to buried wood often near base of eucalypt.</p>	<p>Dusky Helmets (<i>Panaeolus fimicola</i>) Cap 10 – 30 mm, tall, stiff stem. Found in grassy areas, parks, and playing fields.</p>
		<p>Photographs: Natural Area Holdings Pty Ltd Information: Bougher, 2009</p>
<p>Golden Splash Tooth (<i>Phlebia subceracea</i>) Golden yellow blunt teeth up to 1.5 mm in flat patches. Found on dead wood.</p>	<p>Common Rosegill (<i>Volvariella speciosa</i>) Cap to 120 mm wide, slimy, tall stem. Found in grass, woodchips, rich organic beds.</p>	

3.0 Assessment Reference Information

3.1 Vegetation Type Assessment Methodology

The vegetation type was determined using the structural classes described in Bush Forever Volume 2 (Government of Western Australia, 2000), and records dominant over storey, middle and understorey species. A Trimble GPS unit was used to differentiate the locations of the vegetation types across the site and assist with mapping outcomes. A description of the various structural classes is provided below.

Vegetation structural classes

Life Form/Height Class	Canopy Percentage Cover			
	100 – 70%	70 – 30%	30 - 10%	10 – 2 %
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10 – 30 m	Closed forest	Open forest	Woodland	Open woodland
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland
Tree Mallee	Closed tree mallee	Tree mallee	Open tree mallee	Very open tree mallee
Shrub Mallee	Closed shrub mallee	Shrub mallee	Open shrub mallee	Very open shrub mallee
Shrubs over 2 m	Closed tall scrub	Tall open scrub	Tall shrubland	Tall open shrubland
Shrubs 1 – 2 m	Closed heath	Open heath	Shrubland	Open shrubland
Shrubs under 1 m	Closed low heath	Open low heath	Low shrubland	Low open shrubland
Grasses	Closed grassland	Grassland	Open grassland	Very open grassland
Herbs	Closed herbland	Herbland	Open herbland	Very open herbland
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland

(Source: Government of Western Australia 2000)

3.2 Vegetation Condition

Vegetation condition was assessed using the rating scale attributed to Keighery in Bush Forever Volume 2 (Government of Western Australia, 2000). A Trimble GPS unit was used to differentiate the locations of the vegetation condition across the site and assist with mapping outcomes. A description of the rating scale is provided below.

Vegetation condition ratings

Category	Description
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 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.
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 some very aggressive weeds at high density, partial clearing, dieback and grazing.
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 very 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.

(Source: Government of Western Australia 2000)

3.3 Conservation Code Descriptions

Western Australia

Conservation Code	Name	Description
T	Threatened	Flora or fauna that is rare or likely to become extinct (Schedule 1 of the <i>Wildlife Conservation Act 1950</i>) Taxa that have been adequately searched for and deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
X	Presumed Extinct	Flora or fauna that is presumed to be extinct in the wild (Schedule 2 of the <i>Wildlife Conservation Act 1950</i>) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
IA	International Agreement	Birds protected under international agreement (Schedule 3 of the <i>Wildlife Conservation Act 1950</i>) Birds that are subject to an agreement between governments of Australia and other countries relating to the protection of migratory birds and birds in danger of extinction
S	Specially Protected	Other specially protected fauna (Schedule 4 of the <i>Wildlife Conservation Act 1950</i>) Fauna that is in need of special protection, otherwise than for the reasons listed in other schedules of the <i>Wildlife Conservation Act 1950</i> .
<i>Schedule 1 species that are ranked by the DEC according to their level of threat using IUCN Red List criteria</i>		
CR	Critically endangered	Species considered to be facing an extremely high risk of extinction within the wild
EN	Endangered	Species considered to be facing a very high risk of extinction within the wild
VU	Vulnerable	Species considered to be facing a high risk of extinction in the wild
<i>Taxa that have not been adequately surveyed for listing under Schedule 1 or 2 of the Wildlife Protection Act are added to the Priority Lists under priorities 1, 2 or 3, according to the priority for further survey and evaluation of their conservation status.</i>		
1	Priority One	Poorly known taxa Taxa which are known from one or a few collections or sight records (generally <5), on all lands not managed for conservation, such as road verges, urban areas, farmland, active mineral lease and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
2	Priority Two	Poorly known taxa

Conservation Code	Name	Description
		Taxa which are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, such as national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves and similar. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes
3	Priority Three	Poorly known taxa Taxa that are known collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
4	Priority Four	Rare or near threatened and other taxa in need of monitoring Rare: Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. Near threatened: Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for vulnerable. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
5	Priority Five	Conservation Dependent Taxa Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

(Source: Department of Parks and Wildlife, 2014)

Commonwealth

Category	Description
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Taxa facing a very high risk of extinction in the wild in the near future
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium term

(Source: Department of Sustainability, Environment, Water, Population and Communities, 2014)

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