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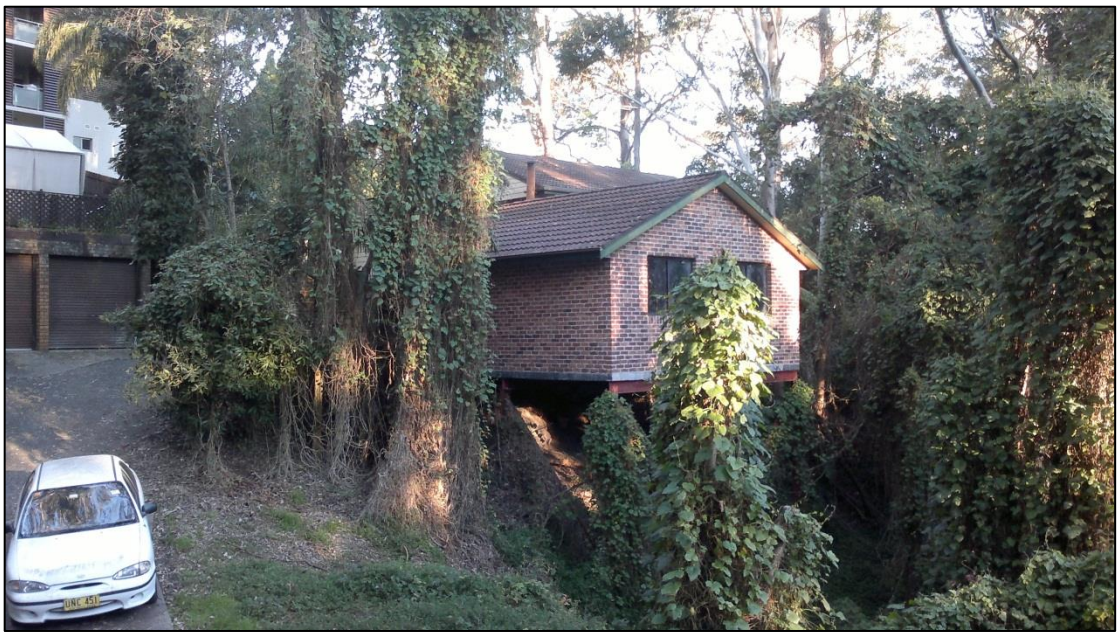
Updated Vegetation Management Plan

5 – 15 Lamond Drive
Turramurra
Ku-ring-gai LGA

For: Mackenzie Architects



REF: KMC 12-560
March 2013

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Cover: Number 7 Lamond Drive sits precariously above the steep weed-infested slope.

Photo: E. Ashby, 7th August 2012

TABLE OF CONTENTS

PART A BACKGROUND

1 INTRODUCTION

Keystone Ecological has been engaged by Mackenzie Architects to prepare a Vegetation Management Plan (VMP) at Lots 3, 4, 6, 7 and 8 DP 260234 (9, 5, 7, 11 and 15 Lamond Drive respectively), Turramurra in the Ku-ring-gai Local Government Area. This document has been prepared to accompany the impact assessment (Ashby 2012) and landscape plan (Conzept Landscape Architects 2012).

The proposal includes the demolition of the existing buildings, construction of two connected residential flat buildings, with basement car parking and associated works as shown in plans provided by Mackenzie Architects. The proposal includes landscaped gardens and a large area of revegetated and regenerated Blue Gum High Forest (BGHF).

The Updated Impact Assessment (Ashby 2013) relied upon the rehabilitation of these areas to contribute to the mitigation of further losses to and impacts on the critically endangered ecological community Blue Gum High Forest in the local area.

The original extent of BGHF on the rich, deep shale soils of the Hornsby Plateau was probably over 4,000 hectares but it has now been reduced to only several hundred hectares. Reserves containing this community are few and small, with Dalrymple Hay Nature reserve at St Ives and Sheldon Forest nearby in Turramurra containing the largest and best examples.

It now occurs predominantly as isolated trees in gardens and small patches that are infested by weeds. Conservation options are therefore limited and development proposals in the BGHF area are routinely accompanied by rehabilitation proposals for any remnant vegetation on site.

The major objective of this VMP is to provide a working document that delivers the following within a landscaped and developed environment:

1. directs the choice of plants;
2. protects remnant trees;
3. regenerates the BGHF on site;
4. enhances the habitat for BGHF on site;
5. enriches the local flora with weed control; and
6. enriches the local flora with an emphasis on planting local provenance species that are appropriate to BGHF.

2 DESCRIPTION OF THE SITE

The subject site is made up of five irregularly shaped residential blocks with dwellings. It occurs at the upper slope at the head of a gully that eventually feeds into the first order tributary of an unnamed creek that feeds in turn eventually into the Lane Cove River to the south west.

The location of the subject site is shown in Figure 1.

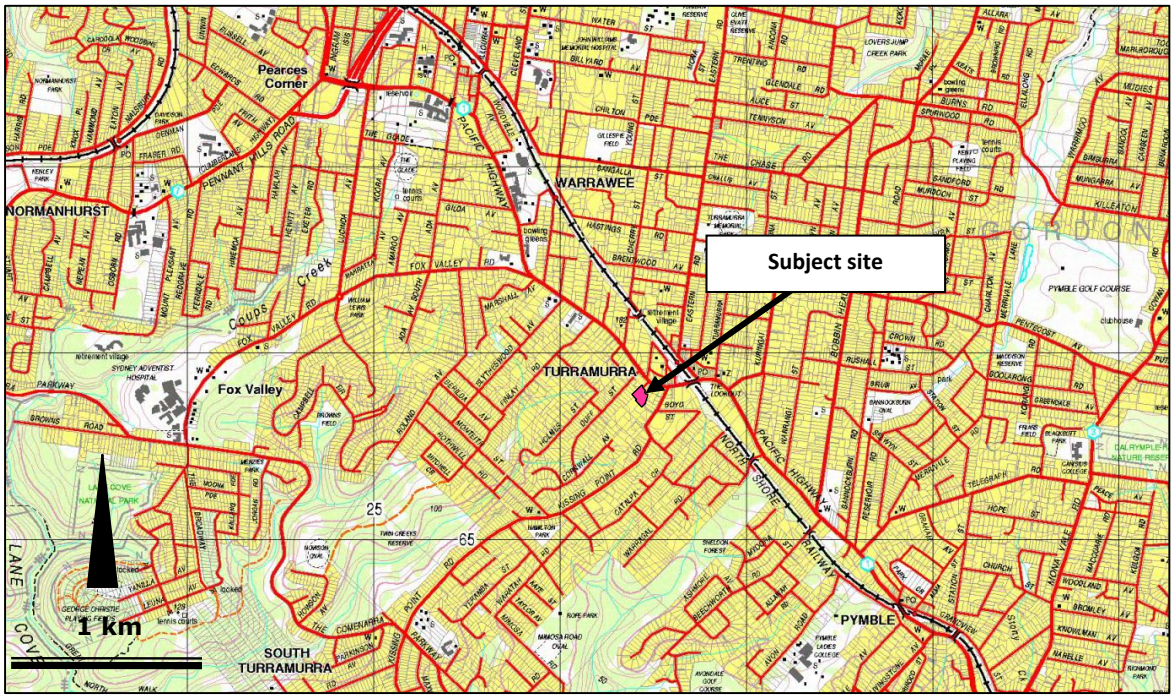


Figure 1: Subject site in relation to local features. Source map: TopoView Raster, Hornsby 1:25,000 topographic map.

The subject site occupies 5,908.6 square metres and supports weed-infested native vegetation in its steepest parts.

The native vegetation of the subject site was principally of two kinds: canopy trees over established gardens and a wild remnant patch on the lower slope made up of eucalypts with significant weed infestation in the understorey. This remnant and regrowth native vegetation constitutes Blue Gum High Forest (BGHF), a Critically Endangered Ecological Community.

Comparison of current and historical aerial photography (see Figure 2) reveals that the neglected part of the site is probably remnant vegetation, as are some of the trees scattered in the gardens. A soil-stored seedbank may remain beneath the blanket of weeds and thus afford the remnant some level of resilience.

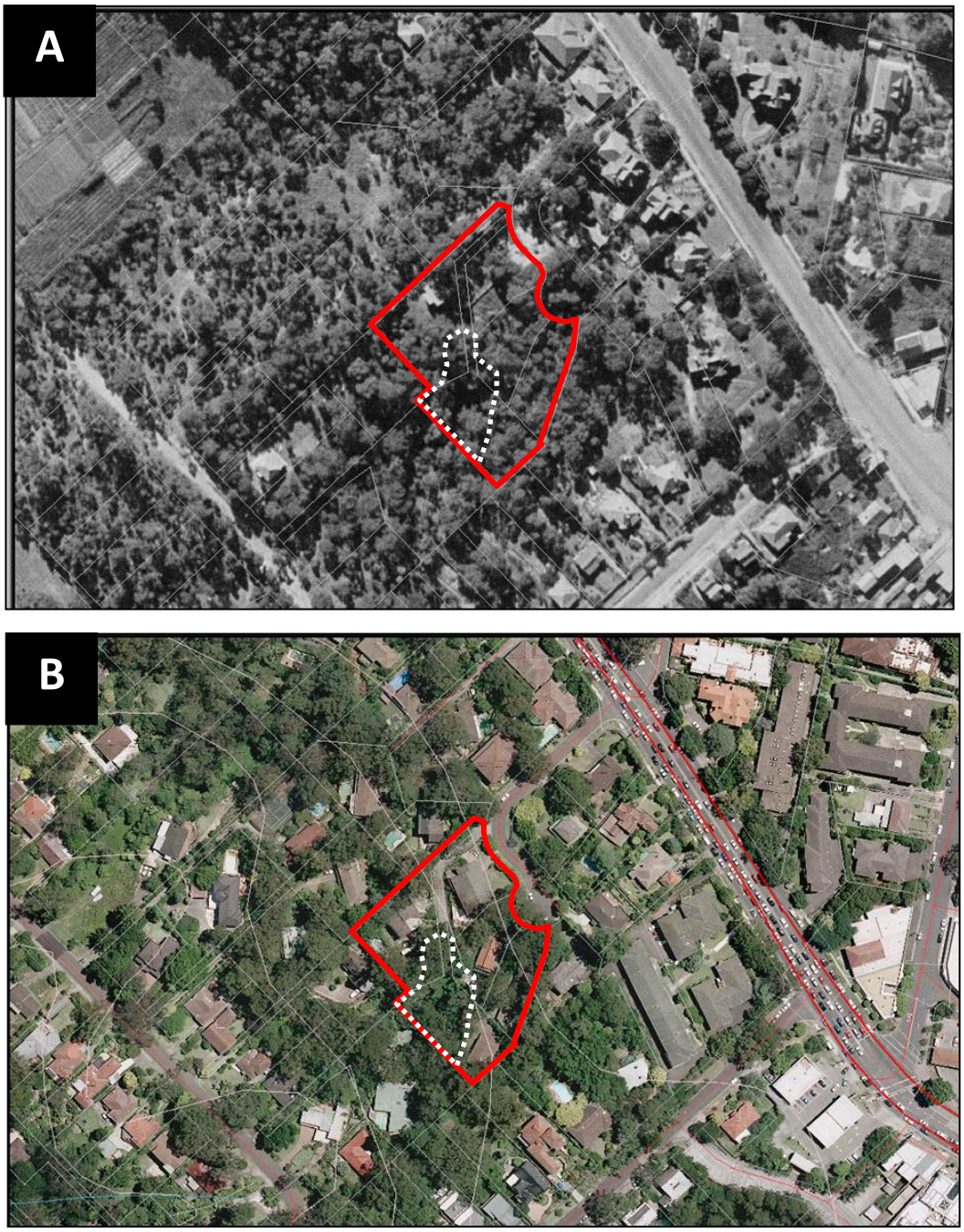


Figure 2: Aerial of subject site (red) in 1943 (A) and 2011 (B). Note that the area delineated by the white dotted line in 2008 is apparent in 1943 and is therefore probably remnant vegetation. Remnant trees remain in other parts of the site but the understorey has been removed for development or replaced by gardens. Source aerial: Department of Lands SIX Viewer.

2.1 Native Vegetation

A site inspection was carried out on 7th August 2012 and a species list compiled (see Table 1 below) from targeted random meander and supplemented by the trees identified across the site by the consultant arborist (Advanced Treescape Consulting 2012).

The site has the overwhelming characteristics of long established gardens with some remnant eucalypts as canopy trees and a large neglected area dominated by weeds.

Table 1: Locally native plant species recorded from the subject site.

Family	Scientific Name	Common Name
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern
Blechnaceae	*Doodia aspera*	Rasp Fern
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cyperaceae	*Cyperus gracilis*	-
Fabaceae	*Glycine tabacina*	Twining Glycine
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Myrtaceae	*Angophora floribunda*	Rough-barked Apple
Myrtaceae	*Corymbia maculata*	Spotted Gum
Myrtaceae	*Eucalyptus paniculata* subsp. *paniculata*	Grey Ironbark
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Rice Grass
Poaceae	*Oplismenus aemulus*	Basket Grass
Sterculiaceae	*Brachychiton acerifolius*	Illawarra Flame Tree

The following locally native species were also observed on site but given their position in garden beds and their popularity in horticulture, were probably planted:

Table 2: Locally native plant species that are probably planted.

Family	Scientific Name	Common Name
Araceae	*Alocasia brisbanensis*	Cunjevoi
Arecaceae	*Archontophoenix cunninghamiana*	Bangalow Palm
Aspleniaceae	*Asplenium australasicum*	Birds Nest Fern
Myrtaceae	Callistemon salignus	Willow Bottlebrush

The following native species were also present, but they are not locally native:

Table 3: Native plant species that are not locally native.

Family	Scientific Name	Common Name
Araliaceae	*Schefflera actinophylla*	Umbrella Tree
Cyatheaceae	*Cyathea cooperi*	Straw Treefern
Davalliaceae	*Nephrolepis cordifolia*	Fish-bone Fern
Myrtaceae	*Agonis flexuosa*	WA Weeping Myrtle
Proteaceae	*Grevillea robusta*	Silky Oak

2.2 Introduced Flora

Introduced species dominated the site either as garden plants or weeds that were rampant in the neglected steep bushland at the rear. Many of the exotic species were dominant (Morning Glory) or have the potential to dominate (Privet, Camphor Laurel). A list of introduced species that were observed is provided below in Table 4.

Seven species listed under the NSW Noxious Weeds Act 1993 were recorded. Those on site are all class 4 weeds.

The control objectives of class 4 noxious weeds are to reduce potential impact of those species on the economy, community and the environment.

Table 4: Introduced plant species recorded. ^{N4} = noxious weed class 4.

Family	Scientific Name	Common Name
Amaryllidaceae	*Clivia miniata*	Bush Lily
Apocynaceae	*Araujia sericifera*	Moth Vine
Araceae	*Monstera deliciosa*	Fruit-salad Plant
Araliaceae	*Hedera helix*	English Ivy
Arecaceae	*Livistona chinensis*	Chinese Fan Palm
Arecaceae	*Syagrus romanzoffiana*	Cocos Palm
Asteraceae	*Bidens pilosa*	Cobbler's Pegs
Asteraceae	*Sonchus oleraceus*	Common Sowthistle
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle
Commelinaceae	*Tradescantia fluminensis* ^{N4}	Wandering Jew
Convolvulaceae	*Ipomoea indica* ^{N4}	Coastal Morning Glory
Fabaceae	*Senna pendula* var. *glabrata*	-
Lauraceae	*Cinnamomum camphora* ^{N4}	Camphor Laurel
Magnoliaceae	*Magnolia grandiflora*	Southern Magnolia
Magnoliaceae	*Michelia figo*	Port Wine Magnolia
Malaceae	*Photinia serratifolia*	Chinese Photinia
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne
Melastomataceae	*Tibouchina lepidota*	Tibouchina
Ochnaceae	*Ochna serrulata* ^{N4}	Mickey Mouse Plant
Oleaceae	*Fraxinus floribunda*	Himalayan Ash
Oleaceae	*Ligustrum lucidum* ^{N4}	Large-leaved Privet
Oleaceae	*Ligustrum sinense* ^{N4}	Small-leaved Privet
Poaceae	*Ehrharta erecta*	Panic Veldtgrass
Rosaceae	*Duchesna indica*	Wild Strawberry
Rosaceae	*Prunus* sp.	Cherry Blossom Tree
Solanaceae	*Solanum mauritianum*	Wild Tobacco Bush
Strelitziaceae	*Strelitzea juncea*	Bird of Paradise
Verbenaceae	*Lantana camara* ^{N4}	Lantana
Zingiberaceae	*Hedychium gardnerianum*	Ginger Lily

3 POTENTIAL AND EXISTING ENVIRONMENTAL PROBLEMS

Alterations to the natural environment in and around the subject site are profound due to the nature and history of disturbances associated with a long established residential area. These include:

1. Root compaction of mature remnant trees due to roadworks and other development;
2. Physical harm to the roots of mature trees due to excavation works and proximity of buildings, paths and pools;
3. Dominance of persistent and problematic weeds such as *Ipomoea indica* Morning Glory;
4. Loss of native biodiversity in the soil seed bank;
5. Alteration of natural soil processes;
6. Disruption of nutrient balance;
7. Disturbance to natural soil horizons;
8. Alterations to natural soil levels;
9. Use of herbicides; and
10. Unchecked outflows into the riparian zone.

The proposed works will also present potential environmental challenges including:

1. Sedimentation and erosion of downslope environments during works where soils are exposed;
2. Root disturbance of retained trees during excavation and construction works;
3. Spread of weed propagules;
4. Displacement of fauna during removal of weeds; and
5. Displacement of fauna during excavation and construction works.

The implementation of this VMP and the proposed works according to the approved plans and processes will minimise the potential for these negative impacts and will ultimately provide a benefit to the habitat for the critically endangered ecological community Blue Gum High Forest in the local area.

PART B MANAGEMENT

4 MANAGEMENT ACTIONS

4.1 Objectives and actions

The principal objective of the plan is to enhance and enrich the local occurrence of Blue Gum High Forest by applying bush regeneration protocols that aid natural regeneration, along with dense plantings of local provenance material in the revegetation areas and in the landscaped gardens. Of critical importance is the re-establishment of understorey species as this is the missing structural element in almost all remnant and regrowth BGHF. It is intended that the VMP and the accompanying Landscape Plan (LP) deliver a diversity of structures and species in the rehabilitated BGHF.

Bush regeneration will be applied in those areas where the resilience is judged to be high enough for natural regeneration to occur and **revegetation** where it is not. Thus, the site is divided into **Regeneration** and **Revegetation** areas.

There will also be landscaped gardens in the development and these will use many BGHF species. The major strategy to deliver a conservation outcome for BGHF is the implementation of this VMP, that part of the LP that is relevant to the Revegetation areas and the remainder of the site where the LP emphasises BGHF species.

Fire has been demonstrated to be an important trigger for germination of the sclerophyllous shrub layers of BGHF (McDonald et al. 2002) and therefore this component of the community may not regenerate simply by the removal of weeds. As fire cannot be used in a residential area, plantings may also need to occur in the 'bush regeneration' areas.

In correspondence related to similar nearby development proposals, Council has suggested that only the species listed in the NSW Scientific Determination of BGHF be used as the pool of species from which to plant. However, the list of species contained within the Scientific Determination of BGHF is not comprehensive. The NSW Scientific Committee (2007) states that:

> *"The total species list of the community is considerably larger than that given above, with many species present in only one or two sites or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall or drought condition and by its disturbance (including fire) history. The number of species and the above ground relative abundance of species will change with time since fire, and may also change in response to changes in fire regime (including changes in fire frequency). At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is of vascular plant species; the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented."*

Thus, in order to restore the diversity to the remnant that has been lost due to a long history of disturbance, the species composition of the plantings for the site is to be guided principally by those species that define BGHF according to the body of scientific work that has now developed around the composition and ecology of this community, particularly Benson and Howell (1994), DECCW (2009), DSEWPC (2011), Ku-ring-gai Council (2010), NSW Scientific Committee (1997), NSW Scientific Committee (2007), Tozer (2003), Tozer et al. (2010) and Threatened Species Scientific Committee (2005). This species list is reproduced at Appendix B.

Five Management Units (MUs) have been defined within this plan. Each MU has been classified according to its objectives and management actions. All works are to be carried out in accordance

with this plan and the accompanying Landscape Plan; the actions and strategies are summarised in Figure 3 and detailed in Section 5 of this report.

4.2 Qualifications and experience of VMP contractors

All vegetation management actions specified in this VMP shall be carried out by suitably qualified and experienced bush regenerators. The minimum qualifications and experience required for the bush regeneration contractor are a TAFE Certificate 2 in Bushland Regeneration with two years demonstrated experience (for site supervisor) and a TAFE Certificate 2 in Bushland Regeneration with one year demonstrated experience (for other personnel). In addition, the site supervisor is to be eligible for full professional membership of the Australian Association of Bush Regenerators (AABR).

The use of trained personnel will ensure correct plant identification, work methods and compliance with required Occupational Health and Safety standards.

Due to the presence of Critically Endangered Ecological Community BGHF, the engaged bushland restoration contractors must be in the possession of or work under a Section 132c licence and/or Section 91 obtained from the NSW Office of Environment and Heritage.

4.3 Monitoring

It is recommended that the MUs described in this VMP be maintained for a minimum period of 5 years.

The rehabilitation actions identified in this VMP are to be monitored by the engaged bushland restoration contractors or a suitably qualified and experienced landscape architect, horticulturist, bush regenerator or ecologist. Monitoring should occur throughout the entire contract period and the provenance of material to be planted checked and certified.

The main objective of the monitoring program is to evaluate the effectiveness of the weed management program, to determine if adequate natural regeneration is occurring and monitor the success of plantings. If, after monitoring, it is deemed that the weed eradication techniques are ineffective, then the plan can be altered at any time to reduce the weed biomass. Likewise, if natural regeneration is failing then corrective measures will need to be implemented, including planting of tube stock from local provenance material.

The monitoring program will start immediately before commencement of preparation works and continue for a period to be determined by the Conditions of Consent. Progress reports will be provided to Ku-ring-gai Council every six months for the initial period of monitoring and thence annually. The need for subsequent monitoring should be reviewed regularly.

Progress reports shall be in the form of the template and according to the protocols detailed in Appendix A and based largely on the collection of data from quadrats established within each MU along with the photo reference points (see below).

Permanent monitoring quadrats and / or transects are to be established in each MU in order to judge changes over time within that unit.

4.4 Photographic reference points

Reference points will be established in all management units before the commencement of vegetation management. The locations of these points may be marked permanently on the ground or the location simply recorded by GPS and are to be associated with the quadrats and transects.

Once established, standard photographs should be taken before this plan is implemented and then again immediately before submitting each progress report. The aim of the reference photographs is to provide a pictorial record that will aid in the judgement of the effectiveness of the vegetation management strategies.

4.5 Hygiene and disease control

Hygiene is particularly important to prevent the transfer of plant diseases such as *Phytophthora* or Myrtle Rust.

The following simple procedures can reduce the chance of transferring diseases:

- use of sharp equipment (i.e. knifes and secateurs) that are regularly cleaned with methylated spirits;
- cleaning of loose soil off boots and tools with bleach;
- vehicles kept out of the works area as soil could be attached to the tyres;
- wearing of clean work clothes each day and for each work site; and
- make all efforts to ensure all plants brought onto the site are free of pathogens such as *Phytophthora* fungus and Myrtle Rust.

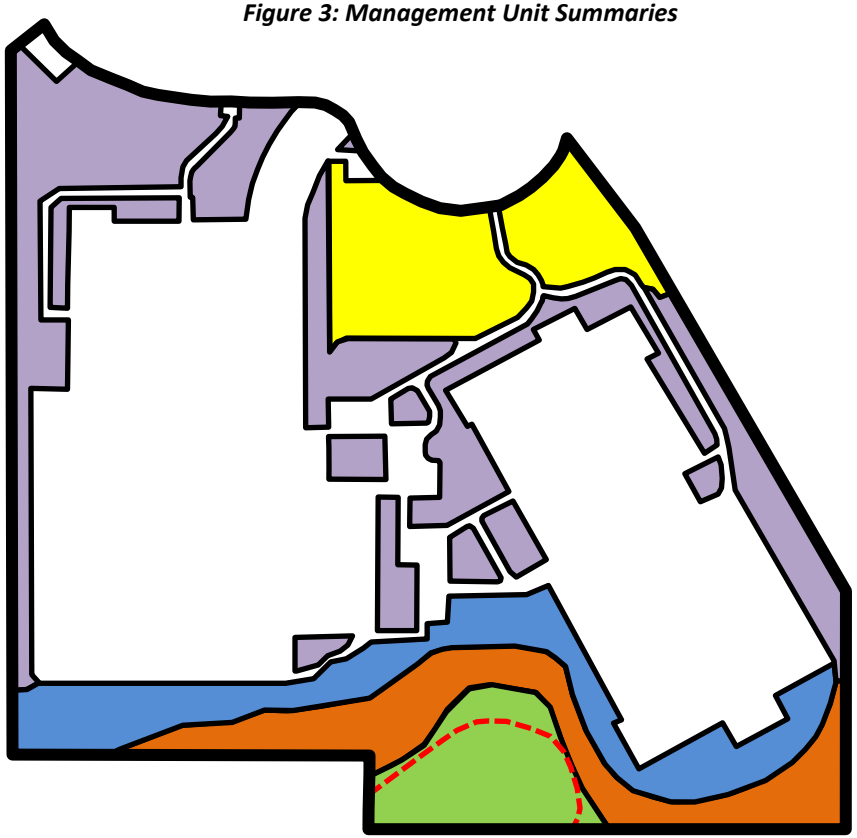
5 MANAGEMENT UNITS

The natural areas have been divided into five Management Units (MUs) – four in the Revegetation and Regeneration areas (MU1 to 4) and one (MU5) in the formal gardens.

All works are to be carried out in accordance with this plan, which is summarised in Figure 3. In general, the management strategies to be used in the rehabilitation of the BGHF on site include the following actions:

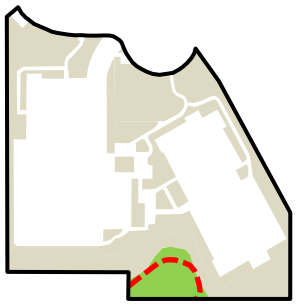
1. Delineate MUs 1 to 4 on the ground as defined within this plan.
2. Erect temporary fencing where feasible to protect the MUs from construction.
3. Primary weeding of the Morning Glory and Lantana infestations with necessary follow-up secondary weeding where it occurs in the Regeneration and Revegetation areas.
4. Recover tree canopies of native trees for their seed that are to be felled elsewhere in the development.
5. Use the heads as brush matting in MU 1 to aid in fast seedling establishment, soil conservation and provide fauna habitat.
6. Recover trunks from felled trees to provide terrestrial habitat and aid in soil conservation.
7. Use sediment fences across the steep slopes as a means of soil conservation and as a physical barrier to weeds such as *Tradescantia fluminensis* Wandering Jew.
8. Plantings in the MUs to at least replace the trees removed for the development at a ratio of 2:1.
9. Keep the Morning Glory and other exotic cover below 75% at all times as native species composition declines when weed cover is above this threshold (Gooden et al. 2009).
10. Seed collection should be carried out on site and material propagated for planting as well as making use of commercially available local provenance material.
11. Temporary fencing is to be used between the excavation / construction areas and their adjacent regeneration / revegetation areas in order to prevent accidental damage to retained vegetation.

Figure 3: Management Unit Summaries



MU	*Objectives & Strategies*
1	**Fully structured BGHF and protected riparian zone.** Aggressive primary weeding with regular follow-up. Stabilise soil on steep slope. If bush regeneration fails to encourage dense natural regeneration, then plant out with local provenance material. Long term maintenance weeding.
2	**Fully structured BGHF and stabilised slope.** Primary weeding with regular follow-up. Protect natural features. Plant out with local provenance material. Long term maintenance weeding.
3	**Native tree canopy with dense vines and scramblers.** Aggressive primary weeding with regular follow-up. Stabilise soil on steep slope. Plant out with local provenance material. Long term maintenance weeding.
4	**Native tree canopy with dense grasses and graminoids.** Aggressive primary weeding with regular follow-up. Stabilise soil on steep slope. Plant out with local provenance material. Long term maintenance weeding.
5	**Landscaped gardens** Treat as per approved Landscape Plan with an emphasis on BGHF species.

5.1 Management Unit 1



Area: 269.2 square metres

Objective:

- Fully structured BGHF.
- Riparian area protected and stabilised.
- Slope stabilised.
- Weeds controlled.
- Natural regeneration populating the understorey and replacement trees growing.

Existing condition:

- Badly weed infested remnant. Morning Glory blankets trees and understorey.
- Canopy trees with very little native understorey.
- Wholly contains the riparian zone.

Management Actions:

- Primary weeding, particularly for Morning Glory and Large-leaved Privet.
- Follow up weeding aim in first instance is to at least keep below 75% cover threshold.
- Morning Glory is most easily rolled with the stems / roots revealed cut and scraped with glyphosate.
- Privet can be cut and poisoned with rafts of material left off the ground to rot and provide fauna habitat.
- Climbing weeds to be cut and bases poisoned but not pulled out of trees. This provides habitat for fauna and avoids damaging the host trees.
- As the slope is steep, the erosion hazard must be addressed. Suggested methods for Morning Glory controls that avoid mobilising soil include:
    - spray with a recommended glyphosate dose if there is no threat to spraying other native groundcovers growing amongst it.
    - weed in a mosaic pattern so that only patches of Morning Glory are being removed at any one time and not exposing large areas of bare ground.
    - remove all the Morning Glory, and install coir logs/ eco logs and plants in erodible areas. Jute matting may be necessary and, as this can suppress natural regeneration, native ground covers are to be directly planted at a high density (at least 4/m^2).
- Monitor regeneration closely. If not keeping pace with weeds, then dense plantings of local provenance material to be implemented as well.

Plantings:

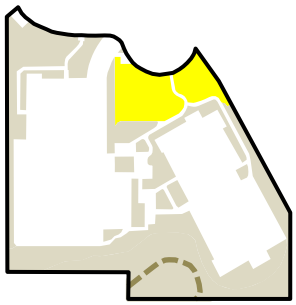
- Only if deemed to be required because of failure of natural regeneration.
- Suggested schedule of plantings as required:
    - *85 Adiantum aethiopicum*
    - *85 Blechnum cartilagineum*
    - *85 Breynia oblongifolia*
    - *85 Carex inversa*

- *85 Cissus hypoglauca*
- *85 Dianella caerulea*
- *85 Doodia aspera*
- *85 Leucopogon juniperinus*
- *85 Lomandra longifolia*
- *85 Notelaea longifolia*
- *85 Poa affinis*
- *85 Persoonia linearis*
- *85 Rapanea variabilis*

Scheduling:

- Work in this MU is not dependant on the construction or excavation being completed.
- Work should begin without delay, as the weed infestation is severe and causing deterioration in the condition of the BGHF.

5.2 Management Unit 2



Area: 450.2 square metres

Objective:

- Fully structured BGHF.
- Stabilised steep slope.
- Weeds controlled.
- Plantings of BGHF canopy and understorey species that provide amenity without impeding entry path or adjacent public street.

Existing condition:

- Steep semi-natural garden.
- Many native canopy trees but also a number of exotics (e.g. Cocos Palms).
- Many weedy exotics in understorey.

Management Actions:

- Remove exotic species using best practice methodology.
- Retain and protect all existing native trees.
- Retain and protect all exposed rock.
- Work at grade, using bush regeneration principles and an emphasis on manual techniques to protect soil.
- Selectively prepare pocket plant areas.
- Install BGHF canopy and understorey plants according to approved Landscape Plan.
- Maintenance weed and water on a regular basis.

Plantings:

- Canopy trees as per approved Landscape Plan according to the following listing:
    - 2 *Eucalyptus saligna*
    - 1 *Eucalyptus pilularis*
- Understorey as per approved Landscape Plan at a density of 3/m^2 according to the following listing:
    - *150 Blechnum cartilagineum*
    - *150 Carex inversa*
    - *150 Cissus hypoglauca*
    - *150 Dianella caerulea*
    - *150 Doodia aspera*
    - *150 Poa affinis*
    - *150 Leucopogon juniperinus*
    - *150 Poa affinis*
    - *150 Notelaea longifolia*
    - *150 Persoonia linearis*
- See Species list in Appendix B for further options as required.

Scheduling:

- This work may be impeded by the construction.

5.3 Management Unit 3

Area: 436.7 square metres

Objective:

- Established plantings of BGHF species with an emphasis on canopy trees, vines and scramblers.
- Slope stabilised.
- Weeds controlled.

Existing condition:

- Weed infested slope with some native canopy trees.

Management Actions:

- Remove exotic species using best practice methodology.
- Lightly cultivate and condition (as required) the existing soil.
- Install jute matting for soil stability and weed suppression.
- Pocket plant with viro-cell local provenance BGHF understorey species as per approved Landscape Plan.
- Maintenance weed and water on a regular basis.

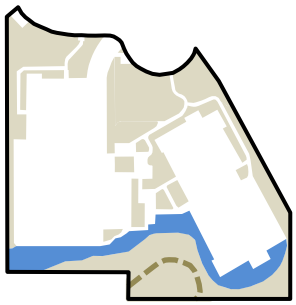
Plantings:

- Canopy trees as per approved Landscape Plan at a density of 3/m^2 according to the following listing:
    - 3 *Angophora costata*
    - 3 *Angophora floribunda*
    - 3 *Eucalyptus saligna*
    - 5 *Eucalyptus pilularis*
    - 5 *Elaeocarpus reticulatus*
    - 9 *Backhousia myrtifolia*
- Understorey as per approved Landscape Plan at a density of 3/m^2 according to the following listing:
    - *210 Cissus hypoglauca*
    - *210 Clematis aristata*
    - *210 Glycine clandestina*
    - *210 Morinda jasminoides*
    - *210 Pandorea pandorana*
    - *210 Smilax glyciphylla*
    - *210 Viola hederacea*
- See species list in Appendix B for further specific options as required.

Scheduling:

- Work in this MU is not dependant on the construction or excavation being completed.
- Work should begin without delay, as the weed infestation is severe and causing deterioration in the condition of the BGHF.

5.4 Management Unit 4



Area: 519.7 square metres

Objective:

- Established plantings of BGHF species with an emphasis on canopy trees, shrubs, grasses and graminoids.
- Slope stabilised.
- Weeds controlled.

Existing condition:

- Hardstand.
- Weed infested slope with some native canopy trees.

Management Actions:

- Remove exotic species using best practice methodology.
- Lightly cultivate and condition (as required) the existing soil.
- Install jute matting for soil stability and weed suppression.
- Pocket plant with viro-cell local provenance BGHF understorey species as per approved Landscape Plan.
- Maintenance weed and water on a regular basis.

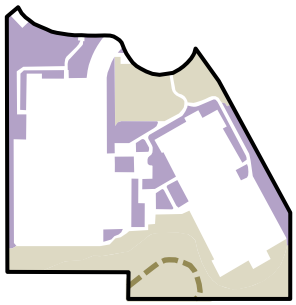
Plantings:

- Canopy trees as per approved Landscape Plan according to the following listing:
    - 5 *Eucalyptus saligna*
    - 5 *Eucalyptus pilularis*
    - 3 *Angophora floribunda*
    - 5 *Elaeocarpus reticulatus*
    - 3 *Backhousia myrtifolia*
- Understorey as per approved Landscape Plan at a density of 4/m^2 according to the following listing:
    - *325 Carex inversa*
    - *325 Dianella caerulea*
    - *325 Entolasia stricta*
    - *325 Lomandra longifolia*
    - *325 Notelaea longifolia*
    - *325 Oxalis perennans*
    - *325 Persoonia linearis*
    - *325 Poa affinis*
- See species list in Appendix B for further specific options as required.

Scheduling:

- Work in this MU may be impeded by the construction or excavation.
- Work should begin as soon as possible as the weed infestation is severe and causing deterioration in the condition of the BGHF.

5.5 Management Unit 5



Area: 781.5 square metres
Objective:

- Garden areas to provide amenity and aesthetically-pleasing surroundings, with an emphasis on the planting of BGHF species

Existing condition:

- Buildings and hardstand.
- Gardens and lawn.
- Mature canopy trees and some underplantings.
- Weed-infested neglected gardens.

Management Actions:

- As per approved Landscape Plan.
- Condition soil.
- Plant out as per approved Landscape Plan.
- Monitor and follow up weeding by Landscape Contractors.

Plantings:

- See Landscape Plan for details, but BGHF elements include canopy trees, small trees, shrubs, vines, scramblers, grasses, graminoids, herbs and forbs according to the following listing:
    - 5 *Acmena smithii*
    - 7 *Angophora costata*
    - 10 *Angophora floribunda*
    - 11 *Eucalyptus saligna*
    - 17 *Eucalyptus pilularis*
    - 5 *Allocasuarina torulosa*
    - 2 *Ficus rubiginosa*
    - 30 *Backhousia myrtifolia*
    - 39 *Elaeocarpus reticulatus*
    - 5 *Glochidion ferdinandii*
    - 24 *Livistona australis*
    - 38 *Cyathea australis*
    - 49 *Asplenium australasicum*
    - 31 *Dodonaea triquetra*
    - 38 *Callistemon salignus*
    - 23 *Doryanthes excels*
    - 5 per m^2 *Dianella caerulea*
    - 3 per m^2 *Lomandra longifolia*
    - 3 per m^2 *Adiantum aethiopicum*
- See Species list in Appendix B for further specific options as required.

Scheduling:

- Work in this MU cannot be done until after the excavation and construction are completed.

6. WORKS SCHEDULE

As the project is a complex construction project, a strict time frame and works schedule cannot be provided at this stage. However, the order of works is outlined below. These works are to be taken into account in the Construction Plan or similar.

Phase	Activity	Details	Timing
1. Preparatory Works	Engage contract bush regeneration company	Only qualified and experienced bush regeneration contractors to be engaged.	Prior to other works
	Photographic record	Establish photographic reference points	
	Fencing	Erect 1.8m high protective fencing including sediment erosion control fencing to protect MUs 1,2 and 3.	
		Ensure sediment control installed properly.	
2. Primary weed control and seed introduction	Weed management	Undertake appropriate weed control methods in MUs 1,2,3. Weed density to be maintained below 75% cover.	Weeks 2-4
	Tubgrindings	Supervise vegetation clearing / tubgrinding contractors in obtaining seed from trees approved for removal.	
	Plantings	Source local provenance plants – may include contract growing.	
3.Secondary weed control	Weed management	On at least a monthly basis during Spring and Summer, weed herbaceous and woody weeds using techniques appropriate to the species and scale of outbreak. Autumn and Winter months require one session a month.	Week 6 to 26
		Monitoring photos from standard locations to be taken.	
		Appropriate responses to weeds formulated according to status of rehabilitation works. Weed density to be maintained below 5% cover.	
	Brush matting	Collect native seed laden material and place within previously cleared open areas	

Phase	Activity	Details	Timing
4. Revegetation and rehabilitation	Weed management	Undertake appropriate weed control methods in MUs 4 and 5. Weed density to be maintained below 75% cover.	After construction works completed
	Brush matting	Stabilise steep slopes	
	Soil preparation	Condition soil and prepare for plantings.	
	Plantings	Install plants and mulch around base	
		Water and maintain plants. Survival rate of 80% expected and replacement plantings required if not met.	
		Enrichment plantings in MU1 and 2 as required.	
4. Reporting and Maintenance Phase	Monitoring and reporting	Monitoring photos from standard locations to be taken.	Every 6 months after work begins
		Inspection reports provided to Council.	
	Maintenance Weeding and bush regeneration	Continue weed control on at least a two-monthly basis, Weed density to be maintained below 5% cover.	Between inspections
		Carry out actions determined necessary at inspection.	

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APPENDIX A
MONITORING AND REPORTING

It is recommended that the VMP be implemented for a minimum period of 5 years before formal review of the VMP is required. The rehabilitation actions identified in this VMP are to be monitored by the engaged bushland restoration contractor. Monitoring should occur throughout the entire implementation period.

The main objectives of the monitoring program are to:

- evaluate the effectiveness of the weed management program;
- detect new outbreaks of weeds;
- determine if adequate natural regeneration is occurring; and
- monitor the success of plantings.

If, after monitoring, it is deemed that the weed eradication techniques are ineffective, then the plan can be altered at any time to reduce the weed biomass. Likewise, if natural regeneration is failing then corrective measures will need to be implemented, including planting of tube stock from local provenance material.

Monitoring includes both informal and formal collection of data:

1. regular sweeps of the site are to occur in order to check for weed outbreaks;
2. a quadrat in each Zone is to be measured annually; and
3. a photograph is to be taken annually at pre-determined reference points and at each quadrat.

Regular Sweeps

All of the Management Units are to be regularly checked via random and targeted meander in order to detect new or previously undetected weed outbreaks. These weed sweeps are to occur more frequently in the growing season and when target weeds are more detectable.

Quadrats / Transects

Monitoring quadrats and transects are to be sampled at 6 monthly intervals for the life of the VMP. Each quadrat is to be 1 m x 1 m and spread throughout the MU in order to capture the variation of the site. Quadrats and transects are to be located according to the approximate locations shown in the figure overleaf.

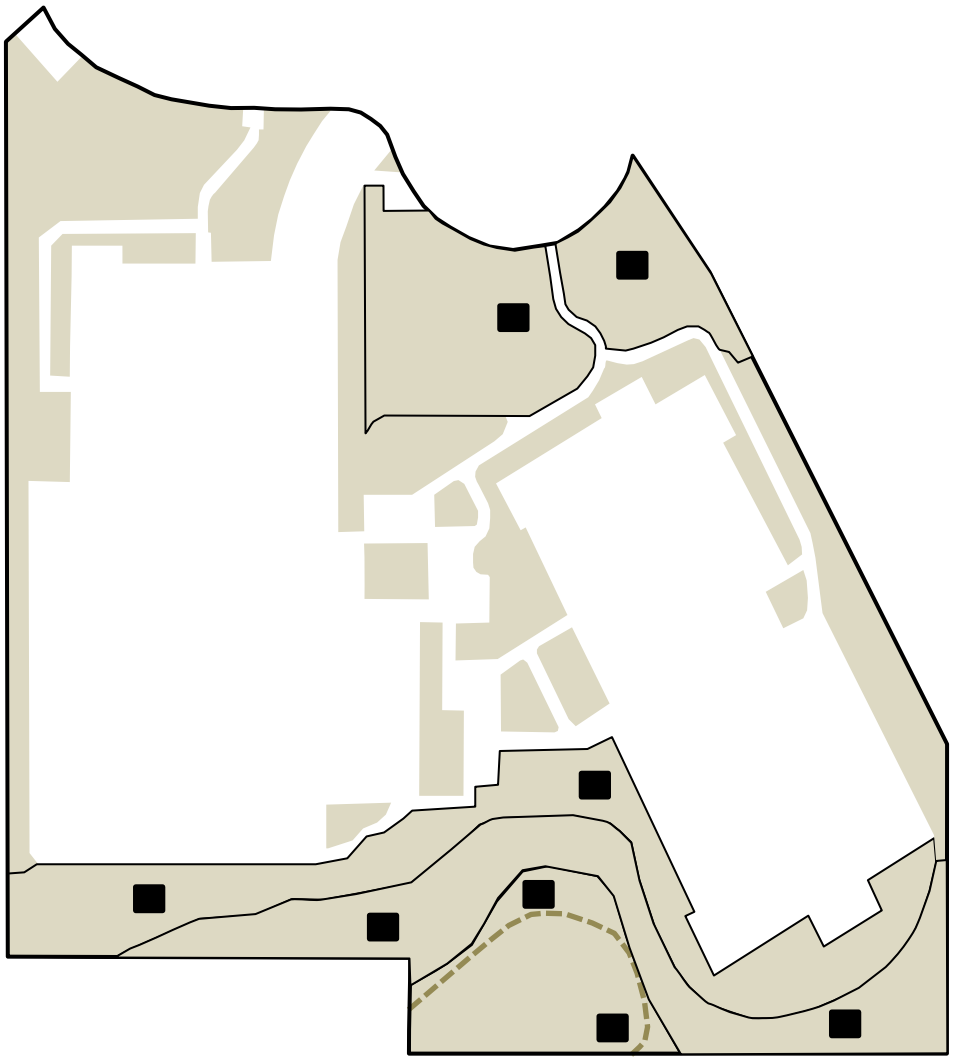
The data to be collected from each quadrat comprises:

- description of each vegetation layer - an estimate of height, percentage cover and a list of up to three major species in that layer;
- species list for each quadrat with a cover abundance rating, using a modified Braun-Blanquet rating system (see table overleaf); and
- photograph of each quadrat taken from the north west corner, facing south east.

Reporting

Reports of these monitoring results are to be prepared by the bush regeneration contractors and submitted to Council at 6 monthly intervals for the first 2 years and then annually thereafter.
Reports shall be guided by the Template provided overleaf and shall include:

- An annual review regarding compliance with the VMP's management strategies and fulfilment of the objectives. This is to include any recommendations for alterations to the management strategies in response to the condition of the vegetation; and
- Specific results from the monitoring quadrats, transects and photo points. This should include a time series of data and photographs to illustrate the changes over the entire management period. The grid references of the locations of each photo point should also be collected via GPS and reported in this document.



Approximate proposed locations of 8 monitoring quadrats across the 4 Management Units outside of the formal landscaped gardens.

Modified Braun-Blanquet cover readings		
Rating	**Cover**	**Explanation**
1	<5%	rare or few individuals, 3 or fewer individuals
2	<5%	uncommon, more than 3 but sparsely scattered or localised
3	<5%	common, consistent throughout plot
4a	<5%	very abundant, many individuals throughout
4b	5-25%	
5	25-50%	
6	50-75%	
7	75-100%	

Progress Report for Vegetation Management Works at Lamond Drive, Turramurra, NSW

1.	**Date of plan approval:**	
2.	**Tick report interval from date of council consent**	□ 6 month □ 1 Year □ 1.5 years □ 2 years □ 3 years □ 5 years □ subsequent ……
3.	**Management Unit:** □ 1 □ 2 □ 3 □ 4	
4.	**Weed cover (%) per structural layer:**	
5.	**Major weeds and % cover:**	
6.	**Regeneration success:**	
7.	**Number of plants planted.**	
8.	**Source of plant material.**	
9.	**Success rate (%):**	
10.	**Additional plants required/comments:**	
11.	**General progress/Comments:**	
12.	**Assistance required:**	
13.	**Compiled by:**	
14.	**Contact details:**	
15.	**Date:**	
16.	**Signature:**	

APPENDIX B

BLUE GUM HIGH FOREST SPECIES FOR PLANTINGS

Trees	
Acacia decurrens	
Acacia floribunda	
Acacia implexa	Hickory Wattle
Acacia parramattensis	Parramatta Wattle
Acmena smithii	Lillypilly
Allocasuarina torulosa	Forest Oak
Alphitonia excelsa	Red Ash
Angophora costata	Smooth-barked Apple
Angophora floribunda	Rough-barked Apple
Angophora hispida	Dwarf Apple
Backhousia myrtifolia	Grey Myrtle
Brachychiton acerifolius	Flame Tree
Corymbia eximia	Yellow Bloodwood
Corymbia gummifera	Red Bloodwood
Elaeocarpus reticulatus	Blueberry Ash
Eucalyptus globoidea	White Stringybark
Eucalyptus paniculata subsp. *paniculata*	Grey Ironbark
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus resinifera	
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus saligna X botryoides	Sydney Blue Gum-Bangalay hybrid
Eucalyptus tereticornis	Forest Red Gum
Exocarpos cupressiformis	Cherry Ballart
Ficus coronata	Sandpaper Fig
Glochidion ferdinandi var. *ferdinandi*	Cheese Tree
Melia azedarach	White Cedar
Myrsine variabilis (was *Rapanea variabilis*)	-
Notelaea longifolia	Large Mock-olive
Pittosporum undulatum	Sweet Pittosporum
Syncarpia glomulifera	Turpentine
Trema tomentosa	
Shrubs / small trees	
Acacia longissima	Long-leaf Wattle
Breynia oblongifolia	Coffee Bush
Bursaria spinosa	Blackthorn
Callistemon salignus	
Clerodendrum tomentosum	Hairy Clerodendrum
Dodonaea triquetra	Large-leaf Hop-bush
Exocarpos cupressiformis	Cherry Ballart
Hibbertia aspera subsp. *aspera*	Rough Guinea Flower

Shrubs / small trees (continued)	
Homalanthus populifolius (was *Omalanthus populifolius*)	Bleeding Heart
Indigofera australis	
Leucopogon juniperinus	Prickly Beard-heath
Leucopogon lanceolatus	
Livistona a australis	
Maytenus silvestris	Narrow-leaved Orangebark
Ozothamnus diosmifolius	White Dogwood
Persoonia linearis	Narrow-leaved Geebung
Pittosporum revolutum	Rough fruit Pittosporum
Platylobium formosum	Handsome Flat Pea
Polyscias sambucifolia	Elderberry Panax
Rubus parvifolius	Native Raspberry
Tristaniopsis laurina	Water Gum
Zieria smithii	Sandfly Zieria
Ferns	
Adiantum aethiopicum	Common Maidenhair
Adiantum hispidulum	Common Rough Fern
Asplenium flabellifolium	Necklace Fern
Blechnum cartilagineum	Gristle Fern
Calochlaena dubia	Rainbow Fern
Doodia aspera	Prickly Rasp Fern
Pteridium esculentum	Bracken Fern
Grasses and graminoids	
Austrodanthonia racemosa	Wallaby Grass
Carex inversa	-
Carex maculata	-
Cyperus gracilis	Slender Flat-sedge
Dianella caerulea	Blue Flax-lily
Dichelachne micrantha	-
Digitaria parviflora	
Echinopogon caespitosus	Hedgehog Grass
Echinopogon ovatus	Hedgehog Grass
Entolasia marginata	Bordered Panic
Entolasia stricta	Wiry Panic
Imperata cylindrica var. *major*	Blady Grass
Lepidosperma laterale	-
Lomandra filiformis	
Lomandra longifolia	Spiny-headed Mat-rush
Microlaena stipoides	
Oplismenus aemulus	-
Oplismenus imbecillis	-
Poa affinis	-
Themeda australis	Kangaroo Grass

Herbs and forbs	
Brachyscome linearifolia (was *Brachycome angustifolia)*	
Brunoniella australis	Blue Trumpet
Centella asiatica	
Commelina cyanea	
Coronidium scorpioides (was *Helichrysum scorpioides*)	
Dichondra repens	
Einadia hastata	
Einadia trigonos	Fishweed
Galium propinquum	
Geranium homeanum	
Gonocarpus tetragynus	
Goodenia heterophylla	
Hydrocotyle laxiflora	Stinking Pennywort
Hydrocotyle peduncularis	
Oxalis exilis	
Oxalis perennans	-
Phyllanthus gunnii	
Plantago debilis	
Plectranthus parviflorus	
Poranthera microphylla	
Pratia purpurascens	Whiteroot
Pseuderanthemum variabile	Pastel Flower
Rumex brownii	
Senecio hispidulus	
Sigesbeckia orientalis	
Solanum prinophyllum	Forest Nightshade
Veronica plebeia	Speedwell
Viola hederacea	Native Violet
Wahlenbergia gracilis	
Climbers / scramblers	
Billardiera scandens	
Cassytha glabella	-
Cayratia clematidea	Native Grape
Cissus antarctica	
Cissus hypoglauca	Water Vine
Clematis aristata	Old Man's Beard
Clematis glycinoides	
Desmodium rhytidophyllum	
Desmodium varians	
Eustrephus latifolius	Wombat Berry
Geitonoplesium cymosum	Scrambling Lily

Climbers / scramblers (continued)	
Glycine clandestina	-
Glycine microphylla	
Glycine tabacina	
Hardenbergia violacea	
Hibbertia dentata	
Hibbertia scandens	
Kennedia rubicunda	
Marsdenia rostrata	Milk Vine
Morinda jasminoides	Sweet Morinda
Pandorea pandorana	Wonga Wonga Vine
Passiflora herbertiana subsp. *herbertiana*	Native Passionfruit
Sarcopetalum harveyanum	
Smilax australis	Lawyer Vine
Smilax glyciphylla	Sweet Sarsaparilla
Stephania japonica var. *discolor*	Snake Vine
Tylophora barbata	Bearded Tylophora