PROPOSED SUBDIVISION OF LOT 1 DP 408800, 62 HILLSIDE ROAD, NEWPORT

Vegetation Management Plan

For:

Martens & Associates Pty Ltd

June 2016

Final

PO Box 2474
Carlingford Court 2118

Report No. 15023RP2

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Approved by: David Robertson

Position: Director

Signed: David Robertson

Date: *23 June, 2016*

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Chapter 1

Introduction

1.1 Introduction

Cumberland Ecology has been commissioned by Martens & Associates Pty Ltd on behalf of Cariste Pty Ltd, to prepare a Vegetation Management Plan (VMP) to support a Development Application for the proposed subdivision of Lot 1 DP 408800, also known as 62 Hillside Road, Newport, in the Pittwater Local Government Area (LGA) (**Figure 1.1**).

The subdivision of Lot 1 DP 408800 will create four new housing lots and provides for indicative building envelopes, Asset Protection Zones (APZs) (which includes a small area of the adjoining Lot 22 DP1036400), and ancillary works. The proposed development will require the clearing of an area of Littoral Rainforest, which complies with the Endangered Ecological Community (EEC) under the New South Wales *Threatened Species Conservation Act 1995* (TSC Act). Parts of the community also complies with the listing for Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Critically Endangered Ecological Community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved development on the adjoining Lots 21 and 22 DP 1036400 includes the construction of a shared driveway, drainage works, and APZs in association with an existing dwelling (on Lot 22) and indicative building footprint (on Lot 21). Littoral Rainforest vegetation is also retained on each of these lots, and is not currently managed for conservation.

1.1.1 Purpose

The purpose of this VMP is to provide instruction for the rehabilitation, and adequate protection of Littoral Rainforest to be retained as part of the proposed subdivision of Lot 1 DP 408800. However, in order to maximise the conservation outcome for Littoral Rainforest in the locality, and to further offset for the loss of this community as a result of the proposed subdivision, the VMP has been prepared to address the conservation requirements for all Littoral Rainforest retained across Lot 1 DP408800 and Lots 21 and 22 DP 1036400 (referred to collectively as 'the Subject Site').

The application of the VMP will allow for a holistic approach to management of the Littoral Rainforest present, including restoration from damage experienced in some areas at the perimeter of the Subject Site, which appears to be as a result of upslope neighbours (located on Kanimbla Avenue) clearing or otherwise impacting on vegetation outside their boundary.

Coordinate System: MGA Zone 56 (GDA 94)

Legend

- Subject Site
- Lot Boundary

Grid North

Image Source:
Image © Nearmap
(dated 30-12-2014)

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I:\...15023\Figures\RP2_VMP\20160602\Figure 1.1. Location_Subject Site

Figure 1.1. Location of the Subject Site

10 0 10 20 30 40 m

1.2 Duration of the VMP

The management period of the VMP should apply for a period of five years. After this time progress made on site should be reviewed against the management objectives of the VMP to determine the future management of the Subject Site.

1.3 Responsibilities

The majority of works to be undertaken under this VMP will be undertaken by a qualified bushland regeneration contractor. Other persons responsible for undertaking works are specified in **Appendix A**.

1.4 Background

1.4.1 Location

The Subject Site is located at Lot 1 DP 408800 and Lots 21 and 22 DP 1036400, also known as 62 and 85 Hillside Road, Newport (respectively), and covers an area of approximately 1.06ha. The Subject Site is zoned as E4 – Environmental Living under the Pittwater Local Environmental Plan 2014 (LZN_017) and contains land subject to the Pittwater 21 Development Control Plan (DCP) Section B.4.17 Littoral Rainforest - Endangered Ecological Community. The Subject Site is bounded by residential properties on three sides, and Attunga Reserve adjoins the site to the east.

1.4.2 Assessment History

The Subject Site has been subject to extensive studies spanning more than fifteen years, the preparation of a number of development applications (DA), and proceedings in the NSW Land and Environment Court.

1.4.3 Bushfire Risk

The site is mapped as being bushfire prone land under Pittwater Council's Bushfire Prone Land Map (2013) as Vegetation Category 1.

1.5 Site Description

The Subject Site consists mostly of a southern facing, forested slope. A drainage line runs through the centre in a south-easterly direction. In the centre of the site an old fibro residential dwelling, and an associated shed are present, and to the west of the existing driveway, a brick dwelling occurs. The site is surrounded by residential properties to the west and north. Some of the adjoining properties appear to have encroached on the Subject Site, potentially through clearing beyond their boundaries, lack of noxious weed control, and/or the release of uncontrolled stormwater. The eastern border of the Subject Site is contiguous with Attunga Reserve, and the southern border contiguous with Porter Reserve, council reserves containing remnant and revegetated native communities.

Chapter 2

Methods

2.1 Literature Review

The preparation of the VMP involved a literature review to determine the most up to date methods of weed control for exotic species that are present on the Subject Site. This literature review involved a variety of sources including government fact sheets and websites. Personal experience of a Cumberland Ecology botanist formerly employed in bushland regeneration was also utilised.

In order to prepare species planting lists for revegetation of Littoral Rainforest to be retained on site, survey data was reviewed along with:

- Littoral rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions – endangered ecological community listing – Final determination ((NSW Scientific Committee, 2004);
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia – Commonwealth listing advice (Threatened Species Scientific Committee, 2008); and
- NSW Bionet (OEH, 2015).

2.2 Flora Surveys

Flora surveys undertaken by Cumberland Ecology were conducted on the 19th of March 2015 and the 15th of June 2015 by a botanist and ecologist. Surveys involved random meander transects to determine vegetation condition, targeted searches for threatened species known to occur in the locality, distribution of exotic weed species within the Subject Site, and to document vegetation conditions with photographs.

In addition two 20 x 50 m BioBanking quadrats were undertaken; for each quadrat the following information was collected:

- All vascular flora species present within a 20 x 20 m quadrat;
- The stratum in which each species occurred;
- The relative frequency of occurrence of each plant species;
- The relative percentage foliage coverage of each plant species;

- Vegetation structural data (i.e. height and percentage cover of each stratum);
- Number of hollows in canopy trees;
- The diameter at breast height of canopy trees containing hollows;
- Number of logs (and total length);
- The ground cover composition (exotic groundcover, native grasses, native shrubs, every meter along a 50 m transect;
- Quantum and species of regenerating trees;
- A waypoint to mark the location of the quadrat, using a handheld GPS; and
- Photographs of the quadrat.

In addition to the recent surveys conducted as part of the proposed development and for preparation of the VMP, historic surveys, conducted as part of previous development applications was incorporated, to provide a comprehensive list of plant species known to occur.

Chapter 3

Existing Vegetation

A list of all flora species recorded on site by Cumberland Ecology is provided in **Appendix B**. Vegetation communities present on the Subject Site are shown in **Figure 3.1**.

3.1 Vegetation Communities and Distribution of Weeds

i. Littoral Rainforest: Closed native canopy with native dominated understorey

This community occurs throughout the northern half of the site (**Photograph 3.1**) and as a band along the southern border of the site (**Photograph 3.2**). It conforms to the description in the final determination for the EEC Littoral rainforest in the NSW North Coast, Sydney Basin and South East Corner bioregions, listed under the TSC Act, and the Commonwealth listing advice for the CEEC Littoral Rainforest and Coastal Vine Thickets of Eastern Australia, listed under the EPBC Act. The community also conforms to the description of the vegetation mapping unit Temperate Littoral Rainforest by Tozer et al. (2010). The community on site is associated with a south facing slope, and sandy soils amongst sandstone rocks.

The closed canopy is dominated by the tree species *Livistona australis* (Cabbage Tree Palm), *Acmena smithii* (Lilly Pilly), *Pittosporum undulatum* (Sweet Pittosporum), and *Glochidion ferdinandi* var. *Ferdinandi* (Cheese Tree). Other species such as *Banksia integrifolia* (Coastal Banksia), *Ficus rubiginosa* (Port Jackson Fig), *Eucalyptus botryoides* (Bangalay), and *Allocasuarina littoralis* (Forest Oak) occur less frequently in the canopy, and as emergents. Underneath the canopy a small tree layer is present, comprised predominately of *Eupomatia laurina* (Native Guava), *Synoum glandulosum* (Scentless Rosewood), *Acmena smithii*, and *Pittosporum undulatum*. The exotic tree species *Erythrina x sykesii* is present in the canopy in the southern half of the site.

A dense shrub layer is present in most areas dominated by *Eupomatia laurina* and *Synoum glandulosum*, and juveniles of the trees *Livistona australis* and *Pittosporum undulatum*. The exotic weed species *Lantana camara* is dominant in the understorey of some areas of the site, and other species such as *Ligustrum sinense* (Small-leaved Privet) occur more sporadically. Other shrubs species present with patchy occurrences include *Wilkiea huegeliana* (Veiny Wilkiea), *Notelaea longifolia*, *Pittosporum revolutum* (Rough-fruited Pittosporum), and *Elaeocarpus reticulatus* (Blueberry Ash). Vines are common in the understorey and include the species *Morinda jasminoides* (Sweet Morinda), *Smilax australis* (Lawyer Vine), and *Geitonoplesium cymosum* (Scrambling Lily).

The ground layer is dominated by ferns in most areas, the dominant species on site being *Doodia aspera* (Rasp Fern) and *Blechnum cartilagineum* (Gristle Fern), with others such as

Adiantum aethiopicum (Maidenhair fern), Adiantum hispidulum (Rough Maidenhair Fern), and *Calochlaena dubia* (False Bracken Fern) occurring less frequently. Other herbaceous species such as *Pseuderantheum variabil*e (Pastel Flower), *Lepidosperma elatius* (Tall Sword-sedge), *Schelhammera undulata* (Lilac Lily), and the grasses *Entolasia marginata* (Margined Panic) and *Oplismenus imbecillis* (Creeping Beard Grass) have a scattered distribution in the ground layer. Exotic weed species are common in areas that have undergone disturbance, or are close to current and former residential properties, such as the interface between the rainforest and backyards in the north of the site, and below old fibro buildings in the south of the site. These species include *Ehrharta erecta* (Panic Veldtgrass), *Asparagus aethiopicus* (Sprenger's Asparagus), and *Tradescantia fluminensis* (Fluminensis), which are all listed as 'Transformer Weeds' that threaten the survival of Littoral Rainforest (Threatened Species Scientific Committee, 2008).

Photograph 3.1 Littoral Rainforest in the northern half of the site

Photograph 3.2 Littoral rainforest in the south eastern portion of the site

ii. Littoral Rainforest - Closed native canopy with exotic dominated understorey

This community occurs in the southern half of the site, and is associated with areas of the site that have undergone disturbance, and with areas along a drainage line that are likely to have nutrient enriched soils from residential runoff upslope (Photograph 3.3). The canopy in these areas is predominately comprised of *Livistona australis, Glochidion ferdinandi var. ferdinandi* and *Pittosporum undulatum*, and to a lesser extent *Acmena smithii*. Exotic shrubs such as *Lantana camara, Ligustrum sinense*, and *Ochna serrulata* (Mickey Mouse) are common in the understorey, and the ground layer is dominated by exotic weed species such as *Nephrolepis cordifolia* (Fishbone Fern), *Ageratina adenophora* (Crofton Weed), *Tradescantia fluminensis*, (Wandering Jew), *Ehrharta erecta* and *Hedychium gardnerianum* (Ginger Lily). Other exotic species such as *Solanum nigrum* (Blackberry) occur less frequently.

Photograph 3.3 Littoral Rainforest with exotic understorey

iii. Littoral Rainforest: Open native canopy with exotic dominated understorey

This area conforms to the TSC Act listing for the community, however does not conform to the EPBC listing due to the lack of canopy (**Photograph 3.4**). The canopy at the time of the 2015 site survey consisted of several scattered *Livistona australis* individuals, and the shrub layer consisted of juvenile *Livistona australis* individuals. Vegetation for the most part was less than a metre in height. The ground layer included regrowth individuals of native species including *Lomandra longifolia* (Spiny Mat-rush), *Commelina cyanea* (Scurvy Weed), *Oplismenus aemulus* (Basket Grass), *Calochlaena dubia*, and the vine *Cissus hypoglauca* (Water Vine), however was depauperate in native species in comparison to adjacent, upslope intact areas.

Exotic weed species were extremely common in the ground layer and consisted of juvenile individuals of the shrubs *Lantana camara* and *Ligustrum sinense*, and herbs including *Solanum nigrum* (Blackberry Nightshade), *Nephrolepis cordifolia* (Fishbone Fern), and *Ageratina adenophora*. During a site inspection in March 2016, the exotic understorey species were observed to have increased in dominance, since the 2015 surveys, within this community and adjoining areas of the closed canopy variants of Littoral Rainforest.

Photograph 3.4 Littoral Rainforest with Open Canopy (looking east)

iv. Urban Native/Exotic Vegetation (Not Listed)

This vegetation community predominantly occurs surrounding and downslope of old fibro residential dwellings on the property (**Photograph 3.5**). There are also small patches of exotic vegetation at the perimeter of the Subject Site, where potential clearing or weed spread has occurred from adjoining properties (located upslope, on Kanimbla Ave). The community consists of old garden shrubs, uncontrolled lawn grasses, and exotic herb species. The western extent of this community has a canopy of several large *Erythrina x sykesii*, and garden shrubs present include the species *Citrus x limon* (Lemon), and *Murraya paniculata* (Orange Jessamine). Also in the shrub layer are several of the non-endemic tree fern *Cyathea cooperi* (Straw Treefern), and exotic weeds such as *Senna pendula var. glabrata* (Cassia) and *Ligustrum sinense*, and the prostrate *Asparagus aethiopicus*.

The ground layer is dominated by exotic weed species with native species limited to scattered individuals of common species such as the grasses *Microlaena stipoides* (Weeping Grass) and *Oplismenus aemulus* (Basket Grass), the forbs *Hydrocotyle peduncularis* (Native Pennywort) and *Cotula australis* (Common Cotula), and the ferns *Calochlaena dubia* and *Asplenium australasicum* (Bird's Nest Fern), with the latter planted in a former garden bed. Weeds include the forbs *Conyza sumatrensis* (Tall Fleabane), *Acetosa sagittata* (Turkey Rhubarb), *Ageratina adenophora,* and *Crassocephalum crepidioides* (Thickhead), and the grasses *Ehrharta erecta* and *Stenotaphrum secundatum* (Buffalo Grass).

Photograph 3.5 Urban Native/Exotic vegetation surrounding dilapidated buildings

Coordinate System: MGA Zone 56 (GDA 94)

Legend

- Subject Site
- Approved Driveway (DA N0274/09)
- Managed APZ (DA N0730/10)

Vegetation Community (CE, 2015)

- Littoral Rainforest: Closed native canopy with native dominated understorey (TSC Act & EPBC Act)
- Littoral Rainforest: Closed native canopy with exotic dominated understorey (TSC Act)
- Littoral Rainforest: Open/ cleared native canopy with exotic dominated understorey (TCS Act)
- Urban Native/ Exotic Vegetation (not listed)

Grid North

Image Source:
NearMap
(dated 30-12-2014)

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I:\...15023\Figures\RP2_VMP\20160622\Figure 3.1. Vegetation Communities_Subject Site

Figure 3.1. Vegetation Communities on the Subject Site

10 0 10 20 30 40 m

3.2 Weed Species

3.2.1 Noxious Weeds and Weeds of National Significance

Table 3.1 details the species recorded on the Subject Site listed as noxious in the Pittwater LGA and those listed as Weeds of Nationals Significance. Noxious weeds are weeds that are required to be controlled by property owners legally under the NW Act. WONS are the species categorised as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.

Table 3.1 Noxious weeds and Weeds of National Significance recorded on the Subject Site

Species	Common Name	Category	Legal Requirements
Asparagus aethiopicus	Ground Asparagus	WONS/Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Cestrum parqui	Green Cestrum	Noxious Class 3	The plant must be fully and continuously suppressed and destroyed
Cinnamomum camphora	Camphor Laurel	Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed.
Lantana camara	Lantana	WONS/Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread
Ligustrum lucidum	Broad-leaf Privet	Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread
Ligustrum sinense	Small-leaved Privet	Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread
Ochna serrulata	Mickey Mouse Plant	Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed.
Olea europaea subsp. cuspidata	African Olive	Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed.
Senna pendula subsp. *glabrata*	Cassia	Noxious Class 4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed.

3.2.2 Environmental Weeds

A number of weed species that occur on the site and are not listed as noxious or WONS are still problematic species that outcompete native species, particularly in nutrient enriched areas, such as drainage lines funnelling urban run-off. Of these species the most problematic species on the Subject Site, or species with the potential to become problematic, are listed in **Table 3.2** below.

Table 3.2 Problematic environmental weeds on the Subject Site

Species	Common Name
Acetosa sagittata	Turkey Rhubarb
Ageratina adenophora	Crofton Weed
Bidens pilosa	Cobbler's Pegs
Ehrharta erecta	Panic Veldtgrass
Erythrina x sykesii	Coral Tree
Hedychium gardnerianum	Ginger Lily
Ipomoea purpurea	Common Morning Glory
Nephrolepis cordifolia	Fishbone Fern
Passiflora caerulea	Blue Passion Flower
Ranunculus repens	Buttercup
Solanum seaforthianum	Brazilian Nightshade
Tradescantia fluminensis	Wandering Jew
Tropaeolum majus	Nasturtium

Chapter 4

Management Zones and General Site Management

4.1 Management Zones

The following management zones for vegetation have been created based on specific site management requirements, such as Asset Protection Zones (APZs), and management requirements relevant to the condition of existing vegetation, as shown in **Figure 4.1**.

4.1.1 Management Zone 1 – Intact Littoral Rainforest

Vegetation in this area has a diverse array of native species present in all vegetation strata. Management within this area will require weed and erosion control only, and regeneration of native species will be through control of weeds preventing natural regeneration through competition for resources (light, water, nutrients space).

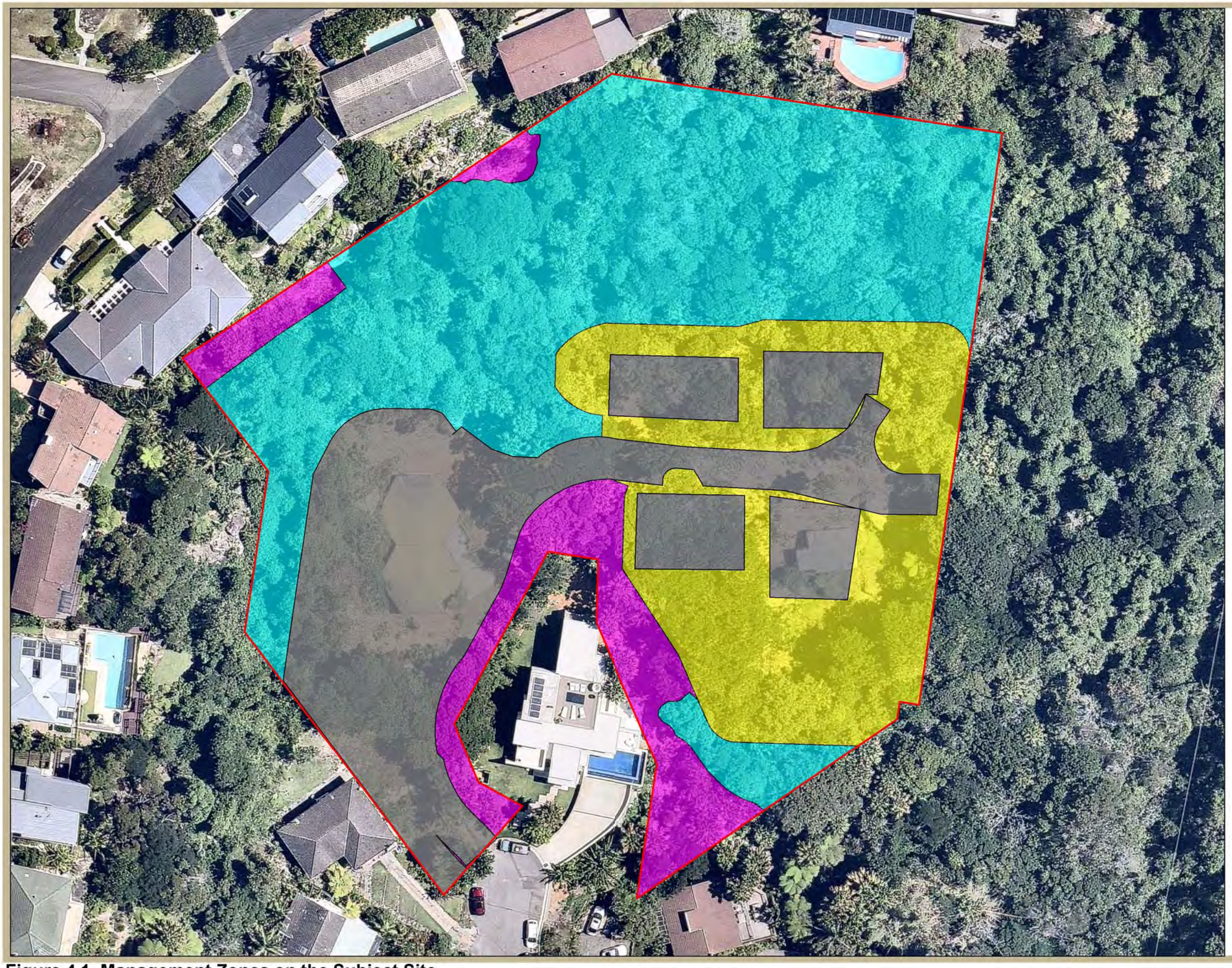
4.1.2 Management Zone 2 – Degraded Littoral Rainforest

Vegetation within this area will require weed and erosion control, and some areas may require planting to fill gaps in native vegetation strata. Initially, within six months of control of major weed infestations, erosion and weed control should be undertaken and planting used only if adequate native plant coverage and diversity are not observed regenerating from the soil seed bank.

4.1.3 Management Zone 3 – Asset Protection Zones and Development Set-backs

Management within APZs and development set-back areas will involve weed control and erosion control. Native vegetation will be managed as per the requirements of the Bushfire Management Plan (**Chapter 7**).

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Subject Site
- Development Area

Management Zones

- Management Zone 1
- Management Zone 2
- Management Zone 3

Grid North

Image Source:
NearMap
(dated 30-12-2014)

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I:\...15023\Figures\RP2_VMP\20160622\Figure 4.1. Management Zones_Subject Site

Figure 4.1. Management Zones on the Subject Site

10 0 10 20 30 40 m

4.2 Flora and Fauna Management During Construction

4.2.1 Marking Limits of Vegetation Clearing

Disturbance will be limited to the minimum necessary for clearing during each stage of the development. Prior to clearing being undertaken the edge of the vegetation to be cleared needs to be clearly delineated. Clearing limits can be marked with high visibility tape, fencing, or other appropriate boundary markers. To avoid unnecessary damage to vegetation or inadvertent habitat removal, disturbance is to be restricted to the delineated area. No stockpiling of equipment, soils, or machinery will occur beyond the boundary.

The person responsible for the clearance activities will be responsible for ensuring that the boundary markers are installed.

4.2.2 Fencing of Native Vegetation to be Retained

All native vegetation that is to be retained on site needs to be fenced off with temporary exclosure fencing to prevent inadvertent damage to vegetation by machinery. Temporary fencing should be of a durable material and act to physically protects vegetation, to the extent practical, as well as visually delineates native vegetation to be retained. This fencing is to remain in place until all works have been finished in the area. No vehicles or machinery will be permitted to enter areas of native vegetation to be retained.

4.2.3 Pre-clearance Surveys

Prior to the commencement of any vegetation clearing required for development a pre-clearance survey needs to be undertaken by a certified ecological consultant. During the survey native fauna and habitat that have the potential to be disturbed during clearing will be identified.

4.2.4 Fauna Relocation and Clearing Protocols

i. All Fauna

Clearing has the potential to impact on native fauna, particularly less mobile species, juveniles, and nocturnal species. In order to minimise potential impacts to fauna, a two-staged clearing process is required to ensure that fauna either self-relocate prior to clearing, or else will be removed and relocated to suitable adjoining habitat. All fauna handling will be carried out by licensed wildlife carers and/or ecologists. Clearing contractors will then be informed of any changes to the sequence of clearing if required (see below).

The clearing will be conducted using a two-stage clearing process:

1. Trees marked with an “H” by the Ecological Consultant will not be cleared during the first instance of vegetation clearing in an area; however all vegetation around the tree will be so that the tree is isolated. Other habitat features marked with an “H”, such as logs and log piles, will be supervised during clearing.

2. Identified habitat trees will be will be left to stand overnight after stage 1 clearing to allow resident fauna to voluntarily move from the area. Then, the habitat trees will be cleared using the following protocols:

    a. If possible, trees marked as containing hollows will be shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows and move on;

    b. Nests may be removed by hand, or the branches carefully cut to access nests;

    c. Use a bulldozer to start pushing the tree over. Move the bulldozer over the roots and continue gently pushing the tree over. The tree should not fall heavily to the ground;

    d. Remove branches with hollows and sections of trunk and set aside for immediate transfer to a storage area for placement within rehabilitation areas;

    e. The Ecological Consultant will investigate all hollows for the presence of fauna following felling of the tree; and

    f. The felled habitat tree will be left overnight to allow any remaining fauna time to leave the hollows and move on.

The two-stage clearing process enables fauna to feel secure whilst clearing occurs around their tree, and allows them a chance to self-relocate upon nightfall, when foraging typically occurs. Fauna are not likely to re-inhabit trees, as they are not likely to feel secure in their tree with all trees around it cleared.

The Ecological Consultant will be present during clearing to rescue animals injured during the clearance operation. Any fauna found will be captured and relocated to nearby remnant vegetation and released after nightfall to minimise the risk of predation by diurnal predators. Any animals that are inadvertently injured will be taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanised.

4.3 Removal of Rubbish

As dumped rubbish is encountered on the site during weed control it should be removed from site, as large pieces of dumped materials will inhabit germination of native seeds present in the soil.

4.4 Erosion Control

As some areas of the site are currently dominated by exotic weed species such as *Tradescantia fluminensis*, particularly in the ground layer, as weed species are removed the soil will become susceptible to erosion during periods of rain. As such erosion control

measures will be installed where appropriate following weed removal. On slopes on the site logs should be used in combination with wooden stakes to hold them in place. The logs can be left on site indefinitely, as they will break down after native plants have re-established. In areas in which natural regeneration is not observed occurring, logs should be used in addition to planting native species to stabilise the soil surface.

In areas with no native regeneration following weed control that channel water, such as the drainage line within the Subject Site, biodegradable jute matting should be used to stabilise the soil surface, with native species planted through the matting.

Chapter 5

Weed Management Plan

5.1 Introduction

5.1.1 Management Zones

Weed control will be undertaken in all management zones as per **Section 5.2**.

5.1.2 Weed Species and Control Methods

A list of control methods for specific weeds recorded on the site is provided in **Appendix C**.

5.1.3 Relevant Legislation

i. Noxious Weeds Act (1993)

The *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds in New South Wales. Changes to the Act came into force in March 2006 via the Noxious Weeds Amendment Act 2005. Plants that are declared noxious weeds by the Minister are placed into the following weed control categories:

- Class 1 – State prohibited weeds
  - These are plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent.
- Class 2 – regionally prohibited weeds
  - These are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent.
- Class 3 – regionally controlled weeds
  - These are plants that pose a serious threat to primary production or the environment of an area to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.
- Class 4 – locally controlled weeds

- These are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.

➢ Class 5 – restricted plants

- These are plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.

A noxious weed that is classified as a Class 1, 2 or 5 noxious weed is referred to in the Noxious Weed Act as a notifiable weed.

ii. Pesticides Act (1999)

The *Pesticides Act 1999* controls the use of herbicides within New South Wales. Under the Act is illegal to use herbicides for species not listed on a particular herbicides' label, or in a concentration or manner not outlined on the label. Off-label use of a particular herbicide is permitted only upon obtaining a specific permit (see **Section 5.1.5 ii**).

5.1.4 Best Management Practice

Contractors for weed removal within the Subject Site will have regard to the following, to minimise impacts upon existing vegetation and habitats:

➢ The main principles of the Bradley Method of bush regeneration, i.e. not over-clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter;

➢ Removal of fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;

➢ Use of chemicals and sprays only during suitable weather conditions (i.e. not during wet or windy conditions), and only during appropriate seasons;

➢ All equipment should be thoroughly cleaned prior to entering the site to minimise contamination;

➢ Proximity to watercourses and swampy areas; and

➢ Presence of native fauna or nesting/breeding sites.

5.1.5 Weed Control Methods

Bush regeneration weed control is to be implemented for the management zones 1-3. Regeneration works should be approached using the strategies outlined below.

i. Manual Weed Removal

Manual removal, or hand weeding, is an effective form of weed control where all viable parts of the plant are removed from the soil (roots, fruiting material and rhizomes) and site. All weeds removed by hand will be handled according to best practice bush regeneration techniques to prevent subsequent seed set from the removed weeds, and weed spread from vegetative reproduction.

ii. Use of Herbicides

All herbicides should be used according to recommendations on the herbicide label. Appropriate Personal Protective Equipment (PPE) should be worn and consideration given to time of day, likelihood of rainfall, wind direction and likely impact on native species as per guidelines on the label. Use of glyphosate will be appropriate for most species. Glyphosphate is the preferred herbicide for use in environmentally sensitive areas as it is rapidly broken down by microbes in the soil so residue is short lived and will not affect remnant and planted native individuals in the long term following application. In areas near water courses, an appropriate form of the herbicide should be used to minimise impact to aquatic life and amphibians. Herbicide use should be avoided within 2m of waterbodies. Examples of appropriate herbicide forms are Roundup Biactive and Clearup Bio 360 which have surfactants that are formulated to minimise harm to amphibians. As runoff is a likely way for herbicide residue to enter watercourses, chemical treatment should be avoided prior to or directly after rain.

It is important to note that there can be legal restrictions and permit requirements for use of specific herbicides for specific plants, and chemical labels and permit requirements always need to be researched prior to herbicide application. While the recommended methods for weed treatment detailed in **Table C.1** are effective, some will require a permit to be undertaken. The relevant permit numbers are PER9907, and PER11916. These permits need to be obtained from the Federal Government body, the Australian Pesticides and Veterinary Management Authority.

Manual removal will be an appropriate form of control for some species, and all chemical treatment should be carried out according to best practice guidelines.

Planting should not occur within 10 days of herbicide application.

5.1.6 Types of Weed Control

i. Primary Weeding

Primary weeding is the first stage of bushland regeneration and is recommended for all management zones.

Primary weeding may involve techniques such as:

- The selective spraying of weeds, with selective and non-selective herbicides;

- Cutting/scraping and painting deep rooted woody weeds and climbers with hand tools, chainsaws and brushcutters and painting cut stumps with herbicides containing Glyphosate or Picloram;

- Target drilling and injecting certain large tree weeds, such as Coral Trees, with herbicides such as Glyphosate and a Garlon/diesel mix; and

- Selective hand removal of weeds and wicker wiping of tall herbaceous weeds in situations where damage to proximate, low growing native plants can be avoided.

ii. Maintenance Weeding

Follow-up weeding should be undertaken in areas that have received past primary weeding treatments. Follow-up weeding involves the removal or treatment of weeds, whilst allowing regenerating or planted native plants to increase in size, abundance and percentage cover. All weeds should be targeted during the follow-up weeding phase. The follow-up bushland regeneration works are likely to be required at least once a month at the site until weeds are at negligible levels. Site visits may be more frequent if it is determined necessary.

It is recommended that woody weeds, climbers and key herbaceous weeds are subject to a programme of intense follow up weeding around any patches of regenerating native herbaceous plants to encourage the spread of the native plant species.

Follow-up weeding should be implemented for the remainder of the five year management period under the VMP, after primary weeding has been completed. After the five-year follow-up and maintenance period has been completed, a review should be conducted to determine future on-site maintenance requirements.

5.2 Weed Management on the Site

5.2.1 Initial Weed Management

During the first six months of site management, or for a period less than six months if primary weeding is completed before that period, site visits by the Bushland Regeneration Contractor should occur twice monthly, spaced a fortnight apart.

i. Noxious Weeds

The first priority for weed treatment in regeneration areas will be targeting mature individuals of the nine noxious weed species recorded on the site, such as African Olive, and Lantana.

ii. Primary Weeding

Following control of individuals of the noxious weed species, primary weeding should be undertaken throughout the Subject Site. The aims of primary weeding will be:

- Eliminating any mature woody weed species,

- Targeting and eliminating any large, dominant infestations of exotic herbs, vines, and grasses. Prior to chemical treatment any seed on mature exotic plants should be bagged to prevent seed fall and addition to the exotic soil seed bank of propagules.

- In areas where remnant native herbs and grasses occur sporadically amongst dominant infestations of exotic weeds, plastic tree guards should be installed around individuals to protect them from herbicide drift during spraying. The goal of primary weeding for the regeneration areas will be to eliminate all the larger weed infestations to allow natural regeneration and planting to take place to fill gaps in the ground layer, understorey, and canopy, without competition from weed species.

- During site visits for primary weeding the bushland maintenance team should start from one end of each area of landscape and work towards the other end to achieve the aims listed above through the entirety of each area. Spot spraying with herbicide will be used in any areas where there is negligible risk to collateral damage of native vegetation as it is more cost and time effective than hand weeding techniques.

5.2.2 Ongoing Weed Maintenance

Site visits for ongoing weed maintenance should occur once monthly, following the completion of primary weeding. Ongoing maintenance of the reconstruction and regeneration areas should occur for the remainder of the five year period maintenance period by the contracted bushland regeneration company, and the Subject Site should be covered in its entirety once every month, to diminish the soil seed bank of exotic weed species present on site. In order to eliminate the occurrence of these species they need to be controlled before they have a chance to set seed, otherwise progress on the site will not be made. In later stages of maintenance site visits can occur less frequently than once a month when site weed loads are lower, if it is determined weeds are still able to be effectively managed across the site. However, in order to prevent re-establishment of quick growing annual weeds, it is recommended that site visits still occur monthly with less time spent on site each month.

The most cost and time effective method of controlling weed regrowth in a revegetation area or weedy bushland area is by spot spraying a non-selective glyphosphate herbicide. A list of effective methods for control of weeds on site is found in **Table C.1**.

Tree guards should remain around native remnant plants, and native plants that have been planted, for at least 6 months to protect them from herbivory. Rabbits can devastate revegetation areas soon after planting, if tree guards are not used. Tree guards will also allow herbicide to be used for control of the majority of regrowth weeds, without damage to native plants by herbicide drift.

The following sequential steps are recommended to manage each area of the site effectively for each site visit:

1. Initially the bushland regeneration team visiting the site should sweep from one end of each area to the other. During this sweep weeds occurring within tree guards alongside native plants should be removed by hand, along with any weed occurring within a patch of dominant native plants (such as a patches of native grasses). During this sweep regrowth individuals of harder to manage weeds that require other techniques such as sawing, digging, drilling etc. should also be targeted.

2. A member of the team should then sweep the entire area, spraying all regrowth weeds between native plants in open areas with herbicide, and spot spraying in areas of denser native vegetation where possible without causing collateral damage to native species.

During each monthly visit, works should start in the same place on the site, and finish in the same place. In months in which the team is unable to make it through the entire site, this will result in lesser abundance of weeds over time outwards from the starting point, and in later stages the team should be able to move more quickly though the site, to get to areas that have had less management. Starting from a different place during each visit can result in no reduction in the exotic soil seed bank, as missing multiple areas allows prolific annual weeds to consistently set seed between site visits in multiple areas. Due to the sloped nature of the site, monthly works should start from a point of upper elevation in the site, to eliminate the source of weed propagules moving down through the site to lower elevations, through runoff and gravity.

It is important during site visits for ongoing weed maintenance that as many weeds as possible are controlled so individuals are not able to achieve maturity and set seed between site visits. Some weed species such as *Bidens pilosa* (Cobbler's Pegs), and *Ehrharta erecta* (Panic Veldtgrass) are quick growing, prolific seeders, and many exotic plants can have seed that remains viable in the soil for long periods of time. In order to effectively diminish the soil seed bank occurrences of exotic species it is important that individuals are not allowed to set seed between site visits and maintain a presence in the soil seed bank.

During site visits for weed control, Noxious Weeds and WONS (**Table 2.1**) should be prioritised for control. Individual plants of these species on site should not be allowed to achieve a reproductive stage in their life cycles.

Chapter 6

Revegetation Plan

6.1 Introduction

The most intact areas of Littoral Rainforest do not appear to have undergone clearing in the past, and consequently, the Subject Site as a whole contains a reasonably diverse array of remnant native plant species. Diversity of species is greatest in the northern areas of Management Zone 1 which have undergone the least disturbance.

6.2 Timing

Following primary weeding within the first six months of the VMP, planting should be undertaken in areas in which natural regeneration is not occurring with species representative of all strata, and areas in which any strata layers are lacking.

6.3 Revegetation Species

A list of endemic, Littoral Rainforest species has been prepared for revegetation (**Appendix D**). As some areas of the rainforest on the site do not appear to have undergone clearing in the past, it is assumed that the native species diversity currently present on the site is representative of the endemic, historical species composition of the rainforest on site. AS such, the species list has been prepared using data collected from Cumberland Ecology flora surveys rather than a more exhaustive list of species known to occur more broadly in this community. The species *Pittosporum undulatum* (Sweet Pittosporum) and *Glochidion ferdinandi var. ferdinandi* (Cheese Tree) have not been included in the species list. These species are capable of regenerating independently in degraded areas, have readily, bird dispersed fruit, and are well represented on site, and do not require planting.

Species to be planted should be selected from the list provided. All tubestock to be planted should be of local provenance, and sourced from nurseries that specialise in growing seedlings of native plants with seed sourced from local bushland, to avoid planting of cultivars that are human created, and not representative of species as they naturally occur. It is recommended that propagules for plantings where possible are collected from the site to be nursery grown for planting, to retain localised genetic diversity.

It is likely that not all species will be available from nurseries, as the provided list is based on appropriate plantings for the site, and is not reflective of what local nurseries will have in stock, or be able to provide at any given time. For this reason it is not expected that all

species will be planted, but as many species as are available from the list should be planted, to maximise the floral biodiversity of the Subject Site.

6.4 Planting Density Guide

Table 6.1 contains an approximate guide on appropriate planting densities for areas to be revegetated. As much of the ground cover, shrub, small tree, and canopy strata contain intact, remnant occurrences of native species, planting should only take place in areas that do not already contain native vegetation in particular strata, or seedling juveniles of species from all strata, in the months following weed control. In areas where juvenile shrub or canopy species are present regrowing on site, planting of shrub and canopy species is not needed. Groundcover individuals can be planted clumped within each square metre if considered appropriate to allow ease of access for weed control of the site.

Table 6.1 Planting Density Guide

Stratum (Form)	Planting Density
Tree Canopy/Emergent	1 unit/20m^2 in open areas
Small Tree	1 unit/10m^2
Shrubs	1 unit/5m^2
Ground Covers	4 units/1 m^2

6.5 Planting Guide

The following is a guide to ensure success of tube stock plantings.

1. Holes for tube stock should be dug deep enough that at least a few centimetres of the plant are below the soil surface;
2. A plant establishment aid such as Terraform™ should be used to reduce instances of tubestock mortality;
3. Soil should be filled back in surrounding the tube stock;
4. Plants need to be watered once immediately following planting; and
5. A plastic tree guard should be installed around each plant (or clump of planted groundcovers) following planting and watering to protect them from herbivory, and herbicide drift during site visits for weed control.

6.6 Maintenance of Plantings

During site visits for weed control of the revegetation site the contracted bushland regeneration team should monitor the plantings for death of individual plants, which should be replaced with another individual of the same vegetation form during subsequent site visits to ensure at the end of the five year period there are not gaps in vegetation cover. Although native plants generally only need to be watered once upon planting, drought periods or hot, dry weeks in warmer months of the year can result in death of plantings, particularly during El Nino years. The contracted bushland regeneration team should water plantings during site visits in these periods to prevent the loss of plantings from dehydration. As recommended for weed management, site visits should occur twice monthly in the initial maintenance period and monthly subsequently until the VMP expires, or weed levels are low enough to justify scaling back the frequency of site visits.

6.7 Revegetation with management zones

6.7.1 Management Zone 1 – Intact Littoral Rainforest

As native vegetation in these areas are intact in all vegetation strata, it is unlikely that planting will be needed. There are some areas which are more degraded in the north of the site adjoining residential properties, and along the eastern border of the site, and some areas in the south with denser occurrences of weed species, that may require planting if natural regeneration of species from each strata is not occurring. The focus in this area should be assisting natural regeneration through weed control, and stabilisation of the soil surface with erosion control methods, rather than planting.

6.7.2 Management Zone 2 – Degraded Littoral Rainforest

Management Zone 2 has areas with high levels of weed infestation and little native presence in the ground layer, and other strata, and areas lacking a complete native shrub and canopy layer. In the months following weed control, planting will be required of species of plant forms from absent or diversity lacking strata, if natural regeneration is not occurring.

6.7.3 Management Zone 3 – Asset Protection Zones

Planting in this area of native species once weed species have been controlled, and natural regeneration is not occurring, should only be undertaken in a manner consistent with the Bushfire Management Plan (**Chapter 7**).

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Chapter 7

Bushfire Management Plan

7.1 Introduction

An assessment of the potential bushfire risk to the proposed subdivision was undertaken by Travers Bushfire & Ecology (Travers Bushfire & Ecology, 2016). The assessment identified that the existing native vegetation on and adjoining the Subject Site, including Attunga Reserve to the east and south east may be involved in a small scale localised bushfire event if the vegetation were to be ignited. Due to the formation and structure of the vegetation present on the Subject Site and adjoining land; being rainforest, the predicted level of risk is low/moderate.

The Subject Site is shown on the Pittwater Certified Bushfire Prone Land Map (NSW Rural Fire Service, 2003) as containing Bushfire Prone Vegetation and will require the issue of a Bushfire Safety Authority by the Commissioner of the NSW Rural Fire Service pursuant to Section 100B (1) (b) of the Rural Fires Act 1997. However, the Rural Fire Service have been consulted (meeting on 20 October 2015 and previous correspondence in relation to a former DA, in letter dated 31 May, 2007) and the provision of Asset Protection Zones for the proposed residential area have been indicated as appropriate.

Following the receipt of this advice, Travers Bushfire & Ecology and the proponent undertook a review of the subdivision layout with the aim of providing bushfire protection measures which reduce the risk from a small scale bushfire event in the proposed conservation area, to be located within all retained areas of rainforest vegetation on the Subject Site.

This Bushfire Management Plan applies to the vegetation to be retained and managed in the APZ and in the conservation area on the Subject Site, located within each new residential lot, and has been prepared to meet the performance criteria for Asset Protection Zones under Section 4.1.3 of Planning for Bushfire Protection 2006.

7.2 Provision of Asset Protection Zones

Despite the vegetation on the Subject Site being moist and having a low combustion potential, there is a requirement for the provision of bushfire protection measures to each of the proposed dwellings on the Subject Site.

The bushfire protection measures prescribed for the Subject Site have been prepared in consideration of the environmental sensitivity of the site and the Littoral Rainforest vegetation present. Bushfire protection measures also take into account the nature of

rainforest vegetation, and the relative ease with which fuel reduction measures can be accommodated while causing minimal disturbance.

The provision of APZ's is shown in Figure 4.1.

The APZ is to be maintained as a modified Inner Protection Area (IPA) generally in accordance with Appendix A5.4 & Appendix A5.5 of *Planning for Bushfire Protection (2006a)* and the Rural Fire Service *"Standards for Asset Protection Zones" (2006b)*.

7.3 Management of the vegetation in APZs and building set-back areas

It is accepted practice that after construction of a dwelling, gardens will be established and landscaping of the grounds will be undertaken. However, there is an intention to maintain the native vegetation character of the site, and therefore the landscaping will be very minimal, and the use of rainforest species only. Native trees will be retained onsite, including Cabbage Tree Palms (*Livistona australis*) and Lilly Pillys (*Acmena smithii*), and other rainforest species. It is essential that efforts to reduce fuels on adjoining properties are therefore not negated by actions within the immediate curtilage of the building.

It is expected that the curtilage to the dwellings will be maintained by the owner of the land.

In terms of priorities of addressing bush fire attack, priority should be given to preventing flame impingement by not allowing fine debris to accumulate close to a building.

Vegetation management will aim to reduce the spread of bush fire and should include the following:

- Retention of rainforest canopy of trees, including Cabbage Tree Palms, as they do not contribute to fire behaviour when under fuels are well managed. Planting density of 1 unit/20m^2 in open areas;
- Shrubs sparsely separated into clumps. Planting density of 1 unit/10m^2 for shrubs and 4 units/2m^2 for groundcovers, with spacing's of at least 5m been clumps.
- Low groundcover species managed by raking to remove excess plant matter;
- Excessive fuel loads on the ground surface (above 10-12mm for the soil) raked and removed from the site; and
- Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (2002).

Appendix A5.5 of Planning for Bushfire Protection 2006 outlines the following property maintenance items to be undertaken in advance of the bush fire season:

- Removal of material such as litter from the roof and gutters;

- Ensure painted surfaces are in good condition with decaying timbers being given particular attention to prevent the lodging of embers within gaps;
- Check water supplies are available and in working order;
- Check tiles and roof lines for broken tiles or dislodged roofing materials;
- Screens on windows and doors are in good condition without breaks or holes in flyscreen material and frames are well fitting into sills and window frames;
- Hoses and hose reels are not perished and fittings are tight and in good order;
- Doors are fitted with draught seals and well maintained;
- External mats are of non-combustible material; and
- Combustible materials are located well away from the dwelling.

7.3.1 Species for planting in APZ's and building set-back areas

Rainforest species are considered to have a low combustion potential generally, although dried vegetation can provide a hazard if left to build up. However, the prescribed understorey management measures will avoid such build-up of combustible dry matter. For this reason, all species listed in Table D.1 are considered generally suitable for planting in the APZs and building set-back areas, although *Eucalyptus botryoides* (Bangalay) and *Banksia integrifolia* (Coast Banksia) should be avoided, or planted very sparsely, without other trees of the same species in a cluster. All native canopy trees marked for retention on the arborist report (Footprint Green, 2016) should be retained.

Chapter 8

Monitoring and Reporting

8.1 Monitoring

A qualified bushland management or ecological consultant will carry out a program of regular monitoring of the implementation of the VMP in relation to the works schedule (see **Appendix A**). The consultant will be responsible for ensuring the measures outlined in this BMP are implemented and that plant stock is replaced, as needed.

The monitoring program will be carried out for the duration of the VMP and a monitoring survey will be completed every six months for five year management period of the VMP.

General observations of the nature and condition of the revegetation areas along with the collection of quantitative data will be taken during monitoring including:

- A photograph shall be taken at each photo reference point facing north for a visual assessment of site progress;
- Estimates of the success rate of plantings and natural regeneration, and assessment of plant replacement requirements;
- Weed abundance and locations of noxious weeds and WONS in each management zone;
- Exotic to native understorey ratio; and
- Recommendations for corrective measures and/or vegetation management.

8.2 Reporting

A brief and concise report should be prepared based on the findings of the two monitoring visits per year. The report will be prepared by the ecological consultant or bushland management consultant and forwarded to Pittwater Council for approval at the end of each yearly period for the duration of the VMP maintenance period. This report should be based around the points outlined in ***Section 7.1*** and the performance criteria outlined in the schedule of works in **Appendix A**. The final report must be submitted to Council for approval at the end of the five year period, and will certify completion of the works.

Each yearly report should:

- Describe the revegetation works undertaken;
- State the findings of the monitoring surveys;
- Discuss any problems encountered in implementing the VMP; and
- Recommend any adaptations or additions to the VMP.

The report should contain photographs, as well as a short description of weeds in each management zone and a short comparison of the photographs to the previous years. Any other notable occurrences of weeds should also be reported. The report should also recommend and prioritise areas where weed control should be targeted for the following maintenance period.

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Appendix A

Responsibilities, Performance Criteria, and Schedule of Works

Table A.1 Responsibilities and Schedule of Works

Action	Responsibility	Performance Criteria	Timing
Construction Phase			
Vegetation Protection Works	Civil Contractor	All vegetation to be retained outside of approved building pads fenced with temporary construction fencing to prevent inadvertent damage by machinery	Prior to any vegetation clearing/construction
Fauna pre-clearance survey	Ecological Consultant	Areas of fauna habitat within clearing areas marked	Prior to any vegetation clearance
Fauna ecologist present to relocate fauna/rescue injured fauna	Fauna Ecologist	- Any uninjured fauna relocated - Any injured fauna taken to veterinary hospital	During clearance of any marked fauna habitat
Initial Weed Management			
Carry out primary weeding.	BR Contractor	Main weed infestations and mature noxious weeds removed	Within six months of commencement of VMP
Ensure compliance with Noxious Weeds Act 1993 (NW Act); i.e. organise on-site destruction or removal from site of noxious weed propagules and biomass, as per specific action control categories for each species.	BR Contractor	Noxious weeds controlled as per NW Act provisions.	Throughout duration of five year bush regeneration program.
Plant out areas in which natural regeneration is not occurring with	BR Contractor	Plantings have been undertaken	Several months following initial weed removal in any area

Table A.1 Responsibilities and Schedule of Works

Action	Responsibility	Performance Criteria	Timing
species representative of all vegetation strata in Management Zone 1 and 2, with local provenance stock			
Plant out areas in which natural regeneration is not occurring with species representative of allowed densities in vegetation strata under Bushfire Management Plan in Management Zone 3	BR Contractor	Plantings have been undertaken	Several months following initial weed removal in any area
Maintenance Period			
Carry out maintenance weeding throughout management zones.	BR Contractor	- Existing weed growth minimised or controlled. - Regrowth controlled. - No new weed species or infestations.	Monthly throughout five year maintenance period under VMP
Undertake ground fuel load assessment	Bushfire Ecologist	Identify current fuel level, set targets for future fuel level	Upon establishment of canopy trees within APZ areas (approximately 2 years)
Undertake ground fuel load reduction works	BR Contractor	Manually remove fuel based on levels and recommendations of Bushfire Ecologist	Based on recommendations of bushfire ecologist
Carry out replacement of plant stock	BR Contractor	- Minimum 80% original plant stock maintained at any time - No dead plant stock left in ground	Any planted plants observed to deceased should be replanted upon following site visit with plant of the same form for duration of five year maintenance period

Table A.1 Responsibilities and Schedule of Works

Action	Responsibility	Performance Criteria	Timing
Monitoring and Reporting			
Site inspection	Ecological Consultant or Bushland Management Consultant	Identify - Progress of weed maintenance - Areas that have not been planted, that require planting - Noxious weeds remaining, any heavy weed infestations remaining, and locations	Every six months throughout five year maintenance period
Bushland regeneration monitoring report	Ecological Consultant or Bushland Management Consultant	Report including photographs prepared and submitted to Council documenting progress of works, areas that need to be improved, adaptations that need to be made to VMP	At the end of every year of maintenance
Fuel load monitoring	Bushfire Ecologist	Report on current fuel level, set targets for future fuel level	As per Bushfire Management Plan
Final site inspection	Ecological Consultant or Bushland Management Consultant	Identify - Success of weed control - Any future works required	At end of five year maintenance period under VMP
Final bushland regeneration monitoring report	Ecological Consultant or Bushland Management Consultant	Report on success of bushland regeneration program submitted to council	At end of five year maintenance period under VMP

Appendix B

Flora Species Recorded

Table B.1 Flora species recorded by Cumberland Ecology during surveys

Form and Family	Status	Species	Common Name
Trees			
Casuarinaceae		*Allocasuarina littoralis*	Black She-oak
Elaeocarpaceae		*Elaeocarpus reticulatus*	Blueberry Ash
Euphorbiaceae		*Glochidion ferdinandi var ferdinandi*	Cheese Tree
Fabaceae	*	*Erythrina sykesii*	Coral Tree
Lauraceae		*Endiandra sieberi*	Corkwood
Meliaceae		*Synoum glandulosum*	Scentless Rosewood
Moraceae		*Ficus rubiginosa*	Rusty Fig
Myrtaceae		*Acmena smithii*	Lilly Pilly
Myrtaceae		*Eucalyptus botryoides*	Bangalay
Myrtaceae		*Syncarpia glomulifera*	Turpentine
Pittosporaceae		*Pittosporum undulatum*	Sweet Pittosporum
Proteaceae		*Banksia integrifolia*	Coast Banksia
Arecaceae		*Livistona australis*	Cabbage Palm
Sub-canopy			
Eupomatiaceae		*Eupomatia laurina*	Bolwarra
Fabaceae	*	*Erythrina sykesii*	Coral Tree
Meliaceae		*Synoum glandulosum*	Scentless Rosewood
Moraceae		*Ficus coronata*	Sandpaper Fig
Myrtaceae		*Acmena smithii*	Lilly Pilly
Pittosporaceae		*Pittosporum undulatum*	Sweet Pittosporum
Shrubs			
Cyatheaceae		*Cyathea australis*	Rough Tree Fern
Cyatheaceae	NE	*Cyathea cooperi*	Straw Tree Fern
Zamiaceae		*Macrozamia communis*	Burrawang
Cunoniaceae		*Ceratopetalum gummiferum*	Christmas Bush
Elaeocarpaceae		*Elaeocarpus reticulatus*	Blueberry Ash
Epacridaceae		*Leucopogon juniperinus*	Prickly Beard-heath
Eupomatiaceae		*Eupomatia laurina*	Bolwarra
Euphorbiaceae		*Breynia oblongifolia*	Dwarfs Apples
Euphorbiaceae		*Claoxylon australe*	Brittlewood
Euphorbiaceae		*Glochidion ferdinandi*	

Table B.1 Flora species recorded by Cumberland Ecology during surveys

Form and Family	Status	Species	Common Name
Euphorbiaceae		*Homalanthus populifolius*	Bleeding Heart
Euphorbiaceae		*Homalanthus nutans*	Bleeding Heart
Fabaceae (Mimosoidae)	NE	*Acacia baileyana*	Cootamundra Wattle
Fabaceae (Caesalpinioideae)		*Senna pendula var glabrata*	Cassia
Lauraceae		*Cinnamomum camphora*	Camphor Laurel
Malaceae		*Eriobotrya japonica*	Loquat
Meliaceae		*Synoum glandulosum*	Scentless Rosewood
Monimiaceae		*Wilkiea huegeliana*	Veiny Wilkiea
Myrsinaceae		*Myrsine variabilis*	Variable Muttonwood
Myrtaceae		*Acmena smithii*	Lilly Pilly
Nandinaceae	*	*Nandina domestica*	Japanese Sacred Bamboo
Ochnaceae	*	*Ochna serrulata*	Mickey Mouse Plant
Oleaceae	*	*Ligustrum lucidum*	Large-leaved Privet
Oleaceae	*	*L. sinense*	Small-leaved Privet
Oleaceae		*Notelaea longifolia*	Large Mock Olive
Oleaceae		*Olea africana ssp cuspidata*	African Olive
Pittosporaceae		*Pittosporum revolutum*	Yellow Pittosporum
Pittosporaceae		*Pittosporum undulatum*	Sweet Pittosporum
Rutaceae	*	*Citrus x limon*	
Rutaceae	*	*Murraya paniculata*	Orange Jessamine
Solanaceae	*	*Cestrum parqui*	Green Cestrum
Solanaceae	*	**Physalis peruviana*	Cape Gooseberry
Sterculiaceae	NE	**Brachychiton acerifolius*	Flame Tree
Theaceae	*	*Camelia japonica*	Camelia
Verbenaceae		*Clerodendrum tomentosum*	Hairy Clerodendrum
Verbenaceae	*	*Lantana camara*	Lantana
Arecaceae	*	*Howea fosteriana*	Lord Howe Island Palm
Arecaceae		*Livistona australis*	Cabbage Palm
Arecaceae	*	*Phoenix sp*	Vietnamese Date Palm
Herbs - Ferns			
Adiantaceae		*Adiantum aethiopicum*	Common Maidenhair Fern
Adiantaceae		*A. hispidulum*	Rough Maidenhair
Aspleniaceae		*Asplenium australasicum*	Birds Nest Fern

Table B.1 Flora species recorded by Cumberland Ecology during surveys

Form and Family	Status	Species	Common Name
Blechnaceae		*Blechnum cartilagineum*	Gristle Fern
Blechnaceae		*Doodia aspera*	Rasp Fern
Davalliaceae		*Davallia pyxidata*	Hares Foot Fern
Davalliaceae	*	*Nephrolepis cordifolia*	Fishbone Fern
Dennstaedtiaceae		*Pteridium esculentum*	Bracken Fern
Dicksoniaceae		*Calochlaena dubia*	False Bracken Fern
Herbs - Dicots			
Acanthaceae		*Pseuderanthemum variabile*	Pastel Flower
Apiaceae		*Centella asiatica*	Indian Pennywort
Apiaceae		*Hydrocotyle peduncularis*	
Asteraceae	*	*Ageratina adenophora*	Crofton Weed
Asteraceae	*	*Bidens pilosa*	Farmers Friends
Asteraceae	*	*Conyza albida*	Tall Fleabane
Asteraceae	*	*Conyza sumatrensis*	Tall Fleabane
Asteraceae		*Cotula australis*	
Asteraceae	*	*Crassocephalum crepidioides*	Thickhead
Asteraceae		*Gamochaeta sp*	Cudweed
Asteraceae	*	*Sonchus oleraceus*	Sow Thistle
Balsamaceae	*	*Impatiens sp*	
Brassicaceae	*	*Brassica fruticulosa*	
Brassicaceae	*	*Cardamine flexuosa*	Wood Bittercress
Cactaceae	*	*Cactus spp*	
Caryophyllaceae	*	*Stellaria media*	Chickweed
Crassulaceae	*	*Crassula sp cv*	
Fumariaceae	*	*Fumaria sp*	
Geraniaceae		*Geranium homeanum*	Trailing Storksbill
Malvaceae	*	*Sida rhombifolia*	Paddys Lucerne
Ochnaceae	*	*Ochna serrulata*	Mickey Mouse Plant
Oxalidaceae		*Oxalis sp*	
Polygonaceae	*	*Acetosa sagitatta*	Turkey Rhubarb
Polygonaceae		*Rumex brownii*	
Ranunculaceae	*	*Ranunculus repens*	
Solanaceae	*	*Solanum chenopodioides*	

Table B.1 Flora species recorded by Cumberland Ecology during surveys

Form and Family	Status	Species	Common Name
Solanaceae	*	*Solanum nigrum*	Blackberry Nightshade
Tropaeolaceae	*	*Tropaeolum majus*	Nasturtium
Violaceae		*Viola hederacea*	Native Violet
Herbs - Monocots			
Amaryllidaceae	*	*Agapanthus praecox subsp. orientalis*	Agapanthus
Araceae		*Gymnostachys anceps*	Settlers Flax
Asparagaceae	*	*Asparagus aethiopicus*	Ground Asparagus
Asparagaceae	*	*Asparagus densiflorus*	Fern Asparagus
Commelinaceae		*Commelina cyanea*	Native Wandering Jew
Commelinaceae	*	*Tradescantia fluminensis*	Wandering Jew
Cyperaceae		*Carex sp*	
Cyperaceae		*Gahnia? Melanocarpa*	Black Saw Sedge
Cyperaceae		*Lepidosperma elatius*	Tall Sword-sedge
Cyperaceae		*Lepidosperma laterale*	Broad Sword-sedge
Iridaceae	*	*Iris sp cv*	
Iridaceae	*	*Watsonia sp*	
Liliaceae	*	*Aspidistra elatior*	Aspidistra
Lomandraceae		*Lomandra longifolia*	Spiny-headed Mat-rush
Lomandraceae		*Lomandra multiflora*	Many-flowered Mat-rush
Alliaceae	*	*Nothoscordum borbonicum*	Onion Weed
Orchidaceae	NE	*Dendrobium kingianum*	Pink Rock Orchid
Orchidaceae		*Dendrobium speciosum*	Rock Orchid
Phormiaceae		*Dianella caerulea var producta*	Rough Flax Lily
Poaceae	*	*Ehrharta erecta*	Veldt Grass
Poaceae		*Entolasia marginata*	Margined Panic
Poaceae		*Entolasia stricta*	Wiry Panic
Poaceae		*Oplismenus imbecillis*	
Poaceae		*Poa affinis*	
Poaceae	*	*Stenotaphrum secundatum*	Buffalo Grass
Strelitziaceae	*	*Strelitzia nicolai*	Giant White Bird of Paradise
Uvulariaceae		*Schelhammera undulatum*	
Zamiaceae		*Macrozamia communis*	Burrawang
Zingiberaceae	*	*Hedychium gardnerianum*	Indian Ginger

Table B.1 Flora species recorded by Cumberland Ecology during surveys

Form and Family	Status	Species	Common Name
Vines			
Asclepiadaceae	*	*Araujia sericifera*	Moth Vine
Asclepiadaceae		*Marsdenia rostrata*	Milk Vine
Bignoniaceae		*Pandorea pandorana*	Wonga Wonga Vine
Convolvulaceae	*	*Ipomoea purpurea*	Morning Glory
Dilleniaceae		*Hibbertia dentata*	Scrambling Guinea Flower
Fabaceae		*Glycine clandestina*	
Menispermaceae		*Sarcopetalum harveyanum*	Pearl Vine
Menispermaceae		*Stephania japonica*	Snake Vine
Nyctaginaceae	*	*Bouganvillea sp cv*	Bouganvillea
Oleaceae	*	*Jasminum sp cv*	Jasmine
Passifloraceae	*	*Passiflora edulis*	Passionfruit
Passifloraceae		*Passiflora herbertiana*	Native Passionflower
Passifloraceae	*	*P. caerulea*	Blue Passionflower
Rubiaceae		*Morinda jasminoides*	Jasmine Morinda
Solanaceae	*	*Solanum seaforthianum*	
Vitaceae		*Cissus antarctica*	Simple-leaved Water Vine
Vitaceae		*C. hypoglauca*	Five-leaved Water Vine
Araceae	*	*Philodendrum selloum*	
Luzuriagaceae		*Eustrephus latifolius*	Wombat Berry
Luzuriagaceae		*Geitonoplesium cymosum*	Scrambling Lily
Smilaceae		*Smilax australis*	Prickly Supplejack
Smilaceae		*Smilax glyciphylla*	Sarsaparilla

*Key: * = exotic species*

Appendix C

Weed Species and Control Methods

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
Asteraceae	*Bidens pilosa*	Cobbler's Pegs		- Hand Weed
Asteraceae	*Conyza sumatrensis*	Tall Fleabane		- Spot Spray - Glyphosphate 10mL/1L
Asteraceae	*Crassocephalum crepidioides*	Thickhead		
Asteraceae	*Gamochaeta sp.*	Cudweed		
Asteraceae	*Sonchus oleraceus*	Milk Thistle		
Balsaminaceae	*Impatiens sp.*			
Brassicaceae	*Brassica fruticulosa*	Twiggy Turnip		
Brassicaceae	*Cardamine flexuosa*	Wood Bittercress		
Caryophyllaceae	*Stellaria media*	Common Chickweed		
Fumariaceae	*Fumaria muralis*	Wall Fumitory		
Poaceae	*Ehrharta erecta*	Panic Veldtgrass		
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass		
Solanaceae	*Physalis peruviana*	Cape Gooseberry		
Solanaceae	*Solanum chenopodioides*	Whitetip Nightshade		
Solanaceae	*Solanum nigrum*	Blackberry Nightshade		
Tropaeolaceae	*Tropaeolum majus*	Nasturtium		
Alliaceae	*Agapanthus praecox subsp. orientalis*	African Lily		- Plant is resistant to herbicide - Needs to be dug out with a mattock, or hand mattock, with care taken to remove all rhizomes (rhizomes should be bagged and removed from site)

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
Alliaceae	*Nothoscordum gracile*	Onion Weed		- Can be extremely difficult to control due to numerous bulbils sprouting from main bulb which break off underground and form new plants - The plant can be dug out carefully with hand tools; an effort must be made to carefully remove and bag all bulbils formed around the main bulb. - Follow up hand weeding for many months is required to remove juvenile plants; control is easier if juvenile plants are carefully dug out, taking care to bag and remove bulbs, before bulbils have formed - Spray with 10mL/1L glyphosphate every month; adult plants may take several months to die back. Repeat monthly to control sprouting juvenile plants. - Wipe leaves of plants with undiluted glyphosphate monthly, without missing juvenile sprouting plants. This can be nearly as time consuming as hand digging plants out - Any flowering stem should be cut and bagged, along with any head with seed.
Apocynaceae	*Araujia sericifera*	Moth Vine	X(4)	- Hand Weed Juveniles - Spray juveniles with glyphosphate 10mL/1L - Skirt mature vines (cut through plant close to root) and then pull root manually or apply undiluted glyphosphate to cut surface

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
Arecaceae	*Philodendron bipinnatifidum*	Selloum		- Scrape and paint vine with undiluted glyphosphate - Saw trunk back to ground level and apply undiluted glyphosphate - Cut any regrowth foliage off in subsequent months with loppers and apply undiluted glyphosphate - Bag and remove vegetative material from site to prevent resprouting from trunk segments
Asparagaceae	*Asparagus aethiopicus*	Sprenger's Asparagus	# X(4)	- Any branches profuse with fruit should be cut with secateurs and bagged to prevent further spread of species by birds - Juvenile plants can be eased out of soil with a trowel or knife - care should be taken to remove below ground plant material - For large, mature plants the woody crown at the base can be cut around with a sharp knife, or hacked out with a mattock or peter lever and removed - it is easiest to cut all branches off near the base with secateurs prior to removing crown - plant will not resprout from water storing tubers or roots below ground so these can be left to rot to reduce soil disturbance. - Spray mature and juvenile plants with metsulfuron methyl 6g/100mL + surfactant

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
Asparagaceae	*Aspidistra elatior*	Cast Iron Plant		- Dig out with hand mattock, taking care to dig out rhizomes (bag and remove from site)
Asteraceae	*Ageratina adenophora*	Crofton Weed		- Hand Weed - Spot Spray with Glyphosphate 5mL/1L - Slash large individuals with brushcutter and spray regrowth foliage with glyphosphate 5mL/1L
Cactaceae	*Cactus sp.*			- As the plant reproduces vegetatively the entirety of the plant must be bagged and removed from the site, including as much root material as possible. As the plant is soft the above ground areas of the plant are easily cut into pieces with a hand saw, and after removal of the upper areas of the plant the root material should be dug out with a hand mattock. Heavy gloves should be worn to protect from injury by spines.
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew		- Small infestations can be removed by hand weeding - Care needs to be taken not to leave behind any plant material which will resprout. - Large infestations can be controlled by spraying with glyphosphate 10mL/1L, and the use of a surfactant will increase the efficacy of herbicide. Spraying needs to be repeated during every site visit. It can take several months before the mature plants appear to be affected

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				but a sudden die off will occur after several months of treatment. Any regrowth material following die off of mature plants needs to be sprayed or removed by hand. - Large infestations can be raked up and bagged and removed from site. This is time consuming and labour intensive due to the large mass and weight of heavy infestations of healthy plants. - Large infestations can be covered with black plastic sheets for several months. The plants will die eventually due to lack of required sunlight. This method is not recommended for bushland regeneration as it also inhibits regrowth form seed of native plant species.
Convolvulaceae	*Ipomoea indica and Ipomoea purpurea*	Blue Morning Glory and Common Morning Glory		- Hand pull taking care to remove root system and stem - plant will resprout from stem segments not removed from site - Cut vine at 1m or less above ground height and pull remaining plant out of the ground at the roots - Spray any ground hugging vines with glyphosphate 10mL/1L (will require follow up spraying of regrowth over several months as plant will resprout)
Crassulaceae	*Crassula sp. cv*			- As the plant reproduces vegetatively the entirety of the plant must be bagged and removed from the site,

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				including as much root material as possible.
Cyatheaceae	*Cyathea cooperi*	Straw Treefern		- Species will not regrow if sawn off at base of trunk
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata*		X(4)	- Hand weed juveniles - Spray juvenile individuals with glyphosphate 10mL/1L - Cut and paint mature individuals with undiluted glyphosphate
Fabaceae (Faboideae)	*Erythrina x sykesii*	Australian Coral Tree		- Cut and paint mature individuals with undiluted glyphosphate (will require an arborist for removal of large trees) - Inject stem with undiluted glyphosphate - All vegetative material from removed tree/shrub needs to be contained and disposed of carefully (burnt or taken to landfill); the species will regrow vegetatively from twigs, branches, logs, and on occasion, woodchipped material
Fabaceae (Mimosoideae)	*Acacia baileyana*	Cootamundra Wattle		- Hand weed juveniles, taking care to remove all roots (bag and remove vegetative material - Stem inject, or cut and paint mature individuals with undiluted glyphosphate
Iridaceae	*Iris sp. cv*			- Dig out using hand tools taking care to bag and remove all below ground vegetative material from site
Iridaceae	*Watsonia sp.*			- Remove with hand tools, taking care to bag and

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				remove all corms possible (as some corms can be located at some depth below soil surface this can be difficult); repeat treatment each month, removing juvenile regrowth - Spray foliage with glyphosphate 10mL/1L. Repeat treatment monthly targeting new, juvenile individuals growing from corms. Herbicide spraying of mature plants is most effective just before flowering (usually in Spring) - All bulbils present on mature plants should be carefully bagged and removed from site
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	X(4)	- Hand weed seedlings - Spray seedlings and coppice regrowth with glyphosphate 10mL/1L - Drill and inject stem with, or chisel and apply, undiluted glyphosphate - Cut and paint stump with undiluted glyphosphate (will require an arborist for large trees) - Cut and grind stump of large trees (arborist)
Lomariopsidaceae	*Nephrolepis cordifolia*	Fishbone Fern		- Hand pull plants taking care to bag and remove all rhizomes and tubers; will need to be repeated over subsequent months to remove regrowth from missed tubers and rhizomes - Large infestations can be sprayed monthly with

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				glyphosphate 10mL/1L; fronds will take several months to die back completely, after which repeated monthly spraying is needed to control regrowth juvenile fronds from tubers and rhizomes until infestation is controlled completely
Malaceae	*Eriobotrya japonica*	Loquat		- Hand weed juveniles - Cut and paint stump of larger individuals with undiluted glyphosphate
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne		- Hand weed - Spray with glyphosphate 10mL/1L - Cut large, firmly rooted individuals at the base with secateurs and paint with undiluted glyphosphate
Nandinaceae	*Nandina domestica*	Heavenly Bamboo		- Bag and remove and fruit from site - Cut stems near base with secateurs and paint with undiluted glyphosphate - Treat any new stems growing from roots over consecutive months
Nyctaginaceae	*Bougainvillea sp.*	Bougainvillea		- Cut mature plants close to the ground with a hand saw or loppers and apply undiluted glyphosphate to cut stump surface - Spray any regrowth foliage from cut stumps with glyphosphate 10mL/1L - Wear PPE such as heavy clothing and gloves to

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				protect against thorns
Ochnaceae	*Ochna serrulata*	Mickey Mouse Bush	X(4)	- Stems of all juvenile and mature plants should be scraped and painted with undiluted glyphosphate - follow up treatment may be needed on regrowth stems around base of plant in following monthly site visits - Mature fruits on plants should be bagged and removed from site
Oleaceae	*Ligustrum sinense and Ligustrum lucidum*	Small-leaved Privet and Broad-leaf Privet	X(4)	- Hand weed juveniles - Drill holes with power drill with thick drill bit into mature trees, around base of trunk and fill holes with undiluted glyphosphate. Once glyphosphate has been absorbed refill holes with undiluted glyphosphate several times. - Cut shrub and mature individuals as close to ground as possible with loppers or hand saw (or chainsaw) and treat stump with undiluted glyphosphate - Spray juveniles and regrowth foliage of cut and painted individuals with glyphosphate 10mL/1L
Oleaceae	*Jasminum sp.*	Jasmine		- Hand weed, taking care to dig out all root material - Cut stems back to roots and apply undiluted glyphosphate to cut surfaces - Plant can be cut back to roots and then in subsequent months regrowth foliage sprayed with

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				glyphosate (10mL/1L) + penetrant , or metsulfuron-methyl 600g/kg (5g/10L) + penetrant - Any cut plant material should be bagged and removed from site as plant will resprout roots from cut stems
Oleaceae	*Olea europaea subsp. cuspidata*	African Olive	X(4)	- Spray juveniles with glyphosphate 10mL/1L - Cut mature individuals with saw or loppers near ground level and paint stump with undiluted glyphosphate or Triclopyr (600g/L formulation)/diesel at 4L/60L concentration (as per Garlon 600 label) - Use a power drill (9mm drill bit with dowelling tip) to drill holes less than 20 mm apart throughout lignotuber of mature trees and fill holes with glyphosphate a 1:5 mixture with water. After all holes have been filled with herbicide mixture refill holes with herbicide mixture a second time (plant will have absorbed herbicide by this time). Check trees monthly for regrowth and repeat treatment if resprouting foliage is observed
Passifloraceae	*Passiflora caerulea and Passiflora edulis*	Blue Passion Flower and Passionfruit		- Hand weed Juveniles - Dig roots out of ground for larger individuals or use secateurs to cut the vine near the base and treat cut surface with undiluted glyphosphate
Passifloraceae	*Passiflora edulis*	Passion Fruit		- Hand weed Juveniles

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				- Dig roots out of ground for larger individuals or use secateurs to cut the vine near the base and treat cut surface with undiluted glyphosphate
Polygonaceae	*Acetosa sagittata*	Turkey Rhubarb		- Bag and remove seed present on mature plants - Cut vines close to the ground and dig out as much as of root system and tubers as possible - Juvenile plants growing from seed can be dug out or hand pulled - Tuber at base of plant needs to be removed - On individuals with deep and difficult to remove tubers, stems can be scraped on one side with a blade for a length of 45cm and scraped area painted with undiluted glyphosphate - This treatment may need to be repeated on subsequent site visits - On plants with difficult and deep to remove tubers the tubers close to the surface can also be scraped and painted with undiluted glyphosphate
Ranunculaceae	*Ranunculus repens*	Creeping Buttercup		- Hand weed - Care must be taken to remove all plant parts including runners to prevent vegetative reproduction - Spot spray with glyphosphate 10mL/1L - follow up treatment may be needed
Rutaceae	*Murraya paniculata*	Orange Jessamine		- Hand weed juveniles or spray with 10mL/1L

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				glyphosphate - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosphate to cut stump surface - Spray any regrowth foliage from cut stumps with glyphosphate 10mL/1L
Rutaceae	*Citrus x limon*	Lemon		- Cut shrubs/small trees at base and paint with undiluted glyphosphate
Solanaceae	*Cestrum parqui*	Green Cestrum	X(3)	- Hand weed juveniles - Scrape stem and paint with undiluted glyphosphate - Cut all above ground suckering individuals with loppers or saw and paint stumps with undiluted glyphosphate - Spray regrowth foliage with glyphosphate 10mL/1L
Solanaceae	*Solanum seaforthianum*	Brazilian Nightshade		- Hand weed juveniles - Hand weed mature individuals; species is shallow rooted and generally pulls from the ground easily in soft soils - Dig roots out of ground for larger individuals (if required) or use secateurs to cut the vine near the base and treat cut surface with undiluted glyphosphate
Strelitziaceae	*Strelitzia nicolai*	Giant Bird of Paradise		- Saw plant off at base and apply undiluted

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				glyphosphate to the cut stump. This species can grow over 10m tall, and contains a large amount of water, making the stem heavy. For this reason an arborist may be required for safety reasons to initially cut down mature individuals. Glyphosphate should be applied to the stump immediately after cutting - To improve efficacy of herbicide application, dig around the base to expose roots which can be pierced with a knife or trowel and glyphosphate applied - The plant may reshoot from the centre. The new shoot should be sawn off and glyphosphate applied to freshly cut surface monthly until the plant is dead
Theaceae	*Camellia japonica*	Japanese Camellia		- Cut and paint stump with undiluted glyphosphate
Verbenaceae	*Lantana camara*	Lantana	# X(4)	- Hand weed juveniles and regrowth from small pieces - Spot spray with glyphosphate 10mL/1L - Slash using brushcutter, or hand cut with loppers, and spray regrowth foliage with glyphosphate 10mL/1L - Cut near ground level and paint with undiluted glyphosphate - Some individuals will have stumps which will still regrow foliage, spray regrowth foliage with glyphosphate 10mL/1L
Zingiberaceae	*Hedychium gardnerianum*	Ginger Lily		- Cut, bag, and remove mature seed heads from plants

Table C.1 Weeds on site and control methods

Family	Species	Common Name	Status	Treatment Methods
				- Dig up with mattock or hand pull mature plants, taking care to remove all fleshy rhizomes - Rhizomes need to be removed from site, or crushed and piled on site to rot (monitor for regrowth) - Cut plant as close to rhizome as possible and treat with undiluted metsulfuron methyl at 6g -1 L (winter) or 1g -1 L (summer)

Key: ** = exotic*

X(4) = Noxious Class 4 in Pittwater LGA

X(3) = Noxious Class 3 in Pittwater LGA

Appendix D

Native Species Suitable for Planting

Table D.1 Endemic native species suitable for planting

Form and Family	Species	Common Name
Emergent		
Myrtaceae	*Eucalyptus botryoides*	Bangalay
Trees		
Arecaceae	*Livistona australis*	Cabbage Palm
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Lauraceae	*Endiandra sieberi*	Corkwood
Meliaceae	*Synoum glandulosum*	Scentless Rosewood
Moraceae	*Ficus rubiginosa*	Rusty Fig
Myrtaceae	*Acmena smithii*	Lilly Pilly
Myrtaceae	*Syncarpia glomulifera*	Turpentine
Proteaceae	*Banksia integrifolia*	Coast Banksia
Small Tree		
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
Eupomatiaceae	*Eupomatia laurina*	Bolwarra
Meliaceae	*Synoum glandulosum*	Scentless Rosewood
Moraceae	*Ficus coronata*	Sandpaper Fig
Shrubs		
Cyatheaceae	*Cyathea australis*	Rough Tree Fern
Zamiaceae	*Macrozamia communis*	Burrawang
Cunoniaceae	*Ceratopetalum gummiferum*	Christmas Bush
Epacridaceae	*Leucopogon juniperinus*	Prickly Beard-heath
Eupomatiaceae	*Eupomatia laurina*	Bolwarra
Euphorbiaceae	*Breynia oblongifolia*	Dwarfs Apples
Euphorbiaceae	*Claoxylon australe*	Brittlewood
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart
Monimiaceae	*Wilkiea huegeliana*	Veiny Wilkiea
Myrsinaceae	*Myrsine variabilis*	Variable Muttonwood
Oleaceae	*Notelaea longifolia*	Large Mock Olive
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum
Groundcover - Ferns		
Adiantaceae	*Adiantum aethiopicum*	Common Maidenhair Fern
Adiantaceae	*Adiantum hispidulum*	Rough Maidenhair
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern

Table D.1 Endemic native species suitable for planting

Form and Family	Species	Common Name
Blechnaceae	*Doodia aspera*	Rasp Fern
Davalliaceae	*Davallia pyxidata*	Hares Foot Fern
Dennstaedtiaceae	*Pteridium esculentum*	Bracken Fern
Dicksoniaceae	*Calochlaena dubia*	False Bracken Fern
Groundcover - Dicots		
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
Apiaceae	*Centella asiatica*	Indian Pennywort
Apiaceae	*Hydrocotyle peduncularis*	
Asteraceae	*Cotula australis*	
Geraniaceae	*Geranium homeanum*	Trailing Storksbill
Violaceae	*Viola hederacea*	Native Violet
Groundcover - Monocots		
Araceae	*Gymnostachys anceps*	Settlers Flax
Commelinaceae	*Commelina cyanea*	Native Wandering Jew
Cyperaceae	*Lepidosperma elatius*	Tall Sword-sedge
Cyperaceae	*Lepidosperma laterale*	Broad Sword-sedge
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush
Phormiaceae	*Dianella caerulea var. producta*	Rough Flax Lily
Poaceae	*Entolasia marginata*	Margined Panic
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Oplismenus imbecillis*	Creeping Beard Grass
Poaceae	*Poa affinis*	
Uvulariaceae	*Schelhammera undulatum*	Lilac Lily
Groundcover - Vines		
Apocynaceae	*Marsdenia rostrata*	Milk Vine
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine
Dilleniaceae	*Hibbertia dentata*	Scrambling Guinea Flower
Fabaceae	*Glycine clandestina*	
Menispermaceae	*Sarcopetalum harveyanum*	Pearl Vine
Menispermaceae	*Stephania japonica*	Snake Vine
Passifloraceae	*Passiflora herbertiana*	Native Passionflower
Rubiaceae	*Morinda jasminoides*	Jasmine Morinda

Table D.1 Endemic native species suitable for planting

Form and Family	Species	Common Name
Vitaceae	*Cissus antarctica*	Simple-leaved Water Vine
Vitaceae	*Cissus hypoglauca*	Five-leaved Water Vine
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily
Smilacaceae	*Smilax australis*	Prickly Supplejack
Smilacaceae	*Smilax glyciphylla*	Sarsaparilla