MILTON MEADOWS - ULLADULLA

Vegetation Management Plan

Milton Meadows

20 September 2019

Final

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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 commendations 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:	**Dr David Robertson**
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Glossary

Term	Definition
ABPP	Australian Bushfire Protection Planners
APZ	Assets protection zone
BMP	Bushfire Management Plan
BRC	Bush Regeneration Contractor
CEEC	Critically Endangered Ecological Community
CGWF	Clyde Gully Wet Forest
DA	Development Application
DoEE	Commonwealth Department of the Environment and Energy
EEC	Endangered Ecological Community
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
LGA	Local Government Area
Locality	The area within a 5 km radius of the centre of the subject site
MUSR	Milton Ulladulla Subtropical Rainforest
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
the proposed development	Creation of a senior's housing area, including construction of a two-storey residential care facility (RCF); construction of 127 independent living units in the form of duplex dwellings; a three-storey residential flat building with 133 units across seven blocks and underground car parking; a two-levelled clubhouse including a medical centre, gym, swimming pool, recreational area, restaurant and associated infrastructure. The proposed development will also include an assets protection zone on its northern portion within which two water quality ponds and the 'subject site' will be located.
SEPP	State Environmental Planning Policy
Study Area	Is the land referred to as 196 Windward Way, Milton (Lot 1 in DP 780801 and Lot 1 DP 737576) within which the 'subject site' is located, and includes any area outside the project boundary which has the potential to be impacted on, either directly or indirectly, by the proposed development.
Subject site	Is the area to which this VMP applies and mostly located on the northern portion of the Study Area including the EEC, vegetated riparian zone, and APZ, and Threatened Species Retention Zone in the southern portion.
TPZ	Tree Protection Zone
TSC Act	NSW Threatened Species Conservation Act 1995
VMP	Vegetation Management Plan
VRZ	Vegetated riparian zone
SLEP 2014	Shoalhaven Local Environmental Plan 2014
WoNS	Weed of National Significance

Executive Summary

S1 Purpose

Cumberland Ecology was commissioned by Roger Black on behalf of ANNSCA Property Group (APG), to prepare a Vegetation Management Plan (VMP) in support of a Development Application (DA) to be submitted for a proposed development on land located at 196 Windward Way, Milton (Lot 1 in DP 780801 and Lot 1 DP 737576) (the study area).

This VMP applies to the two patches of Milton Ulladulla Subtropical Rainforest (MUSR) native vegetation, the Vegetated Riparian Zone (VRZ) and the Assets Protection Zone (APZ) located in the northern portion of the Lot (hereafter referred to as the 'subject site'). The study area occupies the entirety of the land located within Lot 1 DP780801, with the subject site including on those areas identified above as being addressed in this VMP.

The purpose of this VMP is to provide guidelines for the conservation, management and rehabilitation of retained MUSR native vegetation; to revegetate and manage the VRZ and to manage the APZ. The MUSR to be retained comprises the vegetation community 'Subtropical Complex Rainforest (Milton Ulladulla Subtropical Rainforest)' an Endangered Ecological Community (EEC) listed under the NSW *Threatened Species Conservation Act 1995*; and the creek associated with this EEC. The VRZ comprises a 20 metre 'from top of bank' zone along the creek.

S2 Methodology

The preparation of this VMP involved a literature review to determine the current methods of weed control for exotic species that are present in and adjacent to the subject site.

The study area was inspected on 11 April 2017 to verify the vegetation communities present, assess the overall condition of the vegetation, and to identify any locations of significant weed infestations. The site was traversed, and photographs were taken in various locations. Incidental observations of fauna within the study area were also recorded.

S3 Existing Biodiversity Values

Existing biodiversity values includes the EEC and its associated creek along the northern portion of the subject site and the large Small-leaved Fig (*Ficus obliqua*) in the south eastern patch. The EEC vegetation community is not proposed to be developed and will be retained. A vegetated riparian zone (VRZ) will also be retained and managed to protect the creek within the subject site. Other vegetation within the subject site includes Native Regrowth and Exotic Weeds, and Exotic Grasslands, which will be revegetated and managed where it occurs within the VRZ and APZ.

Two individuals of the critically endangered *Rhodamnia rubescens* occur within the subject site. One occurs under the large *Ficus obliqua* and the other occurs in the south within a 0.05 ha section of Clyde Gully Wet Forest retained to protect the individual within the Threatened Species Retention Zone.

S4 Vegetation Management

The aims of the Vegetation Management Plan (VMP) are to retain, revegetate, conserve and manage the vegetation in the Milton Ulladulla Subtropical Rainforest (MUSR) community; as well as to manage and revegetate vegetation within the VRZ and Threatened Species Retention Zone, and manage the APZ.

Four vegetation management zones have been established within the subject site. Vegetation Management Zone 1 consists of the EEC vegetation community. This zone will aim at conserving the EEC and planting will consist of species characteristic of the MUSR.

Vegetation Management Zone 2 comprises the VRZ, excluding the EEC. Revegetation and management of this zone will require planting of species characteristic of the Clyde Gully Wet Forest (CGWF) and will aim at stabilising the creek bank. This zone acts as the 20m buffer surrounding the MUSR EEC located in the northern portion only, and does not include the APZ.

Vegetation Management Zone 3 is the APZ. The APZ will consist of inner and outer APZ zones, which will have differing plant densities and understorey formation. The outer APZ will be implemented to act as a secondary barrier to protect the EEC located on the northern portion of the subject site associated with the creek, and will surround the VRZ on all sides with the exception of the north eastern boundary that abuts the access road. Both zones of the APZ will be managed as per requirements of the Bushfire Management Plan for the subject site. Plantings will include species characteristic of the Clyde Gully Wet Forest.

Vegetation Management Zone 4 is the Threatened Species Retention Zone, created to protect an individual of the critically endangered *Rhodamnia rubescens* and improve habitat. Canopy species will be retained in the area where it is determined safe to do so by the project arborist and the native understorey and ground layer will be retained and revegetated with CGWF species.

S5 Re-vegetation

Under this VMP native species typical of the CGWF and MUSR will be planted where required in corresponding revegetation management areas. The MUSR community and its associated creek located on the north-eastern portion of the subject site is in overall good condition and revegetation will be limited to localised areas where bare soil results from weed removal and for creek bank stabilisation. The MUSR community and its associated *Ficus obliqua* in the south eastern portion of the subject site is in overall good condition, however the vegetation community is restricted to the area directly underneath the tree canopy and this patch is occupied largely by the above ground buttressed trunk limiting planting to areas where bare soil results from weed removal or the buttressed trunk is absent. Revegetation will mainly be required in areas of the VRZ (Zone 2) where it contains exotic species, and revegetation will only be required in Zone 4 where weed removal results in gaps in the understorey or ground layer

S6 Weed Management Measures

Weed control will be required across the subject site. Exotic species, particularly priority weeds, Weeds of National Significance (WoNS) and environmental weeds within the Shoalhaven City Council, will be managed as per best practice bush regeneration techniques and using appropriate weed control methods.

S7 Monitoring and Reporting

The VMP will be an adaptive tool implemented for an initial period of five years during which six monthly reports will be prepared and forwarded to Shoalhaven City Council. At the end of the initial five-year period a

final report will be prepared including assessment of achievement of the key performance indicators. The final report will make recommendations based on the condition of the vegetation at that time, and may make provisions for a future ongoing VMP if key performance indicators have not been met.

The six-monthly reports will be prepared documenting the progress of revegetation works against the performance criteria outlined in this VMP. These reports will provide a record of the implementation of the VMP and will provide results of the revegetation and weed management programs undertaken by a bush regenerator and will be monitored and reported periodically.

1. Introduction

Cumberland Ecology was commissioned by Roger Black on behalf of ANNSCA Property Group (APG), to prepare a Vegetation Management Plan (VMP) in support of a Development Application (DA) to be submitted for a proposed development in land located at 196 Windward Way, Milton (Lot 1 in DP780801 and Lot 1 DP 737576) (hereafter referred to as the 'study area'). The focus of this VMP is the Milton Ulladulla Subtropical Rainforest (MUSR), an endangered ecological community (EEC) which contains an individual of *Rhodamnia rubescens* (Scrub Turpentine), the creek associated with MUSR, and the area within the Vegetated Riparian Zone (VRZ) and the Asset Protection Zone (APZ) located on the northern portion of the study area (hereafter referred to as the 'subject site'). Additionally, an area in which a second individual of the critically endangered *Rhodamnia rubescens* (Scrub Turpentine) occurs will be the focus in the southern portion of the subject site in the Threatened Species Retention Zone. The APZ is comprised of an inner protection zone of varying widths bordering the north, east and western boundaries of the subject site, with an additional outer protection zone along the northern border between the inner protection zone and the 20m buffer zone of the MUSR. The VRZ is an area that extends 20 m from the top of bank of the creek. The MUSR vegetation will be retained, managed and revegetated (in some areas), while the reminder of the subject site will be revegetated to the Clyde Gully Wet Forest (CGWF) community taking into account the requirements of the Bushfire Management Plan (BMP).

1.1. Purpose

The purpose of this VMP is to provide guidelines for the conservation, management and rehabilitation of vegetation associated with the subject site. The VMP has been prepared to allow the retention, revegetation (where required), conservation and management of two patches of MUSR and associated creek, as well as to manage and revegetate the VRZ, APZ, and Threatened Species Retention Zone, using bushland regeneration techniques.

The aims of the VMP are as follows:

- To improve the biodiversity values of the MUSR, VRZ, and Threatened Species Retention Zone within the subject site;
- To manage vegetation within the APZ;
- To re-establish native vegetation that is broadly representative of the original plant communities within the subject site, including canopy trees, understorey trees, shrubs and groundcovers;
- To protect two *Rhodamnia rubescens* individuals present within the subject site and improve habitat;
- To establish and enhance habitat for local fauna species with the potential to occur, or are known to occur, within the study area;
- To establish management measures to prevent impacts on the associated creek; and
- To enhance the ecological character of the subject site by systematic staged removal and routine control of weed species within the subject site.

1.2. Background

1.2.1. Study Area and Subject Site Description

The study area is located at 196 Windward Way in the Shoalhaven Council Local Government Area (LGA) and comprises Lot 1 in DP 780801 and Lot 1 DP 737576 (**Figure 1**). The study area is bounded by Windward Way to the south, Princes Highway to the north, and rural/residential developments to the east and west. It is approximately 15.68 ha in area. The study area is largely open, with some small scattered patches of trees on its south-eastern portion, a relatively dense rainforest on its north-eastern portion associated with a creek, moderately dense remnant native vegetation on the northern portion and small patches of native trees scattered on the northern and western areas of the subject land. Exotic Grassland is present on its central portion and northern portion surrounding an existing dwelling. An unused silo and remnants of a dwelling/garden shed are present on the southern end of the study area.

This VMP applies to:

- The MUSR community that consists of two patches, one in the northern portion of the subject site and one in the south eastern portion associated with the large *Ficus obliqua,* which contains an individual of *Rhodamnia rubescens*. The management of this area is addressed under management zone 1 within this VMP.
- The VRZ that extends 20 m from the top of bank of the creek. The management of this area is addressed under management zone 2 within this VMP, excluding the areas where MUSR exists and management zone 1 prevails. Note, this zone acts as a 20m buffer for the protection of the MUSR EEC in the northern portion of the subject site. The MUSR patch in the south east does not have a buffer zone.
- The APZ that occurs surrounding the north, east and western sides of the proposed development and consists of an inner APZ on all three sides, with an additional outer APZ area on the northern boundary between the inner APZ and the VRZ (not including the area abutting the access road). The management of this area is addressed under management zone 3.
- The Threatened Species Retention Zone that occurs along the southern boundary of the subject site. This zone acts as a buffer to protect an individual of *Rhodamnia rubescens* and protect a 0.05 ha area of habitat for the plant. The management of this area is addressed under management zone 4.

1.2.2. Vegetation

Cumberland Ecology ground truthed and mapped the vegetation within the study area as part of surveys conducted for an initial Flora and Fauna Assessment in December 2016 (Cumberland Ecology), and conducted additional surveys to map the northern lot (Lot 1 DP 737576) in April 2018 for inclusion into the study area The vegetation was found to consist of the following:

- Exotic Grassland,
- Native Regrowth of Clyde Gully Wet Forest and Exotic Weeds;
- Planted Natives/Exotics and Weeds;

- Cleared areas;
- Clyde Gully Wet Forest; and
- Subtropical Complex Rainforest (Milton Ulladulla Subtropical Rainforest) an Endangered Ecological Community (EEC) listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act).

1.3. Proposed Development

Hawes and Swan Planning are acting on behalf of APG for the submission of a DA to Shoalhaven City Council for the construction of a senior's housing development in the study area. The development will include construction of a two-storey residential care facility; construction of 127 independent living units in the form of duplex dwellings; a three-storey residential flat building with 133 units across seven blocks and underground car parking; a two-levelled clubhouse including a medical centre, gymnasium, swimming pool, recreational area, restaurant and associated infrastructure (**Figure 2**).

The development aims to retain the majority of the existing vegetation on the northern boundary of the subject site, along with a small patch in the south eastern portion of the subject site, and provide additional offset planting for any loss of vegetation necessary to support the development of the study area. The northern portion of the study area, along with the eastern and western boundaries, will also include an APZ for which a Bushfire Management Plan (BMP) has been prepared by Australian Bushfire Protection Planners (ABPP).

A proposed pond will be constructed adjacent to the E2 zone in the northern portion of the study area to detain rainwater for bushfire protection, while also providing an aesthetic feature for residents.

1.4. Application of the VMP

The VMP applies to the subject site, defined as areas of MUSR, Native Regrowth and Exotic Weeds, and Exotic Grassland vegetation, located in the northern portion of the study area associated with the creek, plus the small patch of MUSR EEC associated with the *Ficus obliqua* in the south east, the area of CGWF along the southern boundary in the Threatened Species Retention Zone, and the APZ (see **Figure 3**). Vegetation within the APZ will require management and revegetation to comply with the requirements of the BMP (**Figure 3**).

The implementation of the VMP on the subject site will increase the ecological values of the native vegetation in the subject site, protect two individuals of the critically endangered *Rhodamnia rubescens* and associated habitat, and provide habitat for local fauna species. It will secure the long-term conservation of the patches of MUSR. The management period of the VMP will apply for a time period of five years, after which a final report will evaluate the achievement of the key performance indicators outlined in this VMP and may make provisions for a future ongoing VMP if key performance indicators have not been met.

All site works are to be conducted by qualified personnel. An experienced Bush Regeneration Contractor (BRC), who has completed a recognised course in bush regeneration and with at least 500 hours or two years' experience in native vegetation community restoration, should oversee the on-ground works.

1.5. Relevant Legislation

Legislation relevant to this VMP includes:

- Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);
- NSW Environmental Planning and Assessment Act 1979 (EP&A Act);
- NSW Biosecurity Act 2015;
- NSW Pesticides Act 1999;
- NSW Threatened Species Conservation Act 1995 (TSC Act); and
- NSW Rivers and Foreshores Improvements Act 1948 (R&FI Act).

1.6. State and Local Government Planning Instruments

- Planning instruments that relate to the development of the study area includes:
- The Shoalhaven Local Environmental Plan 2014; and
- State Environmental Planning Policy 19 – Bushland in Urban Areas.

These are considered below in more detail.

1.6.1. The Shoalhaven Local Environmental Plan 2014

The subject site is located within the Shoalhaven Council LGA and falls under the Shoalhaven Local Environmental Plan 2014. A portion of the study area is mapped as "Excluded Land" and "Biodiversity – significant vegetation" in the Terrestrial Biodiversity Map (Sheet BIO_16C) and roughly corresponds to the subject site.

1.6.2. State Environmental Planning Policy 19 – Bushland Urban Areas

State Environmental Planning Policies (SEPPs) deal with issues significant to the state and people of NSW. They are made by the Governor on the recommendation of the Minister for Planning and may be exhibited in draft form for public comment before being gazetted as a legal document.

SEPP 19 is designed to protect bushland in public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

1.6.3. Biosecurity Act 2015

Under the NSW *Biosecurity Act 2015* (Biosecurity Act) all weeds are required to be controlled by all persons under a "General Biosecurity Duty". The General Biosecurity Duty means that all public and private land owners or managers and all other people who deal with weed species (biosecurity matters) must use the most appropriate approach to prevent, eliminate, or minimise the negative impact (biosecurity risk) of those weeds (DPI 2017).

State-wide management of weeds under the new legislation is directed by the NSW Invasive Species Plan (NSW Local Land Services 2017). This assigns weed responses to four categories:

- Prevention of new weeds establishing;

- Eradication of small and localised infestations where feasible;
- Containment of larger infestation to stop wider spread; and
- Protection of key assets such as threatened plants and agricultural land, to prevent their damage or degradation by weed invasion.

Under the Biosecurity Act some weed species have been prioritised for management by specific regulations and controls under the act. These are known as State Level Priority Weeds.

The state has been divided into 11 regions (each covering a number of LGAs) under the act, with each region managed by a Regional Weeds Committee. Management actions for weeds within a region are detailed within a Regional Strategic Weed Management Plan. Within each region, additional weed species to the State Level Priority Weeds have been prioritised for management. These species are known as Regional Priority Weeds.

A further set of weeds are identified within the Regional Strategic Weed Management Plans as being "other weeds of regional concern". The Biosecurity Act provides powers to Local Control Authorities to take action in relation to these weeds in particular circumstances, for example where a weed threatens a high value asset, and prevention, elimination or reduction of the risk is feasible and reasonable. Examples of high values assets include the Environment, Human Health, and Agriculture.

All land within the subject site occurs within the South East Local Land Services region, and weed management within the region is to be undertaken under the direction of the South East Regional Strategic Weed Management Plan (NSW Local Land Services 2017). Appendix 1 and 2 of the Plan outline the State Priority Weeds, Regional Priority Weeds, and other weeds of regional concern.

1.6.4. Weeds of National Significance

Weeds of National Significance (WoNS) are weed species occurring on a list created under the framework of the National Weeds Strategy (NRMMC 2006). Thirty-two WoNS have been agreed upon by Australian governments as the worst weeds in the country based on an assessment process that prioritised weeds based on their invasiveness, potential for spread and environmental, social, and economic impacts. No Federal legislation has been created which is applicable to WoNS, and legislative control for these species is currently expected to occur under state and territory legislation pertaining to weeds.

1.6.5. Pesticides Act 1999

The *Pesticides Act 1999* controls the use of herbicides within New South Wales. Under the Act it is illegal to use herbicides for species not listed on a particular herbicide's 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 C.1.2**).

2. Methodology

2.1. Desktop Assessment

The preparation of this VMP involved a literature review to determine the most current methods of weed control for exotic species that are present in and adjacent to the subject site.

In order to prepare species planting lists for revegetation, and revegetation strategies for remnant vegetation on the subject site, the following reports were reviewed:

- Preliminary Flora and Fauna Report and Ecological Constraints Analysis prepared by Bushfire Environmental Services (2005);
- Flora and Fauna Assessment prepared by Cumberland Ecology (Cumberland Ecology 2019);
- Endangered Ecological Community Information: Milton Ulladulla Subtropical Rainforest in the Sydney Basin Bioregion – Endangered Ecological Community; and
- Bushfire Management Plan prepared by ABPP (2017).

2.2. Field Surveys

The southern larger lot (Lot 1 DP 780801) of the study area was inspected on 11 April 2017 by botanist Cecilia Phu and ecologist Adriana Corona Mothe of Cumberland Ecology and the northern smaller lot (Lot 1 DP 737576) was inspected on 23 April 2018 by botanist Bryan Furchert and ecologist Heather Gosper, in order to verify the vegetation communities within the study area, to assess the overall condition of the vegetation and to identify any locations of significant weed invasion. The site was traversed, and photographs were taken in various locations. Incidental observations of fauna within the study area were also recorded. Detailed fauna surveys were undertaken in February to March 2018, and a targeted search for *Rhodamnia rubescens* was undertaken in August 2019, and the results of these surveys are provided in the Flora and Fauna Assessment, issued separately.

3. Existing Biodiversity Values

This chapter presents the results of recent surveys and describes the flora and fauna of the subject site.

3.1. Subject Site Vegetation

Flora and Fauna Assessments conducted in the study area (Cumberland Ecology 2018) recorded Native Regrowth and Exotic Weeds, Exotic Grasslands, Planted Natives/Exotics and Weeds, Cleared Areas, Clyde Gully Wet Forest and Subtropical Complex Rainforest (Milton Ulladulla Subtropical Rainforest) (MUSR). The subject site contains Native Regrowth and Exotic Weeds, Exotic Grasslands, Clyde Gully Wet Forest and Subtropical Complex Rainforest (Milton Ulladulla Subtropical Rainforest) (MUSR) (**Figure 4**). The area currently occupied by Native Regrowth and Exotic Weeds vegetation is likely to have historically comprised Clyde Gully Wet Forest (CGWF) as evidenced by the composition of native species in the regrowth areas and the CGWF mapped on the southern portion of the study area.

3.1.1. Subtropical Complex Rainforest

The Subtropical Complex Rainforest vegetation community is consistent with MUSR, an EEC listed under the TSC Act.

This vegetation community occurs as two patches within the subject site. One is located on the north-eastern portion of the subject site and is associated with a creek line running along the northern boundary. The eastern-most extent of this community in the subject site is generally intact (**Photograph 1**) with very few occurrences of exotic species. Higher abundances of exotic species are present further west along the creek line, particularly in the shrub and ground layers. The community is present from the creek line generally to the top of the creek bank, and further upslope in some areas.

The second patch is located on the south eastern portion of the subject site and is associated with a large *Ficus obliqua* (Small-leaved Fig). This community is present within the 0.16 ha area occurring directly under the canopy of the single large *Ficus obliqua* (**Photograph 2**).

Photograph 1 – Subtropical Complex Rainforest associated with the northern creek line

Photograph 2 - Subtropical Complex Rainforest associated with the Ficus obliqua

3.1.2. Clyde Gully Wet Forest

This community occurs in two patches along the southern boundary of the study area and as a patch surrounding two large *Syncarpia glomulifera* (Turpentine) trees on towards the north eastern corner of the study area. The canopy has gaps throughout, due to former clearing, and the understorey is in various states of regrowth, however the community is dominated in all strata by native species consistent with the community as described by Tozer et al (Tozer et al. 2010).The eastern patch is dominated by *Eucalyptus pilularis* (Blackbutt), with sparse occurrences of *Eucalyptus botryoides* (Bangalay) and *Syncarpia glomulifera* (Turpentine) (**Photograph 3**). The western patch has a canopy of *Eucalyptus botryoides* and is more generally degraded than the occurrence in the east (**Photograph 4**).

Photograph 3 - Clyde Gully Wet Forest in the south-east of the study area

Photograph 4 - Clyde Gully Wet Forest in the south-west of the study area

3.1.3. Native Regrowth and Exotic Weeds

This community consists of a number of patches of native regrowth, of species indicating the majority of the study area historically was vegetated with Clyde Gully Wet Forest. Some remnant trees are present in the community and recorded species include *Ficus obliqua* and *Syncarpia glomulifera*, and a number of small trees of the latter species are present growing in association with remnant trees. The majority of these patches consist variously of a canopy of the colonising species *Acacia maidenii, Acacia mearnsii,* and *Acacia maidenii* ranging 15-20 m in height. The large patch in the north/north-west corner of the site also contains numerous occurrences of *Pittosporum undulatum* in the canopy.

Patches of this community across the study area range in condition, with a species depauperate, though native dominated ground layer of *Microlaena stipoides* and *Carex longebrachiata* and scattered native herbs and climbers (**Photograph 5**). Other areas are dominated in the ground layer by exotic species such as *Cenchrus clandestinus* and *Lonicera japonica* (**Photograph 6**).

The largest patch within the subject site occurs in the north-west, consisting of a sparse to dense canopy of *Pittosporum undulatum* and *Acacia* spp., and has an extremely dense understorey with numerous occurrences of both native and exotic shrub species (**Photograph 7**).

Photograph 5 - Acacia dominated regrowth with Microlaena stipoides dominated ground layer

Photograph 6 - Acacia Regrowth patch with exotic dominated ground layer

Photograph 7 - Native Regrowth with dense native/exotic understorey

3.1.4. Planted Natives/Exotics and Weeds

Planted natives and exotics occur in the far northern corner of the subject site surrounding the residential dwelling. Planted natives include *Callistemon viminalis* (Bottlebrush) and *Hakea salicifolia* (Willow-leaved Hakea), which is planted along the fence boundary facing Princes Highway and to the front of the house on Garrad's Lane. Neither of these species is endemic to the site (**Photograph 8**).

The planted natives are interspersed with a fragmented canopy consisting of *Ulmus parvifolia* (Chinese Elm) and *Cupressus sp.* (Cypress) and a sub canopy of scattered planted *Callistemon viminalis* and *Harpephyllum caffrum* (Kaffir Plum).

The ground layer is predominantly comprised of the exotic grass *Cenchrus clandestinus* (Kikuyu), with others such as *Ehrharta erecta* (Panic Veldtgrass) and *Tradescantia fluminensis* (Wandering Jew) present. A number of vines and climbers cover structures such as fences, sections of the building and adjacent trees, including *Jasminum polyanthum* (White Jasmine). *Wisteria sinensis* (Chinese Wisteria), *Rubus fruticosus agg.* (Blackberry), and *Hedera helix* (English Ivy).

Photograph 8 - Planted Natives/Exotics and Weeds at the northern boundary of the study area

3.1.5. Exotic Grassland

Open grassland areas throughout the study area are dominated by the exotic grass *Cenchrus clandestinus* (Kikuyu). Other exotic grasses occurring less frequently include *Dactylis glomerata* (Orchard Grass) and *Stenotaphrum secundatum* (Buffalo Grass) (**Photograph 9**). Exotic forbs such as *Anagallis arvensis* (Scarlet Pimpernel), *Verbena rigida* (Veined Verbena), and *Taraxacum officinale* (Dandelion) are common in these areas.

Native ground layer species are relatively uncommon in these areas, consisting of scattered individuals of common species such as *Microlaena stipoides*, *Centella asiatica*, and *Glycine tabacina*.

A number of scattered trees and shrubs of species such as *Syncarpia glomulifera*, and *Acacia* spp. that are not occurring densely enough to be mapped as a vegetation community are present in these areas growing over exotic grasses.

Photograph 9 - Overgrown exotic grassland to the south of the proposed APZ

3.1.6. Cleared

The area occupied by the house on the northern western boundary of the small lot within the subject site is mapped as cleared. This area has been previously cleared for the residential dwelling, and no vegetation is present where the footprint of the house exists.

3.2. Flora Species

A total of 162 flora species were recorded by Cumberland Ecology (2017) throughout the study area, 77 of which were recorded within the subject site. The dominant plant families encountered within the subject site were Poaceae (grasses), Pteridaceae (ferns), Apocynaceae and Asteraceae (daisies). Species present within the study area consists of a mix of exotics and non-endemic planted natives (33%) and locally indigenous species (67%). No threatened plant species have been recorded from the study area. Quadrat and transect data for the study area are provided in **Appendix A**.

3.2.1. Threatened Flora Species

Two individuals of *Rhodamnia rubescens,* which is listed as critically endangered under the TSC Act, but is not listed under the EPBC Act, were located within the subject site (**Figure 8**). One individual was located just within the subject site (1-2m from the existing fence) along the southern boundary of the site, parallel with Windward Way (**Photograph 10**), within the CGWF community. The other individual was located within the Milton

Ulladulla Subtropical Rainforest community, occurring within the site as a large *Ficus obliqua* individual and associated regrowth understorey (**Photograph 11**).

Rhodamnia rubescens is a shrub to small tree size species which occurs along the east coast of Australia, from as far south as Batemans Bay, to inland of Bundaberg in Queensland to the north. The species typically occurs in coastal areas, occasionally extending inland onto escarpments up to 600 m above sea level in areas with 1000 to 1600 mm of rainfall (OEH 2019). The species occupies soils derived from volcanic and sedimentary sources and is associated generally with rainforests and wet sclerophyll forests, although can occur in adjacent areas of dry sclerophyll forest as a pioneer(NSW Scientific Committee 2019).

The species was common and has a large geographic range, with an extent of occurrence within NSW of 123 459km^2. However, the species has been listed as critically endangered due to its extreme susceptibility to the introduced pathogen Myrtle Rust (*Austropuccinia psidii*). Myrtle Rust was introduced in Australia in 2010 and has since established throughout ecosystems in coastal areas of eastern Australia. All parts of *Rhodamnia rubescens* are affected by the rust, including stems, leaves, and flowers. The rust is known to kill flowers, and infect fruit preventing the fruit maturing. Mortality of the species has been recorded at over 50% in studied populations and it is estimated that within three generations over 80% of plants across its range will be deceased. As a rainforest species, seed dormancy is not expected to be long lived and the soil seed bank is therefore readily extinguished over a short period of time. Seedlings are also highly susceptible to infection by the rust which is widespread and persistent in the environment due to many host species in the Myrtaceae family (NSW Scientific Committee 2019).

The two individuals of the species within the subject site are young, about 40cm in height, and visibly infected with myrtle rust.

Despite efforts to retain the individuals of the species within the subject site, in the mid to long term, there is a high likelihood they will succumb to the Myrtle Rust infection.

Photograph 10 *Rhodamnia rubescens* in south of subject site within Clyde Gully Wet Forest

Photograph 11 *Rhodamnia rubescens* within Milton Ulladulla Subtropical Rainforest under large *Ficus obliqua*

3.2.2. Weeds within the Subject Site

Weeds identified by Cumberland Ecology as occurring within the subject site and study area make up the weed species list used for the basis of the weed management measures outlined in **Chapter 5** of this VMP. **Appendix A** contains a complete flora species list of plants recorded from the study area.

Four of the exotic plant species recorded on the study area are listed as State Priority Weeds under the NSW *Biosecurity Act 2015* in the Shoalhaven LGA. These species are; *Lantana camara* (Lantana), *Senecio madagascariensis* (Fireweed), *Rubus fruticosus* (Blackberry) and *Asparagus aethiopicus* (Ground Asparagus or Asparagus 'Fern'). Two further species, *Ipomoea spp.* (Morning Glory) and *Araujia sericifera* (Moth Vine) are species subject to local management programs. Additionally, *Lantana camara*, *A. Aethiopicus, R. fruticosus* and *S. madagascariensis* are also listed as Weeds of National Significance (WoNS). WoNS are categorised as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts. No legal requirements are listed for WoNS.

Priority weeds and WoNS recorded in the study area are listed in **Table 11** below.

Table 1 - Priority weeds recorded in the study area

Scientific Name	Common Name	Status	WoNS
Lantana camara	Lantana	SP, RP	Yes
Senecio madagascariensis	Fireweed	SP, RP	Yes
Rubus fruticosus	Blackberry	SP, OWRC#	Yes
Asparagus aethiopicus	Ground Asparagus or Asparagus 'Fern'	SP, OWRC#	Yes
Araujia sericifera	Moth Vine	OWRC#	No
Ipomoea spp.	Morning Glory	OWRC#	No

*Key: * Weed SP (State Priority Weed), RP (Regional Priority Weed), OWRC* (Other weed of regional concern - Potential Priority Weeds), OWRC# (Other weed of regional concern - Species subject to local management programs)*

3.3. Fauna Species

3.3.1. Fauna Habitat

The vegetation within the study area provides some potential habitat for fauna. In the subject site, five tree hollows were observed which may provide suitable habitat for fauna such as birds and arboreal mammals and reptiles. The rainforest located along the creek on the north-eastern portion of the site provides habitat for frogs and rainforest birds. A wombat was observed nearby the creek within the MUSR vegetation area during the 2016 surveys, and again in the 2018 surveys, and scattered wombat burrows are present. Therefore the habitats on the subject site are of high fauna value due to their location in a rainforest with its associated creek. Although there are many exotic flora species within the subject site, these can provide potential foraging resources for nectivorous and frugivorous mammals and birds that may use the subject site from time to time as part of a larger foraging range. Foraging habitat values should be enhanced as the result of the management of weeds and their replacement with native plants.

One non-active stick nest was sighted during surveys, and scattered fallen logs occur throughout the subject site which may provide microhabitat for reptiles.

3.3.2. General Species

Forty-eight vertebrate fauna species were recorded across the study area during Cumberland Ecology surveys in December 2016 and February 2018.

A number of wombat burrows were observed scattered across the study area, and a wombat was observed within the MUSR within the subject site in 2016, and again in 2018.

Additional common bird, mammal and reptile species are likely to utilise the subject site and surrounds as part of a larger foraging habitat and so this list is not exhaustive. The disturbed nature of vegetation within the subject site is likely to have an impact on the types and abundance of fauna species occurring.

3.3.3. Threatened Fauna Species

A number of threatened fauna species have been recorded from the locality and have the potential to occur within the study area and subject site.

Several threatened species were recorded within the subject site during the Cumberland Ecology surveys in 2018, however none of these species were observed roosting within the study area and the site most likely constitutes part of a much broader foraging habitat for the species and is deemed not representative of core habitat. The threatened species occurring within the study area include:

- Grey-headed Flying Fox (*Pteropus poliocephalus*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*); and
- Eastern Bentwing-bat (Miniopterus schreibersii oceanensis).

3.4. Subject Site Watercourses

A second order creek is present on the north-eastern portion of the subject site and associated with the MUSR.

Figure 5 shows the subject site's watercourse within its corresponding VRZ.

4. Vegetation Management

4.1. Introduction

The aims of this chapter are to outline the measures to be undertaken to retain, revegetate, conserve and manage the MUSR community, to manage and revegetate vegetation within the VRZ and Threatened Species Retention Zone, and manage the APZ. Planting of native CGWF and MUSR species will occur in revegetation areas and in the APZ. The MUSR patch and its associated creek located on the north-eastern portion of the subject site is in overall good condition and revegetation will be limited to localised areas where bare soil results from weed removal and for creek bank stabilisation.

The following actions are proposed in order to protect the creek and the MUSR:

- The existing stand of MUSR rainforest vegetation is to be retained as it is an EEC and the northern patch is located adjacent to the creek.
- A 20 metre wide (from the top of the bank) Vegetated Riparian Zone (VRZ) shall be retained along the creek;
- Re-vegetation will be undertaken across the VRZ;
- An APZ will be implemented that does not encroach into the VRZ, and that contains both an inner and outer APZ zone of differing planted densities and understorey structure;
- Identified erosion points within the VRZ along the creek will be protected. This can be achieved by placing rock material along their lower faces.
- Earthworks will not be undertaken within the VRZ.

4.2. Photo Reference Points

Photo reference points are recommended to be established by the Bush Regeneration Contractor (BRC) upon initiation of the VMP. Visual markers for photo reference points on the ground are generally composed of star pickets that have been flagged with tape or spray painted to be clearly visible. Photographs at each photo reference point should be taken on a given magnetic direction (i.e. north, south, east or west), and at the same height (typically 1.5m) and use that same compass bearing in all monitoring events undertaken by the BRC. The GPS location of visual markers should be recorded and used during implementation of this VMP.

4.3. Vegetation Management Zones

The subject site has been separated into the following vegetation management zones to facilitate the appropriate management of each zone:

- Zone 1: Milton Ulladulla Subtropical Rainforest
- Zone 2: Vegetated riparian zone;
- Zone 3: Asset protection zone; and
- Zone 4: Threatened Species Retention Zone.

The vegetation management zones are shown in **Figure 6**.

4.3.1. Vegetation Management Zone 1

Vegetation Management Zone 1 comprises the MUSR, located in the northern portion of the subject site and the patch associated with the *Ficus obliqua* in the south eastern portion of the subject site. Most of the MUSR is in good condition and is predominantly free of weeds, except for a small portion on the western end of the northern patch. The objectives within this management zone are:

- To retain, revegetate and conserve the MUSR vegetation community; and
- To manage weeds within the MUSR.

Vegetation Management Zone 1 will focus on preserving the MUSR in its natural condition. Vegetation within Vegetation Management Zone 1 will be replanted with plant species typical of the MUSR vegetation community. The MUSR will require minimal replanting as the vegetation therein is in general good condition. Vegetation plantings should aim at stabilising the creek bank. The western portion of MUSR is weedy and will require more planting to replace the weeds when they are removed.

The area of the MUSR community in the south-east comprised of the large *Ficus obliqua* includes an individual of the threatened *Rhodamnia rubescens*. Herbicide spraying is not to be undertaken within 10 m of the individual, and all weeds are required to be removed by hand surrounding the individual. Herbicide use will be limited to direct application by hand to woody weeds.

4.3.2. Vegetation Management Zone 2

Vegetation Management Zone 2 comprises the VRZ that extends 20 m from the top of bank of the creek. The VRZ includes the portion of the MUSR to the south from the top of bank, and some areas of Native Regrowth and Exotic Weeds and Exotic Grasslands that occur within the 20 m from the top of the creek bank. For vegetation management purposes, the small portion of the MUSR within the VRZ is part of Vegetation Management Zone 1 and its management should follow the objectives of Vegetation Management Zone 1.

The main objectives within Vegetation Management Zone 2 are:

- To revegetate vegetation as CGWF within the VRZ; and
- To manage weeds within the VRZ.

The Native Regrowth and Exotic Weeds and Exotic Grasslands areas that occur within the VRZ will be replanted with native plant species characteristic of the CGWF. Plantings along the creek line will aim at stabilising the creek bank.

4.3.3. Vegetation Management Zone 3

Vegetation Management Zone 3 corresponds to the APZ. This zone will also include the Water Quality Pond. The main objectives within Vegetation Management Zone 3 are:

- To revegetate with plants of the CGWF vegetation community; and
- To manage vegetation to comply with fuel loads requirements of the Bushfire Management Plan; and
- To manage weeds.

The APZ is divided into an inner and outer zone, which are to have different plant densities. The purpose of the outer APZ is to act as a secondary barrier to the MUSR patch associated with the creekline and borders the VRZ replanted area. The outer APZ will consist of 100% indigenous species and will have a >30% shrub density, assisting to prevent the spread of weeds from the proposed development and inner APZ into the MUSR community. The APZ also extends up the eastern and western boundaries of the subject site. On the eastern boundary the APZ acts as flora linkage providing a degree of connectivity between the two patches of MUSR. Australian Bushfire Protection Planners has prepared the Bushfire Management Plan (BMP) for the subject site. The management of this zone will comply with the fuel load requirements for the APZ as detailed in the BMP.

4.3.4. Vegetation Management Zone 4

Vegetation Management Zone 4 comprises the 0.05 ha Threatened Species Retention Zone that occurs within the southern portion of the subject site. The area includes a patch of CGWF which contains which contains an individual of *Rhodamnia rubescens*.

The main objectives within Vegetation Management Zone 4 are:

- To plant CGWF species where required to fill gaps in understorey and ground layer following weed removal;
- To manage weeds within the Threatened Species Retention Zone.

Zone 4 includes an individual of the threatened *Rhodamnia rubescens*. Herbicide spraying is not to be undertaken within 10 m of the individual, and all weeds are required to be removed by hand surrounding the individual. Herbicide use will be limited to direct application by hand to woody weeds.

4.4. Protection of Vegetation during Construction Phase

4.4.1. Signage and Fencing

Some demolishing and extensive earth works will take place in the study area adjacent to the southern boundary of the APZ zone and in the areas where the proposed Water Quality Pond will be placed within the APZ, so appropriate measures need to be undertaken to protect the remnant vegetation, particularly the canopy trees and other trees retained. During the entire construction phase, the trees and other vegetation to be retained will need to be protected with temporary fencing and signage to ensure unnecessary clearing does not occur. Prior to clearing being undertaken, the tree protection zone (TPZ) of trees will need to be delineated, particularly the area surrounding the TPZ of the large *Ficus obliqua* that constitutes the south eastern patch of MUSR. As this patch of MUSR is not subject to the 20m buffer, the clearing boundaries need to be clearly defined and any unnecessary clearing within the vicinity of this patch of MUSR avoided. 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 identified boundary.

The person responsible for the clearance activities will be responsible for ensuring that the boundary markers are installed to enable the suitable environmental and technical inspections of the proposed disturbance area to be undertaken.

Sediment control measures such as sediment fences will also be required to prevent run-off from construction activities such as soil, weed propagules and pollutants.

4.5. Re-vegetation of Subject Site

Re-vegetation within the subject site will include planting species specific to CGWF within most of the APZ and VRZ (Zones 2 and 3) where required to enhance the biodiversity value of this community within the subject site. The CGWF re-vegetation will need to comply with requirements of the BMP where it occurs in the APZ (Zone 3).

Re-vegetation of the MUSR will be undertaken where required in Zone 1 and after removal of weeds which is expected to occur in the weedy section located on the western portion of this vegetation community.

Re-vegetation in the APZ, VRZ and MUSR (Zones 1, 2 and 3) will be undertaken taking into account information presented in the following sub-sections.

4.5.1. Site Preparation

Site preparation activities should include:

- Initial control of weeds and competing grasses through appropriate herbicide application;
- Application of mulch to suppress weeds, or placement of square jute fibre mats, or a similar sturdy biodegradable material, in areas following initial weed control; and
- Watering to ensure ground is moist before planting (if not occurring after rainfall).

Jute matting or a similar sturdy, biodegradable material may be used to curtail erosion in the north-eastern part of the subject site to prevent off-site runoff migration towards the creek line.

4.5.2. Revegetation

Appropriate plant species for CGWF and MUSR within the subject site are provided in **Appendix B**, and are to be used for selection for re-vegetation of the subject site.

The objectives of the revegetation include the following:

- Increase winter flowering trees, such as Eucalypts for threatened bird species such as the flying mammal Grey-headed Flying-fox;
- Include marsupial food trees such as Eucalypts;

- Increase trees and groundcovers favoured by arboreal mammals such as flowering Eucalypts; and
- Include species that mature to become good hollow-bearing trees (such as Eucalypts) for hollow-dependent fauna such as parrots, owls, gliders and microchiropteran bats.

Plantings to be planted will be sourced from local provenance stock. These may come from seed collections or cuttings taken from within the existing remnant vegetation and from additional sources such as from the BRC.

Milton Rural Landcare Nursery located at 14 Deering Street, Ulladulla stock a range of local, endemic flora species for revegetation and regeneration purposes. https://landcare.nsw.gov.au/groups/milton-rural-landcare-inc/

4.5.3. Species Selection

It is recommended that a mix of local native trees, shrubs, and ground layer plants are replanted at the specified densities outlined below. Lists of suitable plant species for reconstruction areas are provided in **Appendix B**. All plants should be disease and pest-free, hardened off and well-watered at the time of planting. All plants are to be provided in a healthy condition. They must have good root development and a sturdy shoot system.

Final species selection will be based upon:

- Availability of seed material;
- Exclusion of plants likely to naturally regenerate on the site; and
- Previous experience with species re-vegetation performance.

4.5.4. Planting Densities

The recommended reconstruction planting specifications for MUSR are as follows:

- Upper Canopy Trees at a density of 1 unit / 10 m^2;
- Middle Canopy Trees at a density of 2 unit / 10 m^2;
- Shrubs at a density of 2 unit / 20 m^2;
- Vines at a density of 1 unit / 20 m^2; and
- Groundcovers at a density of 3-5 units / 10 m^2 planted in clumps/thickets.

The recommended planting specifications for CGWF within Vegetation Management Zone 2 are as follows:

- Upper Canopy Trees at a density of 3 unit / 10 m^2;
- Middle Canopy Trees at a density of 3 unit / 10 m^2;
- Shrubs at a density of 2 unit / 20 m^2;
- Vines at a density of 2 unit / 30m^2; and

- Groundcovers at a density of 3-5 units / 10 m^2 planted in clumps/thickets.

The above listed densities are those recommended for naturally occurring CGWF vegetation. Those densities will be reduced if required to meet the bushfire requirements as per the BMP in Zone 3. Therefore, the BMP will need to be made available for the BRC to properly manage vegetation in this zone.

CGWF planting will only be required in Management Zone 4 to fill gaps created by weed removal.

4.5.5. Characteristic Planting Units

It is advised that species should be planted in characteristic planting units to correspond with the topology, aspect, soil type and proximity to water.

Grasses may be planted in clumps of 3+ (spaced 15–20 cm apart within clumps) to generate physical / structural support for each other and microclimates. Wind pollinated grasses such as *Oplismenus imbecillis* (Creeping Beard Grass) may be particularly planted in clumps to aid fertilisation and to create a natural grassland understorey within the restoration areas.

4.5.6. Maintenance of Plantings

Plants should be protected by a plastic tree guard around them (with the exception of the larger native shrubs). This will protect them from herbicide drift during spraying.

Tree guards should remain installed around remnant, native herbaceous plants until such time as they mature and set seed. This will prevent predation by exotic herbivorous animal species such as rabbits before they contribute seed to the soil seed bank, and protect them from herbicide drift during maintenance site visits by the bushland contractor.

Maintenance of planted areas will include weeding, watering, replacing dead plantings and repairing / replacing weed mat if needed during the planting establishment period, as a part of an ongoing maintenance programme.

4.5.7. Long-term Protection of MUSR and *Rhodamnia rubescens*

Appropriate measures will need to be implemented in order to protect the MUSR vegetation managed in Zone 1 under the VMP in the long term. The MUSR vegetation has the potential to increase its ecological value over time and form a linkage to adjacent remnant MUSR or other native vegetation, such as CGWF vegetation communities located in the locality. It is recommended that the most suitable control measures are constructed, including fencing (such as chain link or PVC fencing or similar for aesthetic reasons, as it will be located in the backyards of several properties).

Signage will be put in place with text such as "Environmentally Sensitive Area – Please notify the Bushland Regeneration Contractor [*insert full name and contact number*] before undertaking any works in this site. This area comprises regenerating MUSR".

Signage will be put in place at access points to the Threatened Species Retention Zone with text such as 'Environmentally Sensitive Area – Please notify the Bushland Regeneration Contractor [*insert full name and*

contact number] before undertaking any works in this site. This area contains an occurrence of the critically endangered *Rhodamnia rubescens* (Scrub Turpentine)'.

5. Weed Management

5.1. Introduction

A large portion of the APZ and VRZ (Zones 2 and 3) have been heavily disturbed by weeds. Outside of the MUSR, most of the subject site consists of primarily heavily disturbed exotic grasslands and disturbed 'Native Regrowth and Exotic Weeds', including some priority weeds such as *Lantana camara* and *Asparagus aethiopicus*. A full list of priority weeds and WoNS identified within the subject site is presented in **Table 1**. The Threatened Species Retention Zone contains only sporadic occurrences of weeds.

This chapter outlines the measures that will be implemented to manage weeds within the subject site.

Weed control methods for all exotic and non-endemic species recorded on the site are located in **Appendix C**. This list includes additional species not recorded on the site that are common, exotic weed species in the Shoalhaven Region. Exotic species recorded in the subject site can be located in **Appendix A**.

5.2. Pre-construction Phase Weed Management and Hygiene

Initial weed management will be carried out over the subject site. The weeds of primary concern occurring on the site are WoNS and priority weeds listed in the South East Regional Strategic Weed Management Plan (NSW Local Land Services 2017), these are identified in **Table 1**.

As exotic groundcover vegetation clearance will occur across the study area during the construction phase, there are risks of erosion and spread of weed propagules if appropriate mitigation measures are not implemented. Sediment fencing should be installed along the entire boundary of the subject site (as far as practicable).

Any weed materials will be carefully removed off site in a manner appropriate to the species or at the direction of the ecologist and the Shoalhaven Council's weed management guidelines (https://www.shoalhaven.nsw.gov.au/Environment/Weed-management/Weeds-environmental) so as to prevent the spread of propagules to areas of native vegetation, both on and off site.

Machinery and tools involved in weed management will also be washed down prior to entry to the site and following activities on site to prevent new weed infestations on site and on-site weeds from spreading to offsite areas. After construction is complete, a final inspection will be undertaken by the ecologist to check that weeds have been successfully contained.

5.3. Phytophthora cinnamomi Protocol

As per the Botanic Gardens Trust (2008) "Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area", a precautionary approach should be implemented by following the hygiene protocol for working in bushland:

- Provide hygiene protocols and induction to all new workers, contractors and volunteers;
- Assume the area you are entering is free of *P. cinnamomi* unless otherwise tested and understand that your activities have the potential to introduce *P. cinnamomi*;

- To avoid introducing infection, before entering uninfected sites remove excess soil and mud and then spray boots, tools, gloves and small equipment with recommended disinfectant until runoff is clear;
- To avoid spreading P. *cinnamomi*, when leaving infested sites remove excess soil and mud and then spray boots, tools, gloves and small equipment with methylated spirits or disinfectant until runoff is clear;
- Plan works so they begin in non-infested sites and then move on to infested areas;
- Use coloured tape to label tools when working in infested sites. Remove tape once tools have been cleaned;
- Do not work on a site if the soil is saturated and mud is likely to adhere to footwear and tools;
- Avoid unnecessary soil disturbance;
- Do not import plants unless they are from nurseries accredited with Nursery Industry Accreditation Scheme (NIASA);
- On infested revegetation sites, plant species known to be resistant to *P. cinnamomi*;
- Use mulch sourced from disease free native trees and taken from at least one meter above ground level;
- Never import soil or gravel unless it is certified to be free of *P. cinnamomi* by plant disease diagnostic laboratory;
- All materials removed from a site must be bagged and taken to landfill;
- Do not drive or park vehicles or trailers off established tracks;
- Use vehicle wash down stations when available;
- Ensure effluent from wash down stations does not drain into bushland; and
- Restrict access in high value areas, particularly if autonomous spread is unlikely to occur.

The recommended disinfectant products include:

- Non corrosive disinfectants include Coolacide®, Phytoclean® or Biogram® for cleaning footwear, tools, tyres, machinery and other items in contact with soil;
- 70% Methylated spirits in spray bottle for personal use; and
- Sodium Hypochlorite 1% is very effective but can damage clothing and degrades rapidly in light.

The recommended hygiene equipment includes:

- Spray bottles;
- Measuring cylinder;
- Portable wash-down unit;

- Large tubs for dipping footwear and tools;
- Scraper or course brush to remove mud;
- Consider construction of footwear washing stations in 'at risk' ecological areas; and
- Consider construction of vehicle wash down stations just inside infested areas to protect nearby un-infested 'at risk' ecological areas.

5.4. Sediment Fencing

Runoff of surface soil after initial weed management works may occur. Therefore, temporary silt sediment fencing will need to be installed around the subject site to prevent soil runoff into the creek line, especially after heavy rainfall events. Fencing should remain during construction activities in the study area to help prevent weed seed and soil run off.

Note that any sediment fencing requires a 15 m setback from the top of the creek line bank.

5.5. Priority Weeds

The first priority for weed treatment in the subject site will targeting mature individuals of the priority weed species recorded on the site. These species are perennial and take several years to reach reproductive maturity so can be controlled providing juveniles are continuously eradicated before reaching maturity.

Management of priority weeds shall follow the 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.

5.6. Initial Weed Treatment

Following control of mature individuals of priority weed species, primary weeding should be undertaken throughout the subject site. The aims of primary weeding will be:

- Eliminating any woody weed species; and
- Targeting and eliminating any large, dominant infestations of exotic herbs and grasses. Prior to chemical treatment any seed on mature exotic plants will be bagged to prevent seed fall and addition to the soil seed bank.

This is achievable by undertaking primary weeding which may involve techniques such as:

- Manual Weed Removal, including:
    - Manual removal, or hand weeding, is an effective form of weed control when all viable parts of the plant are removed from the soil (roots, fruiting material and rhizomes) where practical. All weeds removed by hand will be handled according to best practice bush regeneration techniques to prevent seed spread from the removed weeds.

- The BRC can manually clear small plants with mattocks, brushcutters or other suitable equipment. The root structures of exotic shrubs can be retained in order to stabilise the soil if required, and if the plant has been killed with herbicide to avoid re-sprouting.
- 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.

- Weed removal using herbicides:
  - While the recommended methods for weed treatment detailed in **Appendix C** are effective, some will require a permit application. The relevant permit number is PER9907, and PER11916. Herbicide permits need to be obtained from the Federal Government body, the Australian Pesticides and Veterinary Management Authority.
  - The selective use of spraying of weeds, with selective and non-selective 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. Glyphosate 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 vegetation in the long-term following application.
  - Cutting/scraping and painting deep rooted woody weeds and climbers with hand tools, chainsaws and brush cutters and painting cut stumps with herbicides containing Glyphosate or Picloram;
  - Avoiding planting within 10 days of herbicide application;
  - The VMP also applies to the creek within the MUSR vegetation area and within this area weed control must aim to minimise the use of herbicides to limit impact to aquatic life and amphibians. If herbicides are considered necessary to be used in the creek area, 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 potential means for herbicide residue to enter watercourses, chemical treatment should be avoided prior to or directly after rain; and
  - Herbicide spraying shall not be undertaken within 10 m of either *Rhodamnia rubescens* individual within the subject site Herbicide use in these area will be limited to direct application by hand to woody weed species.

- Primary weeding in the areas supporting remnant native vegetation can be implemented over the course of the initial project period, whereas primary weeding in areas proposed for planting can be implemented just before plantings are undertaken.

5.7. Laying of Weed Suppression Materials

Several days after the second application of herbicide across the subject site, weed suppression materials can be installed in areas of the subject site as required (may only be needed in the ephemeral drainage channel in

the east of the subject site). This will inhibit germination rates of exotic weed seed in the soil, inhibit vegetative regrowth of resilient exotic weed species, and prevent soil runoff of surface soils during rain in the period until native plantings have become established sufficiently to prevent erosion. Weed suppression material can be a form of biodegradable matting such as jute matting.

Jute matting is a commonly used biodegradable form of matting for bushland regeneration works. The heavier available forms of this product suppress weed growth. Holes would be cut in the matting if used, to allow it to be placed around remnant native plant individuals occurring on the site. Holes would also need to be cut to plant tubestock.

Jute matting, or any other form of weed suppressing layer across the ground will inhibit regrowth of weeds, it will also inhibit regrowth of native plants from seed. For this reason, weed suppression matting should only be used initially to establish revegetation in the subject site while intensive weed control is needed, and be allowed to biodegrade over time without being reapplied, unless required during the establishment period. Following application of weed suppression materials the subject site will be planted out where required with native plants as per **Chapter 4**.

5.8. Maintenance Weeding

Follow-up weeding should be undertaken in areas of the subject site that have received past primary weeding treatments in the following months, to treat any regrowth of weeds where initial treatment was not fully effective.

Follow-up weeding involves the selective 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. Maintenance weeding is likely to be required at least every month until weeds are at negligible levels. Site visits may be more frequent if 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 a minimum period of five years, after primary weeding and erosion control and revegetation works have been completed. After the five-year follow-up and maintenance period has been completed, a review should be conducted to determine if further weed control and maintenance is required.

Tree guards should remain around native plants that have been planted for 6 months (see **Chapter 4**). Tree guards protect plants from grazing by exotic herbivores, such as rabbits which can devastate revegetation areas soon after planting. Tree guards will also allow herbicide to be used for control of weeds in areas with native plantings, without damage to them occurring by herbicide drift.

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

- Work during each site visit should focus first on controlling weeds in the areas of the site with the most intact native vegetation;

- During each site visit the bushland regeneration team visiting the site should aim to sweep through the entire site. During this sweep weeds occurring within tree guards alongside planted native plants should be removed by hand, along with weeds occurring within dense patches of dominant native plants; and
- A member or members of the team should then sweep the entire site spraying all weeds in open areas with herbicide using a knapsack sprayer.

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 *Briza maxima* are 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 of exotic species it is important that individuals are not allowed setting seed. Mature weed individuals with seed present need to be bagged and removed.

During site visits for weed control, priority weeds and WoNS should be prioritised for control. Individual plants should not be allowed to reproduce (i.e. ensure they are controlled before flowering and seed set).

6. Schedule of Works

The measures that are planned over the five-year time period are listed below and summarised in **Table 2**.

6.1. Short Term: Year 1 and 2

- Fencing;
- Weed control and stabilisation;
- Planting of canopy species;
- Planting of canopy, shrub, and groundcover species; and
- Replacement of any tubestock individuals that have died between site visits.

6.2. Long Term: Year 3, 4 and 5

- On-going weed control in accordance with the Shoalhaven Council weed management practices;
- Replacement of any tubestock individuals that have died between site visits; and
- Management in accordance with Shoalhaven Council policy.

Table 2 - Schedule of Works Program

Management Zone	Action	Responsibility	Performance Criteria	Timing
Short Term: Years 1 and 2				
Phase 1 - Site Preparation				
Zone 1, 2, 3 and 4	Delineation of clearing boundary and fencing	Property Owner or Subcontractor	Marking using GPS and high visibility flagging tape and boundary markers	Before construction works commence
Zone 1, 2, and 4	Establish fixed monitoring points	Bush Regeneration Contractor or Ecologist	Using star pickets (or something smaller like a small stake and pink flagging) and GPS to establish a series of monitoring sites that can be used for photograph comparison (i.e. Photo Reference Points), measuring weed and plant retention.	Prior to commencement of MUSR, Threatened Species Retention Zone, and VRZ restoration and weeding works.
Zone 3	Clearance of canopy and small trees to meet the requirements of the BMP	Contractor	Removal of exotic vegetation	TBC
Development area (mainly outside the subject site, except for boundary to APZ)	Salvage Habitat Features	Contractor	Planted trees to be removed will be salvaged and stockpiled for future use in revegetation areas.	1-2 weeks after tree removal
Phase 2 - Re-vegetation Works Commence				
Zone 1, 2, and 4	Fixed monitoring points	Bush Regenerator Contractor	Photographs of fixed monitoring sites before initial weeding.	Prior to commencement of restoration works for each zone.

Management Zone	Action	Responsibility	Performance Criteria	Timing
Zone 1 to 4	Carry out primary weeding, soil stabilization and watering.	Bush Regenerator Contractor	Main weed areas and priority weeds and WONS removed - Reproductively mature plants absent from site. Stabilise soil and watering where required.	First two months of restoration works for each Zone.
Zone 1, 2, and 4	Fixed monitoring points	Bush Regenerator Contractor	Photographs of fixed monitoring points prior to weeding each month.	Once a month for duration of VMP restoration works.
Zone 1, 2, and 4	Re-vegetation Canopy (if required), small tree, and ground cover CGWF (Zone 2) and MUSR (Zone 1). Zone 2 will require plantings to be undertaken in groundcover and shrub layer to provide linkability to MUSR in Zone 1.	Bush Regenerator Contractor	Native plants have been planted (species from Appendix B) in all vegetation strata.	Immediately upon establishment of reconstruction areas.
Zone 1, 2, and 4	Fixed monitoring points	Bush Regenerator Contractor	Photographs of fixed monitoring points to compare the survival and retention of plantings.	Every 3 months after the first year of plantings. Every 6 months following the initial year for the life of the VMP.
Zone 1 to 4	Carry out secondary weeding.	Bush Regenerator Contractor	Weed regrowth following primary weeding removed. Work has commenced on control of annual weed species.	Following primary weeding, site visits monthly.
Long Term: Years 3 to 5				

Management Zone	Action	Responsibility	Performance Criteria	Timing
Phase 3 - Maintenance				
Zone 1 to 4	Carry out maintenance weeding throughout vegetation zones.	Bush Regenerator Contractor	Existing weed growth minimised or controlled. Regrowth following secondary weeding controlled. No new weed species or infestations.	Monthly for each zone for duration of 5-year maintenance period under VMP.
Zone 1 to 4	Maintenance of plantings.	Bush Regenerator Contractor	Any dead plantings replaced. Plants watered when drought stressed. Additional plantings where required due to observed gaps in any strata.	Monthly for each zone for duration of 5-year maintenance period under VMP.

7. Monitoring and Reporting

A project manager/supervisor with the BRC should be assigned to coordinate, supervise and manage all works and correspondence with respect to the revegetation of MUSR and re-vegetation of CGWF in the VRZ, Threatened Species Retention Zone, and APZ within the subject site. The project manager must be available for the duration of the project and become familiar with the site and progress of all aspects of works undertaken.

The project manager will be responsible for allocation of maintenance tasks to personnel in response to establishment issues and other factors as monitoring results are reported (e.g.: plant losses/re-planting, weed control, irrigation).

7.1. Monitoring and Reporting Program

7.1.1. Monitoring Program

The following activities are to be conducted as part of the monitoring program:

Establish a series of fixed monitoring points in the subject site. Two monitoring points should be established as a minimum in each management zone, but additional points can be established if required. A photograph will be taken prior to commencement of the restoration works in the selected direction at each photo reference point to establish a baseline visual assessment of the site. A photograph should also be taken from each monitoring point during each six-monthly monitoring survey to visually document the progression of the restoration works;

- Take photographs annually from each monitoring point. Compare photographs to previous years;
- Use the photograph point to form a corner of a 20 m x 20 m quadrat at each monitoring point. Note any weeds occurring in the quadrat and state relative abundance of weed species (using Braun-Blanquet scale), as well as projective foliage cover of native species in each strata. Record numbers of failed plantings in each quadrat;
- Note any other weed outbreaks in the subject site. This can be done while walking between monitoring points;
- Note survival percentage of any planting undertaken;
- Note areas where erosion control is inadequate and needed; and
- Note areas where natural regeneration of native species is not occurring, and additional planting is needed.

Monitoring will be conducted before weed control commences, then once every month while revegetation works are undertaken. Once initial plantings are complete, monitoring will be conducted every three months during the following year, then every six months after that for the life of the VMP.

During the period of six-monthly monitoring, if maintenance weeding is conducted, each area where weed control has occurred should be checked approximately a month afterwards in order to determine whether further weeding is required.

7.1.2. Reporting Program

Based on the results of six-monthly monitoring inspections a brief report will be prepared documenting the progress of revegetation works against the performance criteria outlined in **Table 2**. A report should be submitted every six months for the life of the VMP. This report will be forwarded to the Shoalhaven Council and will provide a record of the implementation of the VMP. The report will:

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

The report should contain the photographs from each photo reference point, as well as a description of weed abundance locations and a comparison of the photographs to the previous six-monthly monitoring periods. The report should also recommend and prioritise areas where weed control should be targeted.

A final report should be prepared at the end of the five-year period documenting the success of the works against performance criteria described in **Table 3** and make recommendations for future management and/or implementation of an ongoing VMP if key performance criteria have not been successfully met.

Table 3 - Monitoring and Reporting Program

Management Zone	Action	Responsibility	Performance Criteria	Timing
Zone 1 to 4	Biannual inspection of site.	Bushland Management or Ecologist.	Site inspection completed as outlined in Chapter 8.	Every 6 months for 5-year maintenance period of VMP.
Zone 1 to 4	Progress report preparation.	Bushland Management or Ecologist.	Annual Report prepared on progress of restoration works.	Once a year for the 5-year maintenance period of VMP.
Zone 1 to 4	Final inspection of Site.	Bushland Management or Ecologist.	Final Inspection carried out at completion of VMP.	After 5 years of maintenance under VMP.
Zone 1 to 4	Final Report.	Bushland Management or Ecologist.	Final Report detailing success of restoration or outlining further works needed.	After 5 years of maintenance under VMP.

8. References

mberland Ecology. 2017. Flora and Fauna Assessment for Milton Meadows - Ulladulla, Epping.

Cumberland Ecology. 2018. Flora and Fauna Assessment for Milton Meadows - Ulladulla, Epping, NSW.

Cumberland Ecology. 2019. Flora and Fauna Assessment for Milton Meadows - Ulladulla, Epping, NSW.

DPI. 2017. Fact Sheet: Weed Management Legislation is Changing.*in* D. o. P. Industries, editor.

NSW Local Land Services. 2017. South East Regional Strategic Weed Management Plan 2017-2022.

NSW Scientific Committee. 2019. Final Determination - Critically Endangered Species - *Rhodamnia rubescens*.

OEH. 2019. Scrub Turpentine - profile.

Tozer, M. G., K. Turner, D. A. Keith, D. Tindall, C. Pennay, C. Simpson, B. MacKenzie, P. Beukers, and S. Cox. 2010. Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Cunninghamia **11**:359-406.

APPENDIX A :
Flora Species Data

Table 4 – Planting Species List – Subtropical Complex Rainforest (Milton Ulladulla Subtropical Rainforest EEC)

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Trees																			
Altingiaceae	*	*Liquidambar styraciflua*	Sweetgum														1		1
Cunoniaceae		*Ceratopetalum apetalum*	Coachwood					30	4										
Cupressaceae	*	*Cypress sp.*	Cypress													1			1
Fabaceae (Faboideae)	*	*Erythrina x sykesii*	Coral Tree															1	1
Fabaceae (Mimosoideae)		*Acacia mabellae*	Mabel's Wattle														1		1
Fabaceae (Mimosoideae)		*Acacia maidenii*	Maiden's Wattle			3	1	3	1							1	1		1
Fabaceae (Mimosoideae)		*Acacia mearnsii*	Black Wattle							35	10					1	1		1
Monimiaceae		*Doryphora sassafras*	Sassafras					5	2										1
Moraceae		*Ficus obliqua*	Small-leaved Fig			30	1											1	1
Myrtaceae		*Acmena smithii*	Lilly Pilly					15	3										
Myrtaceae		*Eucalyptus botryoides*	Bangalay															1	1
Myrtaceae		*Eucalyptus pilularis*	Blackbutt	40	3													1	

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Myrtaceae		*Eucalyptus piperita*	Sydney Peppermint															1	
Myrtaceae		*Syncarpia glomulifera*	Turpentine													1	1	1	1
Pittosporaceae		*Pittosporum undulatum*	Sweet Pittosporum					20	2									1	1
Rhamnaceae		*Alphitonia excelsa*	Red Ash			10	3	10	3							1			
Salicaceae	*	*Populus alba*	White Poplar											1	1		1		
Ulmaceae	*	*Ulmus parviflora*	Chinese Elm													1	1		
Sub-canopy																			
Altingiaceae	*	*Liquidambar styraciflua*	Sweetgum														1		
Anacardiaceae	*	*Harpephyllum caffrum*	Kaffir Plum														1		
Fabaceae (Mimosoideae)		*Acacia longifolia*	Sydney Golden Wattle															1	
Fabaceae (Mimosoideae)		*Acacia mabellae*	Mabel's Wattle														1	1	
Fabaceae (Mimosoideae)		*Acacia maidenii*	Maiden's Wattle	7	5	5	2			5	2								1
Fabaceae (Mimosoideae)		*Acacia mearnsii*	Black Wattle							5	5					1		1	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Malvaceae		*Brachychiton acerifolius*	Flame Tree											<1	1		1		
Meliaceae		*Melia azedarach*	White Cedar													1			1
Monimiaceae		*Doryphora sassafras*	Sassafras					10	4										1
Myrtaceae		*Acmena smithii*	Lilly Pilly			10	2	10	5									1	1
Myrtaceae		*Callistemon viminalis*	Bottlebrush														1		
Myrtaceae	*	*Corymbia citriodora*	Lemon-scented Gum														1		
Myrtaceae		*Eucalyptus botryoides*	Bangalay													1			1
Myrtaceae		*Eucalyptus pilularis*	Blackbutt	5	3														1
Myrtaceae		*Rhodamnia rubescens*	Scrub Turpentine															1	
Myrtaceae		*Syncarpia glomulifera*	Turpentine	15	2			3	1										1
Oleaceae	*	*Ligustrum sinense*	Small-leaved Privet					5	3									1	1
Pittosporaceae		*Pittosporum multiflorum*	Orange Thorn														1		
Pittosporaceae		*Pittosporum undulatum*	Sweet Pittosporum			15	3	10	3					10	4		1		1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Proteaceae		*Hakea salicifolia*	Willow Hakea (planted)														1		
Rhamnaceae		*Alphitonia excelsa*	Red Ash	5	4	10	5										1	1	1
Solanaceae		*Solanum aviculare*	Kangaroo Apple															1	
Solanaceae		*Solanum mauritianum*	Wild Tobacco Bush														1	1	
Ulmaceae	*	*Ulmus glabra*	Scotch Elm														1		
Shrubs																			
Altingiaceae	*	*Liquidambar styraciflua*	Sweetgum														1		
Asteraceae		*Olearia viscidula*	Sticky Daisy Bush																1
Arecaceae		*Livistona australis*	Cabbage-tree Palm			2	5												1
Asteraceae		*Cassinia longifolia*	Shiny Cassinia															1	1
Bignoniaceae	*	*Tecoma capensis*	Cape Honeysuckle														1	1	
Cunoniaceae		*Ceratopetalum apetalum*	Coachwood					4	6										
Fabaceae (Caesalpinioideae)		*Senna pendula*																	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Fabaceae (Caesalpinioideae)	*	*Senna septemtrionalis*	Arsenic Bush					<1	2									1	1
Fabaceae (Faboideae)		*Indigofera australis*	Austral Indigo																1
Fabaceae (Mimosoideae)		*Acacia maidenii*	Maiden's Wattle	10	20					1	5							1	
Lamiaceae		*Clerodendrum tomentosum*	Hairy Clerodendrum	1	2	3	10												1
Malvaceae		*Brachychiton acerifolius*	Flame Tree	1	2	1	2												1
Malvaceae		*Brachychiton populneus*	Kurrajong															1	
Malvaceae		*Howittia trilocularis*	-															1	
Meliaceae		*Synoum glandulosum*	Scentless Rosewood	1	3	<1	2												1
Monimiaceae		*Doryphora sassafras*	Sassafras					10	20										1
Moraceae		*Ficus coronata*	Sandpaper Fig															1	1
Moraceae		*Streblus brunonianus*	Whalebone Tree			1	4												1
Myrsinaceae		*Myrsine howittiana*	Brush Muttonwood	4	10	5	20												1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Myrtaceae		*Acmena smithii*	Lilly Pilly			20	50	3	4										1
Ochnaceae		*Ochna serrulata*	Mickey Mouse Plant			<1	5												1
Oleaceae	*	*Ligustrum lucidum*	Broad-leaved Privet															1	
Oleaceae	*	*Ligustrum sinense*	Small-leaved Privet	1	2			3	5								1		1
Oleaceae		*Notelaea longifolia*	Large Mock Olive	5	20	5	20											1	1
Pennantiaceae		*Pennantia cunninghamii*	Brown Beech			<1	1												1
Phyllanthaceae		*Breynia oblongifolia*	Coffee Bush	15	50	<1	2											1	1
Pittosporaceae		*Bursaria spinosa*	Blackthorn															1	
Pittosporaceae		*Pittosporum multiflorum*	Orange Thorn			1	5	1	5									1	1
Pittosporaceae		*Pittosporum revolutum*	Wild Yellow Jasmine	4	1														1
Pittosporaceae		*Pittosporum undulatum*	Sweet Pittosporum	15	20	5	10			5	20			<1	3		1		1
Proteaceae		*Hakea salicifolia*	Willow Hakea (planted)											1	5		1		1
Rhamnaceae		*Alphitonia excelsa*	Red Ash	2	5					<1	1						1		1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Rubiaceae		*Opercularia aspera*	Common Stinkweed															1	
Rutaceae		*Acronychia oblongifolia*	White Aspen			1	3												1
Salicaceae	*	*Populus alba*	White Poplar											<1	4		1		
Santalaceae		*Santalum obtusifolium*	Sandalwood															1	1
Solanaceae		*Solanum mauritianum*	Wild Tobacco Bush					<1	1	1	3			<1	1	1	1		1
Verbenaceae	*	*Lantana camara*	Lantana	1	1														1
Violaceae		*Melicytus dentatus*		1	10	5	20			3	20							1	1
Fens and Allies																			
Blechnaceae		*Blechnum cartilagineum*	Gristle Fern															1	1
Blechnaceae		*Doodia aspera*	Prickly Rasp Fern					10	1000									1	1
Cyatheaceae		*Cyathea australis*	Black Tree-fern					1	3									1	1
Dennstaedtiaceae		*Pteridium esculentum*	Common Bracken	5	20-50					5	100	2	20				1	1	1
Dicksoniaceae		*Calochlaena dubia*	Rainbow Fern	1	5	1	5	<1	2										
Polypodiaceae		*Microsorum scandens*	Fragrant Fern					1	100									1	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Pteridaceae		*Adiantum formosum*	Black Stem Maidenhair					1	10										1
Pteridaceae		*Adiantum hispidulum*	Rough Maidenhair Fern					1	20										1
Pteridaceae		*Pellaea falcata*	Sickle Fern	15	500	2	100												1
Pteridaceae		*Pteris umbrosa*																1	1
Herbs (Dicots)																			
Acanthaceae		*Pseuderanthemum variable*	Pastel Flower			1	100	1	200							1		1	1
Apiaceae		*Centella asiatica*	Indian Pennywort							<1	100	<1	50						1
Apiaceae		*Hydrocotyle laxiflora*	Sinking Pennywort	<1	3														1
Asteraceae	*	*Cirsium vulgare*	Nodding Thistle											<1	1		1	1	
Asteraceae	*	*Conyza sumatrensis*	Tall Fleabane							<1	5			<1	100		1	1	1
Asteraceae	*	*Hypochaeris radicata*	Catsear							<1	50	<1	50	<1	200	1	1	1	1
Asteraceae	*	*Senecio madagascariensis*	Fireweed							<1	5			<1	10		1		1
Asteraceae		*Sigesbeckia orientalis*		<1	1														1
Asteraceae	*	*Taraxacum officinale*	Dandelion									1	100					1	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Boraginaceae	*	*Echium plantagineum*	Patterson's Curse *															1	
Chenopodiaceae		*Einadia hastata*	Berry Saltbush			<1	5											1	1
Convolvulaceae		*Dichondra repens*	Kidney Weed	<1	100	<1	20			<1	100	<1	20				1	1	1
Fabaceae (Faboideae)	*	*Trifolium repens*	White Clover									<1	100	<1	20		1		1
Fabaceae (Faboideae)	*	*Vicia sativa*										<1	50						1
Geraniaceae		*Geranium solanderi*	Native Geranium	<1	2												1	1	1
Goodeniaceae		*Goodenia ovata*	Hop Goodenia															1	
Lobeliaceae		*Pratia purpurascens*	Whiteroot							<1	100					1		1	1
Lobeliaceae		*Viola hederacea*	Native Violet					<1	1									1	
Malvaceae	*	*Sida rhombifolia*	Paddy's Lucerne	1	100					<1	50						1	1	1
Myrsinaceae	*	*Anagallis arvensis*	Scarlet Pimpernel									<1	50						1
Oleaceae	*	*Ligustrum sinense*	Small-leaved Privet					1	200	<1	20							1	1
Oxalidaceae		*Oxalis perennans*								<1	1			<1	1		1		1
Oxalidaceae	*	*Oxalis purpurea*	Large-flower Wood Sorrel														1		
Plantaginaceae	*	*Plantago lanceolata*	Lamb's Tongues							<1	5	<1	50	1	100		1	1	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Plantaginaceae	*	*Veronica hederifolia*	Ivy-leaved Speedwell					<1	1										1
Polygonaceae	*	*Acetosa sagittata*	Sorrel														1		
Polygonaceae	*	*Rumex crispus*	Curled Dock															1	
Solanaceae	*	*Solanum album*	Potato Vine														1		
Verbenaceae	*	*Verbena bonariensis*	Purpletop															1	
Verbenaceae	*	*Verbena rigida*	Veined Verbena							<1	20	1	50	<1	20	1	1		1
Grasses																			
Poaceae	*	*Holcus lanatus*	Yorkshire Fog	<1	1					<1	20	<1	10					1	1
Poaceae		*Austrostipa sp.*	A spear grass															1	
Poaceae	*	*Axonopus fissifolius*	Common Carpetgrass											1	200		1		
Poaceae	*	*Briza maxima*	Quaking Grass															1	
Poaceae	*	*Bromus catharticus*	Prairie Grass															1	
Poaceae	*	*Cenchrus clandestinus*	Kikuyu Grass							<1	20	65	6000	80	7000	1	1	1	1
Poaceae	*	*Dactylis glomerata*	Cocksfoot							1	100	1	50	1	100		1	1	1
Poaceae		*Echinopogon caespitosus*	Tufted Hedgehog Grass																1
Poaceae		*Ehrharta erecta*	Panic Veldtgrass													1	1	1	1
Poaceae		*Entolasia marginata*	Bordered Panic	<1	20												1	1	

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Poaceae		*Entolasia stricta*	Wiry Panic															1	
Poaceae		*Imperata cylindrica*	Blady Grass															1	1
Poaceae		*Microlaena stipoides*	Weeping Grass	20	200	1	100			20	2000	5	500				1	1	1
Poaceae		*Oplismenus aemulus*	Australian Basket Grass	2	200			<1	20	<1	100						1	1	1
Poaceae		*Oplismenus imbecillis*	Creeping Beard Grass	1	100			5	500									1	
Poaceae	*	*Paspalum dilatatum*	Paspalum											2	200		1	1	1
Poaceae		*Poa* sp.	A tussock grass															1	
Poaceae	*	*Sporobolus* sp.	A Parramatta grass															1	
Poaceae	*	*Stenotaphrum secundatum*	Buffalo Grass							5	500	20	2000						1
Monocots (Other)																			
Araceae		*Gymnostachys anceps*	Settler's Twine			<1	3												1
Araceae		*Zantedeschia aethiopica*	Arum-lily																1
Asparagaceae	*	*Asparagus aethiopicus*	Asparagus 'Fern'			<1	1												1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Commelinaceae		*Aneilema acuminatum*						<1	20										1
Commelinaceae		*Commelina cyanea*		1	50													1	1
Commelinaceae	*	*Tradescantia fluminensis*	Wandering Jew					<1	20										1
Cyperaceae		*Carex longebrachiata*	Bergalia Tussock	5	200	20	1000	3	20	15	15000	<1	2				1	1	1
Cyperaceae		*Cyperus tetraphyllus*				<1	10												1
Cyperaceae		*Gahnia sieberiana*	Red-fruit Saw-sedge					1	4										1
Iridaceae	*	*Gladiolus undulatum*															1		
Iridaceae	*	*Watsonia meriana*	Bulbil Bugle-lily														1		
Juncaceae		*Juncus usitatus*		<1	10													1	1
Liliaceae	*	*Lilium formosanum*	Formosan Lily							<1	4								1
Lomandraceae		*Lomandra longifolia*	Spiny-headed Mat-rush													1		1	1
Phormiaceae		*Dianella caerulea* var. *caerulea*	Paroo Lily															1	
Phormiaceae		*Dianella caerulea* var. *producta*		<1	2														1
Climbers / Vines																			

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Aphanopetalaceae		*Aphanopetalum resinosum*	Gum Vine					2	20									1	1
Apocynaceae	*	*Araujia sericifera*	Moth Vine							<1	20					1	1		1
Apocynaceae		*Marsdenia rostrata*	Milk Vine	1	20	1	5	1	10	2	50								1
Apocynaceae		*Parsonsia straminea*	Monkey Rope	<1	1			1	3								1	1	1
Araliaceae	*	*Hedera helix*	English Ivy													1	1		
Bignoniaceae		*Pandorea pandorana*	Wonga-Wonga Vine	1	5	1	10	<1	10	<1	20						1	1	1
Caprifoliaceae	*	*Lonicera japonica*	Japanese Honeysuckle			<1	1			45	2000					1	1	1	1
Convolvulaceae	*	*Ipomoea cairica*	Cairo Morning Glory											4	100		1		
Convolvulaceae	*	*Ipomoea indica*	Blue Morning Glory														1		
Convolvulaceae	*	*Ipomoea purpurea*	Morning Glory															1	
Dilleniaceae		*Hibbertia scandens*	Climbing Guinea Flower	1	5	<1	2										1	1	1
Fabaceae (Faboideae)		*Desmodium gunnii*	Slender Tick Trefoil	<1	10														1
Fabaceae (Faboideae)		*Desmodium varians*	Variable Tick-trefoil									<1	3					1	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Fabaceae (Faboideae)		*Glycine clandestina*		<1	10					<1	10							1	1
Fabaceae (Faboideae)		*Glycine microphylla*	Small-leaf Glycine	1	100									<1	20		1	1	1
Fabaceae (Faboideae)		*Glycine tabacina*										<1	1	<1	5		1		1
Fabaceae (Faboideae)		*Hardenbergia violacea*	Twining Pea															1	
Fabaceae (Faboideae)	*	*Wisteria sinensis*	Wisteria														1		
Luzuriagaceae		*Eustrephus latifolius*	Wombat Berry	<1	3	<1	1	<1	1									1	1
Luzuriagaceae		*Geitonoplesium cymosum*	Scrambling Lily	1	20	<1	3											1	1
Menispermaceae		*Stephania japonica*	Snake Vine	2	20	1	4	<1	3									1	1
Oleaceae	*	*Jasminum polyanthum*	White Jasmine														1		
Passifloraceae		*Passiflora edulis*	Common Passionfruit					<1	2										1
Passifloraceae		*Passiflora herbertiana*	Native Passionfruit													1			1
Passifloraceae	*	*Passiflora* sp.																1	
Ranunculaceae		*Clematis aristata*	Old Man's Beard							<1	2							1	1

Family		Species	Common name	Q1		Q2		Q3		Q4		Q5		Q6		A	B	C	D
				C	A	C	A	C	A	C	A	C	A	C	A				
Rosaceae	*	*Rubus fruticosus* complex	Blackberry											2	20	1	1	1	
Rosaceae		*Rubus nebulosus*																	
Rosaceae		*Rubus parvifolius*	Native Raspberry	<1	10									<1	1		1	1	1
Rosaceae		*Rubus rosifolius*	Native Bramble														1	1	
Rubiaceae		*Morinda jasminoides*	Sweet Morinda	1	5	1	10	2	20									1	1
Smilacaceae		*Smilax australis*	Lawyer Vine																1
Vitaceae		*Cissus antarctica*	Kangaroo Vine														1		
Vitaceae		*Cissus hypoglauca*	Water Vine													1			

** Exotic / Non-endemic*

A = RMS1

B = RMS 2 (small lot)

C = Rainforest Extra/Additional in Cleared and Re-growth

D = BES identified presence

1 = Presence

APPENDIX B :
Species Planting List

Table 5 – Planting Species List – Subtropical Complex Rainforest (Milton Ulladulla Subtropical Rainforest EEC)

Family	Scientific Name	Common Name	Frequency	Recorded^
Fabaceae (Mimosoideae)	*Acacia maidenii*	Maiden's Wattle	***	
Myrtaceae	*Acmena smithii*	Lilly Pilly	***, #	Yes
Rutaceae	*Acronychia oblongifolia*	White Aspen	***	
Pteridaceae	*Adiantum flabellifolium*	-	#	
Pteridaceae	*Adiantum formosum*	Giant Maidenhair Fern	***	
Pteridaceae	*Adiantum hispidulum*	Rough Maidenhair Fern	***	
Sapindaceae	*Alectryon subcinereus*	Native Quince	***, #	
Aphanopetalaceae	*Aphanopetalum resinosum*	Gum Vine	#	Yes
Rhamnaceae	*Alphitonia excelsa*	Red Ash	***	
Commelinaceae	*Aneilema biflorum*	-	***	
Tectariaceae	*Arthropteris tenella*	-	***, #	
Aspleniaceae	*Asplenium australasicum* forma *australasicum*	Bird's Nest Fern	***	
Aspleniaceae	*Asplenium flabellifolium*	Necklace Fern	***	
Euphorbiaceae	*Baloghia inophylla*	Brush Bloodwood	***, #	
Blechnaceae	*Blechnum patersonii subs. patersonii*	Strap Water Fern	***	
Malvaceae	*Brachychiton acerifolius*	Flame Tree	***	
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	#	Yes
Celastraceae	*Cassine australis* var. *australis* (=syn. *Elaeodendron australe* var. *australe*)	Red Olive Plum	***	
Celastraceae	*Celastrus australis*	Staff Climber	***	

Family	Scientific Name	Common Name	Frequency	Recorded^
Araliaceae	*Cephalaralia cephalobotrys*	Climbing Panax	***	
Cunoniaceae	*Ceratopetalum apetalum*	Coachwood	***	
Lauraceae	*Cinnamomum oliveri*	Oliver's Sassafras		
Vitaceae	*Cissus antarctica*	Kangaroo Vine	#, ***	
Vitaceae	*Cissus hypoglauca*	Water Vine	#, ***	Yes
Cardiopteridaceae	*Citronella moorei*	Churnwood	***	
Euphorbiaceae	*Claoxylon australe*	Brittlewood	#, ***	
Lamiaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum	***	
Euphorbiaceae	*Croton verreauxii*	Green Native Cascarilla	***	
Lauraceae	*Cryptocarya glaucescens*	Jackwood	***	
Lauraceae	*Cryptocarya microneura*	Murrogun	***	
Urticaceae	*Dendrocnide excelsa*	Giant Stinging Tree	#	
Ebenaceae	*Diospyros australis*	Black Plum	#	
Ebenaceae	*Diospyros pentamera*	Myrtle Ebony	***	
Sapindaceae	*Diploglottis australis*	Native Tamarind	***	
Blechnaceae	*Doodia aspera*	Prickly Rasp Fern	#, ***	Yes
Monimiaceae	*Doryphora sassafras*	Sassafras	***	
Boraginaceae	*Ehretia acuminata* var. *acuminata*	Silky Ash	***	
Elaeocarpaceae	*Elaeocarpus kirtonii*	Silver Quandong	#, ***	
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	#, ***	Yes
Myrtaceae	*Eucalyptus quadrangulata*	White-topped Box	***	

Family	Scientific Name	Common Name	Frequency	Recorded^
Myrtaceae	*Eucalyptus botryoides*	Bangalay	*	
Myrtaceae	*Eucalyptus fastigata*	Brown Barrel	*	
Myrtaceae	*Eucalyptus pilularis*	Blackbutt	*	
Myrtaceae	*Eucalyptus saligna* X *botryoides*	Sydney Blue Gum X Bangalay	***	
Eupomatiaceae	*Eupomatia laurina*	Bolwarra	***	
Moraceae	*Ficus spp.*	-	#	Yes
Moraceae	*Ficus coronata*	Sandpaper Fig	***	
Moraceae	*Ficus macrophylla* subsp. *macrophylla*	Moreton Bay Fig	***	
Moraceae	*Ficus obliqua*	Small-leaved Fig	***	
Moraceae	*Ficus superba subsp. henneana*	Cedar Fig	#	
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	#, ***	Yes
Sapindaceae	*Guioa semiglauca*	Guioa	***	
Araceae	*Gymnostachys anceps*	Settler's Twine	#, ***	
Dryopteridaceae	*Lastreopsis acuminata*	Glossy Shield Fern	***	
Dryopteridaceae	*Lastreopsis decomposita*	Trim Shield-fern	***	
Dryopteridaceae	*Lastreopsis microsora* subsp. *microsora*	Creeping Shield Fern	***	
Menispermaceae	*Legnephora moorei*	Round-leaf Vine	#, ***	
Lauraceae	*Litsea reticulata*	Bolly Gum	#, ***	
Arecaceae	*Livistona australis*	Cabbage Fan Palm	***	
Moraceae	*Maclura cochinchinensis*	Cockspur Thorn	#, ***	
Moraceae	*Malaisia scandens (*syn. Trophis scandens *subsp.* scandens*)*	Burny Vine	#, ***	

Family	Scientific Name	Common Name	Frequency	Recorded^
Apocynaceae	*Marsdenia flavescens*	Hairy Milk Vine	***	
Apocynaceae	*Marsdenia rostrata*	Milk Vine	#, ***	Yes
Rutaceae	*Melicope micrococca*	Hairy-leaved Doughwood	***	
Apocynaceae	*Melodinus australis*	Southern Melodinus	***	
Polypodiaceae	*Microsorum scandens*	Fragrant Fern	***	
Rubiaceae	*Morinda jasminoides*	Sweet Morinda	***	
Oleaceae	*Notelaea venosa*	Veined Mock-olive	#, ***	
Poaceae	*Oplismenus imbecillis*	Creeping Beard Grass	#, ***	Yes
Monimiaceae	*Palmeria scandens*	Anchor Vine	***	
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine	#, ***	Yes
Apocynaceae	*Parsonsia straminea*	Common Silkpod	***	
Pteridaceae	*Pellaea falcata*	Sickle Fern	#, ***	Yes
Pennantiaceae	*Pennantia cunninghamii*	Brown Beech	***	
Piperaceae	*Piper novae-hollandiae* (=syn. *Piper hederaceum* var. *hederaceum*)	Giant Pepper Vine	***	
Pittosporaceae	*Pittosporum multiflorum*	Orange Thorn	***	
Pittosporaceae	*Pittosporum undulatum*	Native Daphne	#	Yes
Lamiaceae	*Plectranthus parviflorus*	Cockspur Flower	#	
Podocarpaceae	*Podocarpus elatus*	Plum Pine	***	
Commelinaceae	*Pollia crispata*	Pollia	#	
Escalloniaceae	*Polyosma cunninghamii*	Featherwood	***	
Sapotaceae	*Pouteria australis* (syn. *Planchonella australis*)	Black Apple	***	

Family	Scientific Name	Common Name	Frequency	Recorded^
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower	***	
Pteridaceae	*Pteris umbrosa*	Jungle Brake	***	
Polypodiaceae	*Pyrrosia rupestris*	Rock Felt Fern	***	
Primulaceae	*Rapanea howittiana* (syn. *Myrsine howittiana*)	Brush Muttonwood	***	
Menispermaceae	*Sarcopetalum harveyanum*	Pearl Vine	#, ***	
Cunoniaceae	*Schizomeria ovata*	Crabapple	***	
Smilacaceae	*Smilax australis*	Lawyer Vine	#, ***	Yes
Proteaceae	*Stenocarpus salignus*	Scrub Beefwood	***	
Menispermaceae	*Stephania japonica*	Snake Vine	#	Yes
Moraceae	*Streblus brunonianus*	Whalebone Tree	#, ***	
Symplocaceae	*Symplocos thwaitesii*	Buff Hazelwood	***	
Myrtaceae	*Syncarpia glomulifera* subsp. *glomulifera*	Turpentine		
Meliaceae	*Synoum glandulosum* subsp. *glandulosum*	Scentless Rosewood	***	
Myrtaceae	*Syzygium australe*	Brush Cherry	#, ***	
Meliaceae	*Toona australis* (syn. *Toona ciliata*)	Red Cedar	#, ***	
Monimiaceae	*Wilkiea huegeliana*	Veiny Wilkiea	***	

*Notes: ^recorded by Cumberland Ecology; # Characteristic as per Final Determination; Frequency: *** = Positive Diagnostic Species; ** = Constant; * = Less frequently;*

Table 6 – Planting Species List – Clyde Gully Wet Forest

Family	Scientific Name	Common Name	Frequency	Recorded#, ^
Fabaceae (Mimosoideae)	*Acacia mabellae* (syn. *Acacia mabellae*)	Mabel's Wattle	***	
Myrtaceae	*Acmena smithii*	Lilly Pilly	***	
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	*	
Myrtaceae	*Backhousia myrtifolia*	Grey Myrtle	***	
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern	***	Yes
Cunoniaceae	*Callicoma serratifolia*	Black Wattle	***	
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern	***	
Vitaceae	*Cissus hypoglauca*	Water Vine	***	^
Ranunculaceae	*Clematis aristata*	Old Man's Beard	***	Yes
Lamiaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum	***	^
Myrtaceae	*Corymbia gummifera*	Red Bloodwood	*	
Myrtaceae	*Corymbia maculata*	Spotted Gum	***	
Phormiaceae	*Dianella caerulea*	Blue Flax-lily	**	^
Blechnaceae	*Doodia aspera*	Prickly Rasp Fern	***	Yes
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash	***	
Poaceae	*Entolasia stricta*	Wiry Panic	**	^
Myrtaceae	*Eucalyptus agglomerata*	Blue-leaved Stringybark	*	
Myrtaceae	*Eucalyptus cypellocarpa*	Monkey Grey Gum	*	
Myrtaceae	*Eucalyptus elata*	River Peppermint	*	

Family	Scientific Name	Common Name	Frequency	Recorded#, ^
Myrtaceae	*Eucalyptus globoidea*	White Stringybark	*	
Myrtaceae	*Eucalyptus longifolia*	Woollybutt	*	
Myrtaceae	*Eucalyptus muelleriana*	Yellow Stringybark	*	
Myrtaceae	*Eucalyptus paniculata* subsp. *paniculata*	Grey Ironbark	***	
Myrtaceae	*Eucalyptus pilularis*	Blackbutt	***	^
Myrtaceae	*Eucalyptus piperita*	Sydney Peppermint	***	^
Myrtaceae	*Eucalyptus quadrangulata*	White-topped Box	*	
Myrtaceae	*Eucalyptus saligna* X *botryoides*	Sydney Blue Gum X Bangalay	*	
Myrtaceae	*Eucalyptus scias* subsp. *callimastha*	-	*	
Myrtaceae	*Eucalyptus sclerophylla*	Hard-leaved Scribbly Gum	*	
Eupomatiaceae	*Eupomatia laurina*	Bolwarra	***	
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	***	Yes
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	***	^
Cyperaceae	*Gahnia melanocarpa*	Black-fruit Saw-sedge	***	
Dilleniaceae	*Hibbertia dentata*	Trailing Guinea Flower	***	
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower	***	^
Cyperaceae	*Lepidosperma urophorum*	-	***	
Arecaceae	*Livistona australis*	Cabbage Fan Palm	***	^
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	**	^
Ericaceae (Epacridoideae)	*Leucopogon lanceolatus* var. *lanceolatus*	-	**	

Family	Scientific Name	Common Name	Frequency	Recorded#, ^
Apocynaceae	*Marsdenia rostrata*	Milk Vine	***	Yes
Rubiaceae	*Morinda jasminoides*	Sweet Morinda	***	Yes
Oleaceae	*Notelaea longifolia* forma *longifolia*	-	***	^
Oleaceae	*Notelaea venosa*	Veined Mock-olive	***	
Poaceae	*Oplismenus imbecillis*	Creeping Beard Grass	***	Yes
Bignoniaceae	*Pandora pandorana*	Wonga Wonga Vine	***	Yes
Apocynaceae	*Parsonsia straminea*	Common Silkpod	***	Yes
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung	**	
Pittosporaceae	*Pittosporum revolutum*	Wild Yellow Jasmine	***	^
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower	***	Yes
Rubiaceae	*Psychotria loniceroides*	Hairy Psychotria	***	
Dennstaedtiaceae	*Pteridium esculentum*	Common Bracken	**	Yes
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	***	^
Uvulariaceae	*Schelhammera undulata*	-	***	
Smilacaceae	*Smilax australis*	Lawyer Vine	***	Yes
Gleicheniaceae	*Sticherus flabellatus* var. *flabellatus*	Umbrella Fern	***	
Myrtaceae	*Syncarpia glomulifera* subsp. *glomulifera*	Turpentine	***	Yes
Meliaceae	*Synoum glandulosum* subsp. *glandulosum*	Scentless Rosewood	***	^
Myrtaceae	*Tristaniopsis collina*	Mountain Water Gum	***	
Apocynaceae	*Tylophora barbata*	Bearded Tylophora	***	

*Notes: Frequency: *** = Positive Diagnostic Species; ** = Constant; * = Less frequently: Recorded: # - recorded by Cumberland Ecology; ^ = recorded in the Study Area but outside the subject site*

APPENDIX C :
Weed Control Methods

C.1. Weed Control Methods

Bush regeneration weed control will be implemented for weed management areas shown in **Figure 6**.

Regeneration works should be approached using the strategies outlined below. A list of control methods for specific weed species recorded within the subject site is provided in **Table 7**.

C.2. 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.

C.3. 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. Glyphosate 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 two metres of drainage lines. 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 rains.

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 7** 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.

Table 7 - Weed Control Methods

Family	Species Name	Common Name	Category	Treatment Methods
Asparagaceae	*Asparagus aethiopicus*	Ground Asparagus	State Priority Weed, Other weed subject to local management programs, WoNS	Manual control by crowning and spot spraying. Removal of reproductive parts (flowers, fruits) is required to minimize spreading. - 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
Verbenaceae	*Lantana camara*	Lantana	State Priority Weed, Regional Priority Weed, WoNS	- Hand weed juveniles and regrowth from small pieces - Spot spray with glyphosate 10mL/1L - Slash using brushcutters, or hand cut with loppers, and spray regrowth foliage with glyphosate 10mL/1L - Cut near ground level and paint with undiluted glyphosate - Some individuals will have stumps which will still regrow foliage, spray regrowth foliage with glyphosate 10mL/1L
Asteraceae	*Senecio madagascariensis*	Fireweed	State Priority Weed, Regional Priority Weed, WoNS	- Hand Weed - Spot Spray - Glyphosate 10mL/1L

Family	Species Name	Common Name	Category	Treatment Methods
Rosaceae	*Rubus fruticosus*	Blackberry	State Priority Weed, Other weed subject to local management programs, WoNS	-Hand weed juveniles and regrowth from small pieces -Spot spray with glyphosate 10mL/1L - Slash using brushcutters, or hand cut with loppers, and spray regrowth foliage with glyphosate 10mL/1L - Cut near ground level and paint with undiluted glyphosate - Some individuals will have stumps which will still regrow foliage, spray regrowth foliage with glyphosate 10mL/1L

Notes: WoNS = Weeds of National Significance

FIGURES

Legend

Subject Site

Study Area

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 100 200 300 400 m

I:\...\16245\Figures\RP4\20190903\Figure 1. Study Area and Subject Site

Figure 1. Study Area and Subject Site

Figure 2. Proposed Development

Imgae Source: Zenith Landscape Designs (2019). 16-3351 L02 Rev E

I:\...\16245\Figures\RP2\20190903\Figure 2. Proposed Development

Figure 3. EEC, APZ, VRZ and Threatened Species Retention Zone

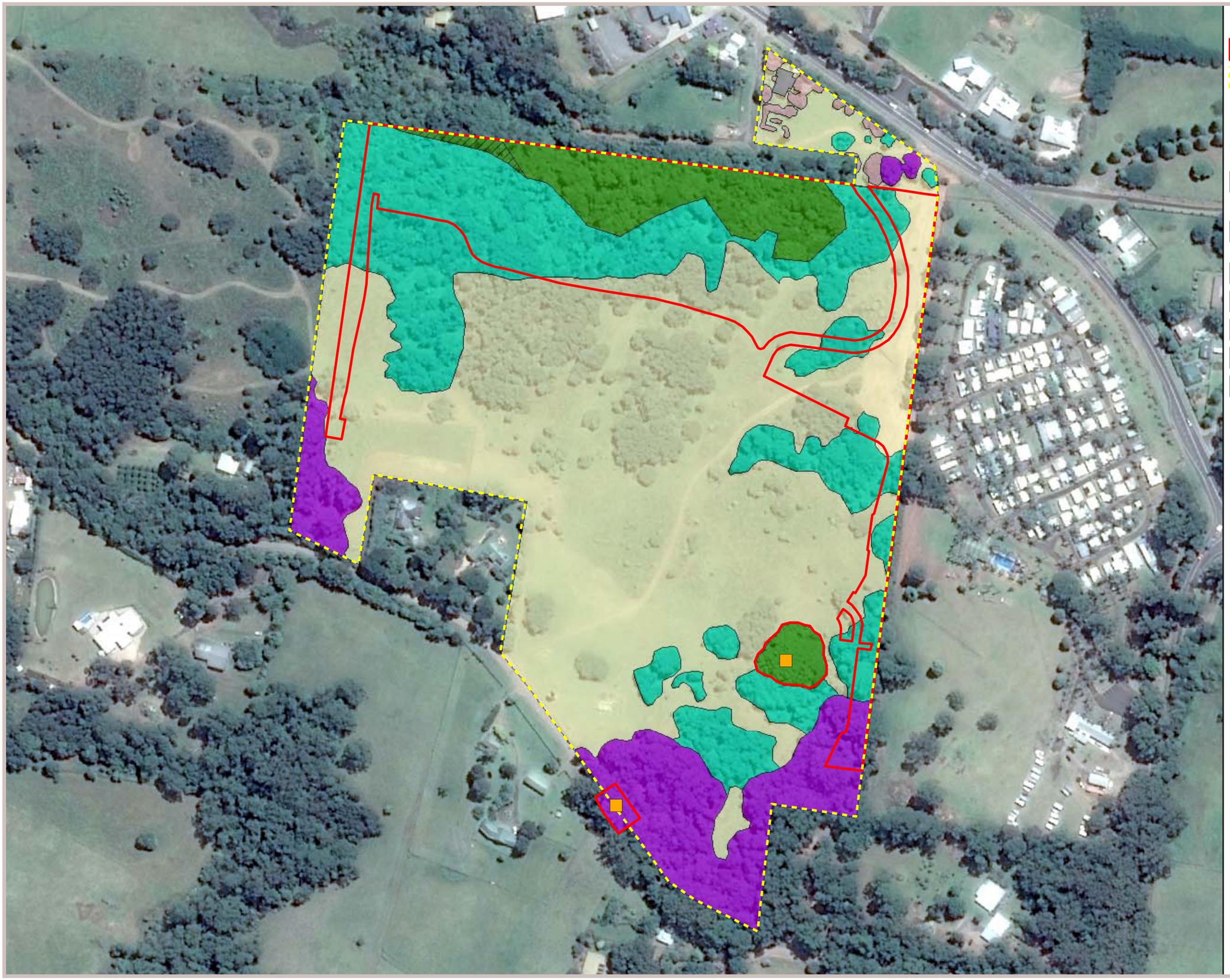

Figure 4. Study Area and Subject Site Vegetation, and Location of Threatened Flora Species

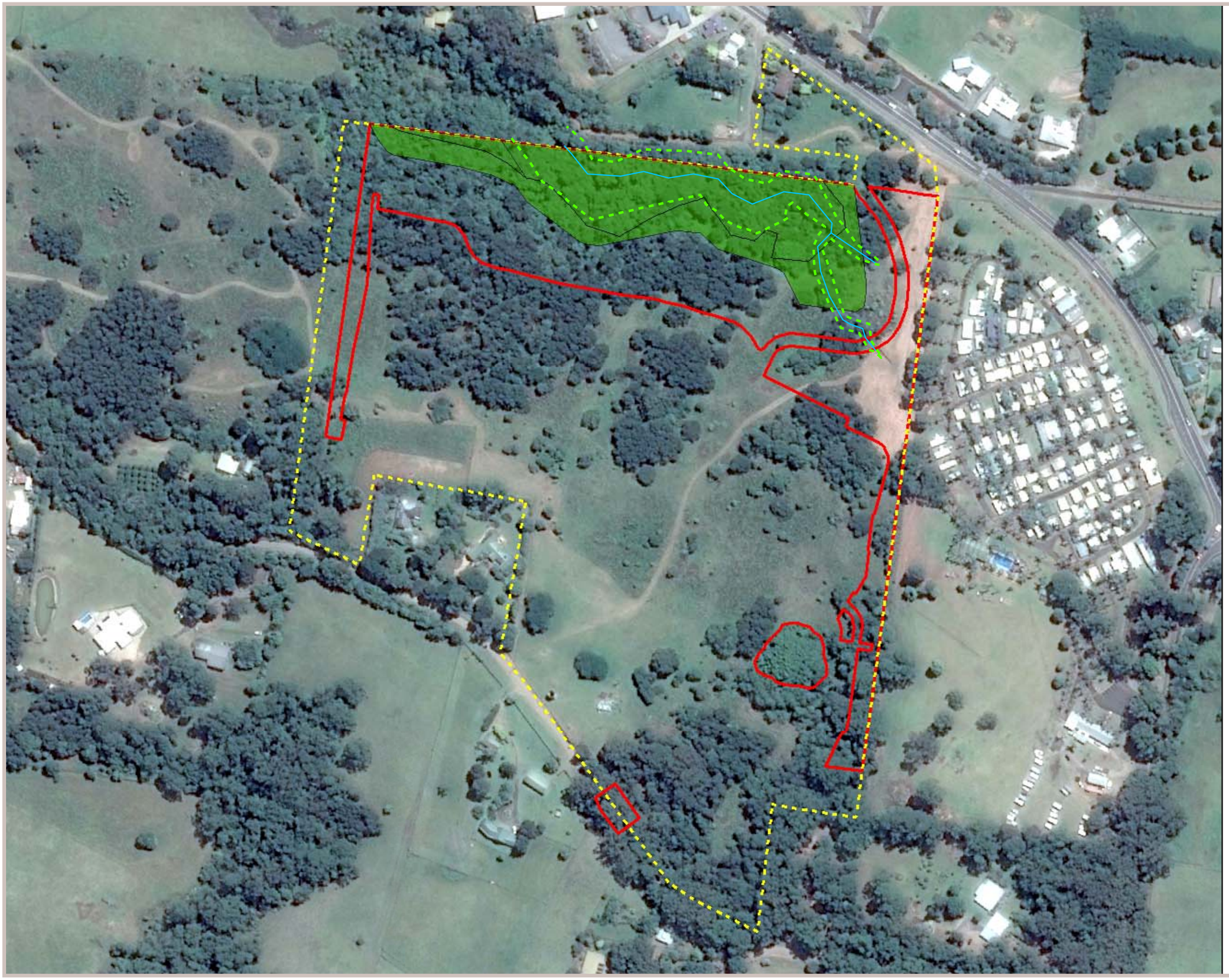

Figure 5. Subject Site Watercourses and Vegetated Riparian Zone

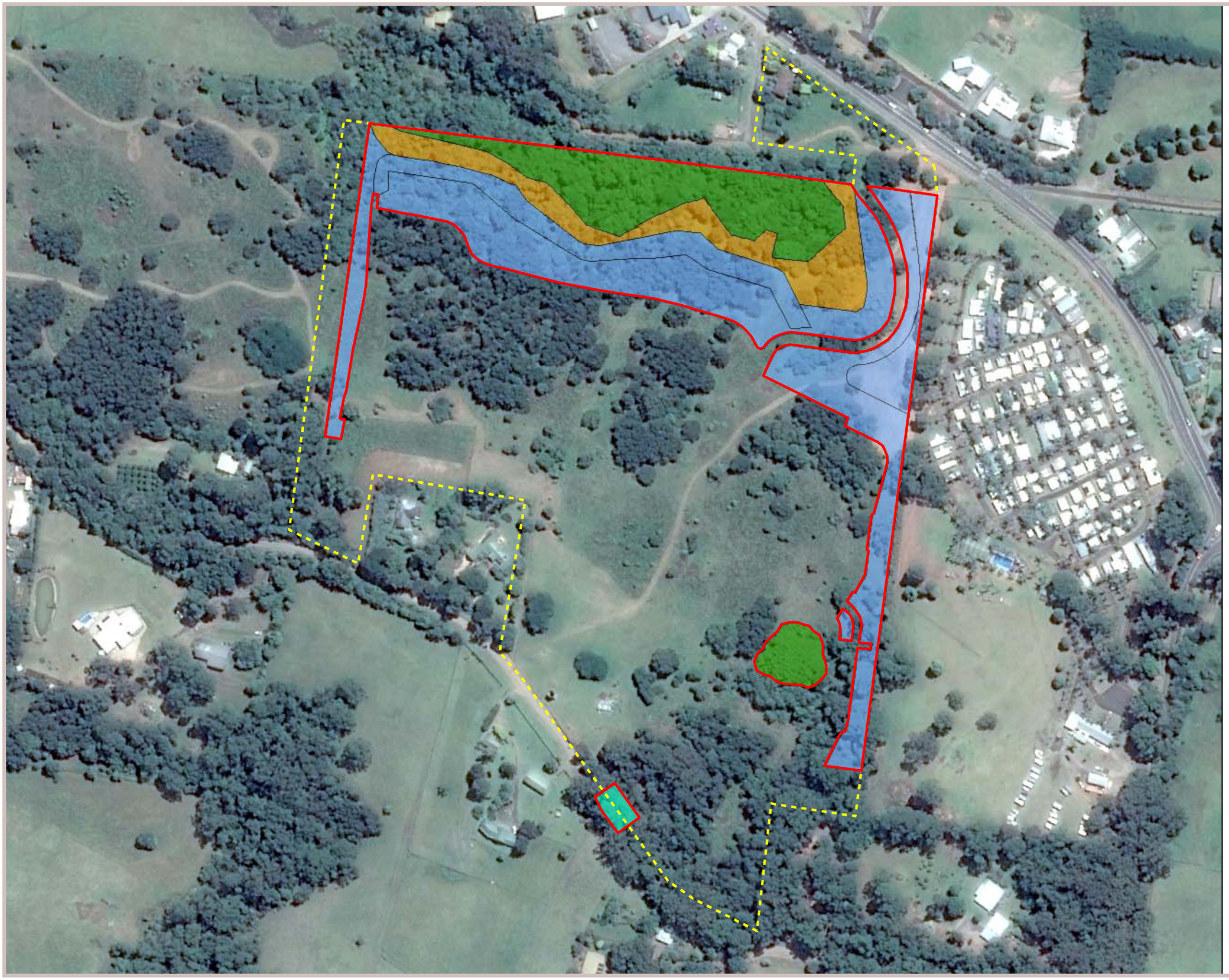

Figure 6. Vegetation Management Zones