Coonara Avenue – Forestry Dedication Area

Vegetation Management Plan

Mirvac

22 February 2023

Final

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Report No. 21108RP6

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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1	22/02/2023	TP/GK	Final for submission to Council

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Position:	Senior Project Manager/Ecologist
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Glossary

BAM	Biodiversity Assessment Method
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BGHF	Blue Gum High Forest
Biosecurity Act	NSW *Biosecurity Act 2015*
BRC	Bush Regeneration Contractor
CEEC	Critically Endangered Ecological Community
Concept DA	Approved DA 860/2022/JP or the Concept Master Plan DA for dwellings, internal roads, superlot arrangement and civil works within 55 Coonara Avenue, West Pennant Hills NSW.
Concept DA VMP area	The parts of DA 860/2022/JP that are subject to a separate VMP for the Concept DA
Council	The Hills Shire Council
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 Property
NSW	New South Wales
Open Space DA	The proposed development of an open space facility within parts of the Property
Open Space VMP area	The parts of the proposed Open Space DA that are subject to a separate VMP
STIF	Sydney Turpentine Ironbark Forest
Subject site	The area subject to this VMP
TEC	Threatened Ecological Community
The Hills LEP 2012	The Hills Local Environment Plan 2012
the Property	Land at 55 Coonara Avenue, West Pennant Hills or Lot 61 DP 737386
VMP	Vegetation Management Plan

1. Introduction

1.1. Purpose

Cumberland Ecology has been commissioned by Mirvac to prepare a Vegetation Management Plan (VMP) for the management of vegetation within areas identified as Lot 2 in approved plan for DA 1414/2022/ZB that are to be dedicated to the NSW Forestry Commission (the subject site). The subject site is located within parts of the property known as 55 Coonara Avenue West Pennant Hills or Lot 61 DP 737386 (The Property).

Parts of the Property are subject to separate Development Applications (DAs), namely the Demolition DA (approved DA 585/2021/HC), the Concept Plan DA (approved DA 860/2022/JP) and the proposed Open Space DA, comprising areas around permitted use item 24 identified in the approved rezoning plans for the Property (in preparation) to develop areas that previously formed part of the former business park, for residential living. The Property contains significant areas of native remnant and regrowth bushland outside the former business park, parts of which are proposed to be dedicated to the NSW Forestry Commission.

As part of the approved DAs, the Property has been subdivided into three lots, of which one lot (Lot 2) is to be dedicated to the NSW Forestry Commission and the remaining two lots (Lot 1 and Lot 3) are to be residual developer lots. Lot 2 (also referred to as the subject site) is further divided into three separate areas; Forestry Area (FA)1 (southern most area), FA 2 (middle area), and FA 3 (northern most area). The location of these Forestry Areas of Lot 2 within the Property are shown on **Figure 1**.

Parts of Lot 1 of the Property are subject to a VMP prepared by Cumberland Ecology to support the Concept Plan DA (referred to as the Concept DA VMP area - see **Figure 1**) while areas in Lot 3 of the Property are subject to a further VMP being prepared for the proposed Open Space DA. Revegetation works for the proposed Open Space DA also includes parts of FA 1 within Lot 2 up to a distance of 25-40m from the Lot 3/FA 1 boundary (**Figure 1**).

Management/Enhancement works within Lot 2 (the subject site) prior to dedication will be subject to a separate DA (known as Forestry Dedication Area 1 DA), which is required to be supported by a VMP (this document). As the proposed bush regeneration areas for the Forestry Dedication Area 1 DA will extend into/connect with proposed bush regeneration and management for the Concept Plan DA and proposed Open Space DA, similar strategies/management zones will be required for all DAs.

This VMP has been prepared to provide guidelines for the conservation, management and enhancement vegetation within the subject site (Lot 2) and has been prepared with due reference to the following documents:

- The Hills Vegetation Management Plan Guideline (the 'VMP Guideline') (The Hills Shire Council 2015);
- 55 Coonara Avenue, West Pennant Hills – Vegetation Management Plan (Cumberland Ecology. 2023);
- 55 Coonara Avenue, West Pennant Hills Open Space Development – Vegetation Management Plan (Cumberland Ecology – in preparation);
- Weed Management and Regeneration Plan – 55 Coonara Avenue, West Pennant Hills (Bushland Management Solutions 2022); and

- Visual Assessment and Tree Risk Assessment Summary – 55 Coonara Avenue, West Pennant Hills (ArborScan 2022).

Table 1 identifies where each required component of the VMP Guideline is addressed in this VMP.

Table 1 Required components of the Hills Vegetation Management Plan Guideline and the location of where each component is addressed within this VMP.

Hills Vegetation Management Plan Guideline Required Component	Where Component is Addressed within VMP
2.1 Site Description	Section 1.2
2.2 Aims of the VMP	Section 1.1
2.3 Objectives of the VMP	Section 1.3
2.4 Identification of Management Zones	Chapter 4
2.5 Define Management Tasks by Management Zone	Chapter 4, Chapters 6 -7
2.6 Fencing	Section 7.2
2.7 Determine Performance Criteria	Chapter 9 (Table 7)
2.8 Define Monitoring and Reporting Methods	Chapter 8
2.9 Provide a Timeframe	Section 7.6 and Chapter 9
2.10 Costing	n/a
2.11 Identify Existing and Potential Threats to the VMP Managed Area and Provide Mitigation Measures	Chapters 5-7
2.12 Maintenance Requirements into the Future	Chapters 6 - 7
2.13 Mapping	Figures 1 - 6
3.1 Signage	Section 7.2
3.2 Local Provenance	Section 7.3
3.3 Habitat Supplementation	Chapter 7
3.4 Information Fact Sheet	n/a

1.2. Background

1.2.1. Site Description

The Property is located within the Hills Shire Council Local Government Area (LGA). It is irregular in shape and is bound by Coonara Avenue to the north and north-west, residential development (the Glades residential development) to the west and bushland areas of Cumberland State Forest to the south and east (**Figure 1**).

As part of the redevelopment of the Property, the existing lot has been subdivided into three Lots of which Lot 2 (the subject site) is to be dedicated to the NSW Forestry Commission and the remaining two lots (Lot 1 and Lot 3) are to be residual developer lots. The subject site contains significant areas of bushland which extend into the adjacent Cumberland State Forest.

1.2.2. Vegetation

The Property is largely vegetated and comprises a mix of remnant/regrowth bushland and planted/landscaped areas within or adjacent to the former (now demolished) business park buildings (**Figure 2**).

Studies to date within the Property have determined that the majority of the remnant/old regrowth vegetation within the Property conforms to two threatened ecological communities, namely Blue Gum High Forest (BGHF) and Sydney Turpentine Ironbark Forest (STIF). Both BGHF and STIF are listed as Critically Endangered Ecological Communities (CEECs) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Other vegetation communities recorded within the Property include exotic grasslands from historic agricultural/orchard uses, landscaped plantings for the former business park and younger regrowth on modified soils from former land uses.

A first order stream is mapped within the Concept DA VMP area and runs from an existing dam in the north to the south and south-west, before joining Bellamys Creek. Detailed investigations conducted by Keystone Ecological for the Concept DA determined that the upper parts of the mapped first order stream are modified/constructed, with overflow from the dam reaching the natural part of the gully via pipes and overland flow on a fill slope. The vegetation along the mapped first order course comprises a mix of planted/landscaped vegetation along the constructed pipes and remnant/regrowth bushland along the natural flow areas.

1.2.3. Proposed Development

The bushland areas within Lot 2, comprising of three separate areas FA1, FA 2 and FA 3, (referred to collectively as Forestry Dedication Area 1) are to be dedicated to the NSW Forestry Commission. However, prior to dedication the following works are required to be conducted within Forestry Dedication Area 1.

- Weed Management;
- Management of 10 high risk trees identified by one of the project arborists; and
- Replacement of 2 bridges (part of former business park landscaping) within FA 1.

These works are to be conducted subject to a DA (referred to as Forestry Dedication Area 1 DA).

The area subject to the Forestry Dedication Area 1 DA is referred to in this VMP as the 'subject site'. The location of the subject site within the Property is shown in **Figure 1** while the vegetation communities occurring in the Property are shown in **Figure 2**. Note that areas of planted/landscaped vegetation (as mapped by Keystone) around the demolished business park buildings have been cleared as part of approved works for the Demolition DA (DA 585/2021/HC) (**Figure 2**).

1.3. Objectives

The objective of this VMP is to guide the management and conservation of vegetation within the subject site in order to increase the ecological value over time. To accomplish this objective, the following measures are detailed within this VMP:

- Identification of management zones (**Chapter 4**);

- Vegetation and habitat clearing protocols (**Chapter 5**);
- Weed management plan (**Chapter 6**);
- Restoration and regeneration plan (**Chapter 7**);
- Monitoring strategies and reporting requirements (**Chapter 8**); and
- Timing and responsibilities (**Chapter 9**).

2. Methodology

2.1. Literature Review

The preparation of the VMP involved a literature review to determine the most up to date methods of weed control for exotic species that are present in the subject site and the Property. This literature review involved a variety of sources including prior ecological studies and management plans for the Property, government fact sheets and websites. Cumberland Ecology staff with expertise in bushland maintenance were also consulted on current best practice methods and techniques.

In order to prepare species planting lists for revegetation, and determine revegetation strategies for BGHF and STIF, the following documents were reviewed:

- Biodiversity Development Assessment Report Demolition Stage Lot 61 DP 737386 55 Coonara Avenue West Pennant Hills (Keystone Ecological 2021);
- Biodiversity Development Assessment Report, Concept Development Application, 55 Coonara Avenue, West Pennant Hills (Keystone Ecological 2022);
- Draft Biodiversity Development Assessment Report, Open Space Development Application, 55 Coonara Avenue, West Pennant Hills (Cumberland Ecology – in preparation);
- Blue Gum High Forest in the Sydney Basin Bioregion – Final Determination (NSW Scientific Committee 2007);
- Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion – Final Determination (NSW Scientific Committee 2019);
- Restoring Bushland on the Cumberland Plain (DEC 2005);
- Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 - Revised July 2021 (LLS: Greater Sydney 2021);
- Vegetation Management Plan, 55 Coonara Avenue West Pennant Hills (2022). Prepared by Cumberland Ecology (Cumberland Ecology. 2023);
- Vegetation Management Plan- Open Space DA, 55 Coonara Avenue West Pennant Hills (2022). (Cumberland Ecology – in preparation); and
- Weed Management and Regeneration Plan – 55 Coonara Avenue, West Pennant Hills (Bushland Management Solutions 2022).

2.2. Field Surveys

The Property has been subject to numerous surveys by Keystone Ecological with additional surveys being conducted by Cumberland Ecology for the Concept DA VMP on 18 May 2021, areas around permitted use item 24 identified in the approved rezoning plans for the site in preparation of the future DA proposed for the Open Space Area on 11 March 2022 and 4 November 2022 and for the Forestry Dedication Areas on 2 December 2022. The subject site was inspected on 2 December 2022 by Cumberland Ecology staff in order to

verify the vegetation communities within the subject site and assess the overall condition of the vegetation for management purposes. The subject site was traversed and survey points and photographs were taken in various locations.

3. Existing Biodiversity Values

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

3.1. Vegetation Communities

The vegetation on the subject site and Property has been impacted by a complex history of land use. Historical aerial imagery from 1943 to 1982 shows clearing over large sections of the Property for agricultural and orchard uses. Based on aerial imagery some historically cleared areas appear to have been allowed to naturally regenerate rather than be utilised for further agricultural purposes.

Development for the former business park was largely contained within previously cleared areas with some additional clearing for ancillary infrastructure. It is understood that the extensive landscaping for the former business park development comprised a mix of locally endemic species as well as non-endemic natives and ornamental species for amenity purposes (Keystone Ecological 2022).

The subject site and the wider Property have been mapped in detail by Keystone Ecological as part of the Biodiversity Development Assessment Report (BDAR) prepared to support the Concept Plan DA. The vegetation communities occurring in the subject site, as identified in the Keystone Ecological BDAR, is summarised in **Table 2** below.

Table 2 Vegetation communities Identified by Keystone Ecological in the subject site

Keystone Vegetation Mapping Unit	Keystone Vegetation Type	Allocated PCT (as per Keystone BDAR)	BC Act/EPBC Act status (as per Keystone BDAR)	Description
2a	Basins and Dams	n/a	n/a	Built structures that intermittently contain water. Some exotic vegetation established around edges
2b	Basins and Dams	n/a	n/a	Built structures that permanently contain water. Supports a mix of native and exotic vegetation around edges
3a	Highly Modified Edges	PCT 1237	not a TEC	Mix of planted and regrowth vegetation on spoil mounds, batters and reshaped slopes around former facility. Locally native tree species include species that generally dominate in BGHF such as *Eucalyptus saligna* (Blue Gum) or *Eucalyptus pilularis* (Blackbutt)

Keystone Vegetation Mapping Unit	Keystone Vegetation Type	Allocated PCT (as per Keystone BDAR)	BC Act/EPBC Act status (as per Keystone BDAR)	Description
4a	Landscaped Gardens	n/a	n/a	Planted gardens around compound carparks and buildings. Species largely native to NSW but not always locally endemic. Dominant species comprise a mix that do not naturally occur together in a defined vegetation unit and include *Corymbia maculata* (Spotted Gum), *Casuarina glauca* (Swamp Oak), *Eucalyptus tereticornis* (Forest Red Gum, *Pittosporum undulatum* (Sweet Pittosporum) and *Syncarpia glomulifera* (Turpentine)
5a	BGHF	PCT 1237	CEEC	Regrowth forest on natural substrate. Considered to be in poor condition as it mainly comprises canopy trees over dense weed infestations. Dominant canopy trees include *Eucalyptus saligna* (Blue Gum) and *Eucalyptus pilularis* (Blackbutt)
5b	BGHF	PCT 1237	CEEC	Regrowth forest on natural substrate. Previously cleared for historical agricultural/orchards but appears to have regrown since the 1960s. Dominant canopy trees include *Eucalyptus saligna* (Blue Gum) and *Eucalyptus pilularis* (Blackbutt)
5c	BGHF	PCT 1237	CEEC	Remnant/old Regrowth forest on natural substrate. No evidence of past clearing in available aerial imagery. Dominant canopy trees include *Eucalyptus saligna* (Blue Gum) and *Eucalyptus pilularis* (Blackbutt)

Keystone Vegetation Mapping Unit	Keystone Vegetation Type	Allocated PCT (as per Keystone BDAR)	BC Act/EPBC Act status (as per Keystone BDAR)	Description
6a	STIF	PCT 1281	CEEC	Regrowth forest on natural substrate. Comprises canopy trees over simplified understorey due to past and present bushfire hazard regime. Dominant canopy trees include *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark)
6b	STIF	PCT 1281	CEEC	Remnant/old Regrowth forest on natural substrate. No evidence of past clearing in available aerial imagery. Dominant canopy trees include *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark)

Further details of these communities are provided in the Concept DA BDAR by Keystone (Keystone Ecological 2022). Further mapping refinement by Cumberland Ecology has largely been limited to the areas around permitted use area item 24 in the zoning plans in preparation of the future DA proposed for the Open Space Area. The distribution of communities as per the Keystone mapping and Cumberland Ecology updates is provided in **Figure 2**.

As the purpose of the VMP is to conserve, manage and rehabilitate retained vegetation to a form that is broadly representative of the original plant communities present within the study area, all areas within the subject site that are to be revegetated will be revegetated to either BGHF or STIF, the exception being the Fuel Management Area.

Although the existing dam within the FA 2 of the subject site will be subject to weed management, the dam will largely to be retained as a 'water body'. Therefore, the dam area will not be fully revegetated to either BGHF or STIF but will be limited to fringing vegetation around the banks of the dam.

General descriptions of BGHF and STIF within the subject site, based on the surveys conducted by Cumberland Ecology are provided below.

3.1.1. PCT 1237 - Blue Gum High Forest

Vegetation Formation: Wet Sclerophyll Forests (Shrubby sub-formation);

Vegetation Class: North Coast Wet Sclerophyll Forests;

Blue Gum High Forest (BGHF) occurs throughout the subject site on deeper shale soils at higher elevation. The occurrences in FA 2 and FA 3 comprise the more degraded forms of BGHF/PCT 1237 (i.e VZ3a and VZ5a), comprising native canopy trees over dense weed infestations whereas the condition in FA 1 comprises better quality BGHF.

The occurrences of this community in FA 1 contains a canopy of *Eucalyptus saligna* (Sydney Blue Gum), *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine) and to a lesser extent *Angophora costata* (Sydney Red Gum). The sub-canopy includes *Pittosporum undulatum* (Sweet Pittosporum), *Elaeocarpus reticulatus* (Blue-berry Ash). *Acacia implexa* (Hickory Wattle) and *Allocasuarina torulosa* (Forest Sheoak). The shrub stratum includes *Polyscias sambucifolia* (Elderberry Panax), *Pittosporum revolutum* (Rough-fruit Pittosporum), *Breynia oblongifolia* (Coffee Bush), *Leucopogon juniperinus* (Prickly Beard-heath), *Ozothamnus diosmifolius* (Dogwood), *Notelaea longifolia* (Large Mock-olive), *Trema tomentosa* (Poison Peach) and *Denhamia silvestris* (Narrow-leaved Orangebark) as well as regenerating canopy species. Exotic shrubs include *Ligustrum lucidum* (Large-leaved Privet), *L. sinense* (Small-leaved Privet), *Lantana camara* (Lantana) and *Ochna serrulata* (Mickey Mouse Plant). Native groundcover species include *aemulus* (Basket Grass), *O. imbecillis* (Creeping Beard Grass), *Entolasia marginata* (Wiry Panic), *Pseuderanthemum variabile* (Pastel Flower) and *Imperata cylindrica* var. *major* (Blady Grass). Common exotic groundcovers include *Ehrharta erecta* (Panic Veldtgrass). Native climbers present include *Pandorea pandorana* (Wonga Wonga Vine), *Sarcopetalum harveyanum* (Pearl Vine), *Parsonsia straminea* (Common Silkpod) and *Gynochthodes jasminoides* (Sweet Morinda).

The occurrences of BGHF in FA 2 and FA 3 are largely limited to a canopy of *Eucalyptus saligna* (Blue Gum) over dense infestations of Lantana and/or Privet.

Examples of the remnant and weedy forms of this community within the subject site are shown in **Photograph 1** and **Photograph 2** respectively.

Photograph 1 Remnant BGHF within FA 1

Photograph 2 BGHF canopy trees over significant weed infestations

3.1.2. PCT 1281 – Sydney Turpentine - Ironbark Forest

Vegetation Formation: Wet Sclerophyll Forests (Grassy sub-formation);

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests;

The occurrence of Sydney Turpentine-Ironbark Forest (STIF) within the subject site is limited to FA 1. STIF dominates this southern area of the subject site on shallower shale soils at lower elevation. This community contains a canopy of *Syncarpia glomulifera* (Turpentine), *Eucalyptus paniculata* (Grey Ironbark), *Eucalyptus pilularis* (Blackbutt), *Angophora costata* (Sydney Red Gum) and *Eucalyptus resinifera* (Red Mahogany). The sub-canopy includes *Pittosporum* undulatum (Sweet Pittosporum) and *Syncarpia glomulifera* (Turpentine). The shrub stratum includes *Polyscias sambucifolia* (Elderberry Panax), *Pittosporum revolutum* (Rough-fruit Pittosporum), *Breynia oblongifolia* (Coffee Bush), *Leucopogon juniperinus* (Prickly Beard-heath), *Ozothamnus diosmifolius* (Dogwood), *Notelaea longifolia* (Large Mock-olive) and *Denhamia silvestris* (Narrow-leaved Orangebark). Exotic shrubs include *Ligustrum sinense* (Small-leaved Privet), *Lantana camara* (Lantana) and *Ochna serrulata* (Mickey Mouse Plant). Native groundcover species include *Lomandra longifolia* (Spiny-headed Mat-rush), *Lobelia purpurascens* (Whiteroot), *Lepidosperma laterale*, *Entolasia marginata* (Wiry Panic) and *Pseuderanthemum variabile* (Pastel Flower). Native climbers present include *Eustrephus latifolius* (Wombat Berry), *Pandorea pandorana* (Wonga Wonga Vine), *Sarcopetalum harveyanum* (Pearl Vine), *Parsonsia straminea* (Common Silkpod) and *Gynochthodes jasminoides* (Sweet Morinda).

A representative area of this community within the subject site is shown in **Photograph 3.**

Photograph 3 Sydney Turpentine Ironbark Forest within the subject site

3.2. Flora Species

3.2.1. General species

224 species were recorded across the subject site during surveys by Cumberland Ecology for the subject site as well as prior surveys for the Concept DA VMP and Open Space DA. Species present within the subject site consists of a mix of 127 native species and 97 exotic species. A full flora list is provided in **Appendix A**.

3.2.2. Threatened Species

No threatened flora species have been recorded within the subject site during surveys by Cumberland Ecology or previous ecological surveys conducted by Keystone Ecological (Keystone Ecological 2021, 2022).

3.2.3. Priority Weeds

Of the 97 weed species recorded within the subject site and adjacent parts of the property, six (6) species comprise State Priority (SP) Weeds under the Greater Sydney Regional Strategic Weed Management Plan (LLS: Greater Sydney 2019) as well as Weeds of National Significance (WoNS) under the National Weeds Strategy. Four (4) Regional Priority (RP) and 11 'Other Weeds of Regional Concern (OWRC)' were also recorded within the subject site. These species are detailed in **Table 3** below.

Table 3 High Threat Weeds recorded within the subject site

Scientific name	Common Name	Status
Acetosa sagittata	Rambling Dock	OWRC
Anredera cordifolia	Madeira Vine	SP, WoNS
Araujia sericifera	Moth vine, Moth plant	OWRC
Asparagus aethiopicus	Asparagus Fern	SP, WoNS
Asparagus asparagoides	Bridal Creeper	SP, WoNS
Asparagus plumosus	Climbing Asparagus Fern	SP, WoNS
Cenchrus clandestinus	Kikuyu	OWRC
Cestrum parqui	Green Cestrum	RP
Lantana camara	Lantana	SP, WoNS
Ligustrum lucidum	Large-leaved Privet	OWRC
Ligustrum sinense	Small-leaved Privet	OWRC
Ludwigia peruviana	Peruvian Water Primrose	RP
Ochna serrulata	Mickey Mouse Plant	OWRC
Olea europaea subsp. cuspidata	African olive	RP
Passiflora suberosa	Cork Passionfruit	OWRC
Phoenix canariensis	Phoenix palm, Canary Island date palm	OWRC
Senna pendula var. glabrata	-	OWRC
Rubus fruticosus	Blackberry	SP, WoNS

Scientific name	Common Name	Status
Solanum seaforthianum	Climbing Nightshade	OWRC
Sporobolus fertilis	Giant Parramatta Grass	RP
Tradescantia fluminensis	Trad	OWRC

WoNS = Weed of National Significance, SP = State Priority, RP = Regional Priority, OWRC = Other Weed of Regional Concern

3.3. Fauna Species

3.3.1. Fauna Habitat

The remnant/regrowth vegetation as well as planted vegetation present within the subject site and Property provides a range of fauna habitats including potential foraging, shelter and breeding opportunities for fauna.

Key habitat features recorded within the subject site and wider Property include:

- Fallen logs, debris and leaf litter – shelter habitat for invertebrates, amphibians, reptiles and ground-dwelling mammals;
- Hollow-bearing trees and stags – providing shelter and breeding habitat for a range of reptiles, birds, arboreal mammals and microchiropteran bats (microbats); and
- Nectar-producing trees and shrubs – foraging habitat for insects, blossom-dependant birds, arboreal mammals and megachiropteran bats (flying-foxes).

These key habitat features may provide habitat for a range of fauna, including some species that are listed as threatened under the EPBC Act and/or the BC Act. Threatened fauna species with confirmed records within the Property include the Dural Land Snail (*Pommerhelix duralensis*) and Powerful Owl (*Ninox strenua*). Several threatened microbat species such as Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Little Bent-winged Bat (*Miniopterus australis*) Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) and Greater Broad-nosed Bat (*Scoteanax rueppellii*) have been recorded on ultrasonic detectors across the wider Property.

4. Vegetation Management Zones

Under this VMP, the vegetation areas to be managed in the subject site have been divided into six management zones based on the existing condition of the vegetation, dominant canopy trees and, the specific management objectives required for vegetation.

These zones are:

- Zone 1: STIF – Good;
- Zone 2: BGHF – Good
- Zone 3: BGHF – Poor;
- Zone 4: BGHF – Replanting;
- Zone 5: Fringing Aquatic Vegetation; and
- Zone 6: Fuel Management Area/Sydney Water Easement.

The objectives and actions for the management zones are detailed in the following sections while the layout of the management zones is shown in **Figure 3**. It is expected that this VMP would be undertaken over a five-year period.

After the life of this VMP, the maintenance measures implemented under this VMP are to be undertaken as ongoing management in the long-term. Such long-term management should include ongoing weed control, assistive regeneration (if required) in areas where natural regeneration does not occur, ongoing maintenance works and monitoring. The frequency/duration for each of these actions should be determined based on vegetation condition at the end of the life of this VMP and a subsequent management plan should be prepared accordingly for management following dedication to NSW Forestry.

4.1. Zone 1: STIF - Good

Zone 1 covers an area of approximately 5.60 ha within the subject site (contained within FA 1). This management zone corresponds to areas mapped as 6a and 6b in the Keystone BDAR. It comprises STIF that conforms to the listed CEEC and occurs in relatively good condition as it is dominated by native canopy species with a mixture of native and exotic understorey species.

4.1.1. Objectives

- Retain and protect existing STIF remnants in the zone;
- Control and reduce cover of exotic weed species; and
- If necessary, revegetate areas with a diverse array of native understorey, and ground layer species.

4.1.2. Actions

As the vegetation in this management zone is in reasonably good condition, it is expected that minimal revegetation will be required. Initial actions within this management zone will be clearing of any exotic shrubs and ground covers present. All of the existing native canopy and understorey will be retained.

Following the removal of exotic species, it is likely that native species will recolonise the ground cover. However, if necessary, characteristic STIF species can be planted as an assistive measure. A species list for STIF planting is provided in **Appendix B**.

4.2. Zone 2: BGHF - Good

Zone 2 covers an area of approximately 1.73 ha within the subject site. This management zone corresponds to areas mapped as 5b and 5c in the Keystone BDAR. It comprises BGHF that conforms to the listed CEEC and occurs in relatively good condition as it is dominated by native canopy species with a mixture of native and exotic understorey species.

4.2.1. Objectives

- Retain and protect existing BGHF remnants in the zone;
- Control and reduce cover of exotic weed species; and
- If necessary, revegetate areas with a diverse array of native understorey, and ground layer species.

4.2.2. Actions

As the vegetation in this management zone is in reasonably good condition, it is expected that minimal revegetation will be required. Initial actions within this management zone will be clearing of any exotic shrubs and ground covers present. All of the existing native canopy and understorey will be retained.

Following the removal of exotic species, it is likely that native species will recolonise the ground cover. However, if necessary, characteristic BGHF species can be planted as an assistive measure. A species list for BGHF planting is provided in **Appendix B**.

4.3. Zone 3: BGHF - Poor

Zone 3 covers an area of approximately 1.01 ha within the subject site. This management zone largely corresponds to areas mapped as 3a or 5a in the Keystone BDAR. This management zone generally comprises areas dominated by the canopy species *Eucalyptus saligna* (Blue Gum) over highly modified areas and exotic understorey, including significant weed infestations. Although the areas mapped as 5a in the BDAR are considered to conform to the listed CEEC and the areas zoned 3a are not, both these vegetation zones have been grouped into a single management zone within this VMP based on the presence of BGHF native canopy species over exotic understorey species, thus requiring further understorey management and planting.

Areas of Zone 3 in the northern parts of the subject site, primarily FA 2 also comprise potential roosting habitat/buffer to roosting habitat for the Powerful Owl.

4.3.1. Objectives

- Retain and protect existing BGHF canopy (*Eucalyptus salingna*) remnants in the zone;

- Control and reduce cover of exotic weed species, if possible in a staged replacement planting method to maintain understorey density and avoid creation of unvegetated gaps that would reduce habitat suitability for fauna (particularly Powerful Owl);
- Increase canopy species diversity via planting of diagnostic BGHF canopy species other than Eucalyptus saligna;
- Revegetate understorey with a diverse array of native shrub and ground layer species.

4.3.2. Actions

The vegetation in this management zone is largely limited to the BGHF canopy species, *Eucalyptus saligna*, and lacks a native understorey. Initial actions within this management zone will be clearing of any exotic shrubs and ground covers present. All of the existing native canopy will be retained.

Following the removal of exotic species, native shrubs and groundcovers characteristic of BGHF are to be planted. Diagnostic BGHF canopy species, other than *Eucalyptus saligna*, will also be planted to increase canopy species diversity. A species list for BGHF planting is provided in **Appendix B**.

4.4. Zone 4: BGHF - Replanting

Zone 4 covers an area of approximately 0.13 ha within the subject site. This management zone largely corresponds to areas mapped as 4a in the Keystone BDAR and is limited to the western and southern parts of FA 2. This management zone generally comprises areas with planted landscape trees.

4.4.1. Objectives

- Control and reduce cover of exotic weed species; if possible in a staged replacement planting method to maintain understorey density and avoid creation of unvegetated gaps that would reduce habitat suitability for fauna (particularly Powerful Owl); and
- Revegetate areas with a diverse array of native canopy, understorey, and ground layer species.

4.4.2. Actions

The vegetation in this management zone currently lacks characteristic BGHF species. Initial actions within this management zone will be clearing of any exotic shrubs and ground covers present. In order to minimise disturbance to adjacent BGHF management zones, planted trees (areas zoned 4a in the BDAR) that are endemic to the locality (though not characteristic of BGHF) should be retained with tree removal limited to exotic ornamentals and eucalypts not native to NSW (such as *Corymbia citriodora*). Following the removal of exotic species, native trees, shrubs and groundcovers characteristic of BGHF are to be planted. A species list for BGHF planting is provided in **Appendix B**.

4.5. Zone 5 – Fringing Aquatic Vegetation

Zone 5 consists of approximately 0.13 ha of aquatic vegetation around the dam within FA 2. This management zone largely corresponds to areas mapped as 2a in the Keystone BDAR and comprises a dense infestation of

Ludwidgia peruviana along the banks of the dam, although some native species such as *Eleocharis sphacelata* are also present as scattered occurrences.

4.5.1. Objectives

- Control and reduce cover of aquatic weeds;
- Revegetate areas proximate to the waters edge with native aquatic species such as *Eleocharis sphacelata*; and
- Revegetate upper banks of dam with a diverse array of native understorey, and ground layer species of BGHF.

4.5.2. Actions

The vegetation in this management zone currently lacks characteristic BGHF species. As the dam is to be retained as a waterbody, replanting of BGHF on the lower banks of the dam may not be feasible and these areas may need to be revegetated with emergent aquatic native species. Nonetheless some BGHF understorey and groundcover species could be planted on upper banks.

Initial actions within this management zone will be clearing of the infestation of *Ludwigia peruviana*. Following the removal of exotic species, native aquatic species should be allowed to naturally colonise the banks. Further assistive replanting with groundcovers characteristic of BGHF should be conducted as required to stabilise banks that are not naturally recolonised. A species list for BGHF planting is provided in **Appendix B**.

4.6. Zone 6 – Fuel Management Area/Sydney Water Easement

Zone 6 covers an area of 0.64 ha within the subject site. This management zone largely corresponds to areas subject to the past Hazard Reduction Certificates (HRC) issued by the NSW Rural Fire Service (RFS) and is located along the western boundary of the subject site. This management zone comprises a mix of vegetation zones 3a, 6a and 6b as per the Keystone BDAR mapping. This zone also includes a Sydney Water right of way access.

The Fuel Management Area has been designed to protect the properties in the adjacent 'The Glades' residential development and comprises a 15.17m wide APZ from the rear boundaries of these private properties as specified by the HRC issued by the Rural Fires Service (RFS) in July 2020 and stated in the approved Fuel Management Plan prepared by UBM Ecological Consultants (UBM) in 2021 (UBM 2021). However, due to the allowance within the HRC to clear up to a maximum distance of 20m from adjacent dwelling and the fact that the Sydney Water right of way comprises a 20m wide area, for practical on-ground management purposes, this management zone comprises a 20m wide corridor from the boundary between the adjacent residential development and the subject site.

4.6.1. Objectives

- Manage vegetation for bushfire safety purposes and allow for Sydney Water access;
- Retain and protect existing canopy remnants in the zone at requisite conditions specified in HRCs;

- Maintain canopy density/cover at the requisite levels specified in the issued HRCs and any Fuel Management Plans;
- Control and reduce cover of exotic weed species/replace with native groundcover species at allowed densities; and
- Revegetate large bare patches/cleared exotic areas with selective subset of STIF or BGHF ground layer species tolerant to hazard reduction maintenance levels.

4.6.2. Actions

This management zone has already been subject to hazard reduction works under HRCs issued to date and is subject to ongoing management. While further hazard reduction works may be required in some sections, actions within this management zone primarily comprise maintaining the current management regime.

The additional hazard reduction works in some sections primarily comprise clearing of exotic shrubs and ground covers present. All of the existing native canopy will be retained and following the removal of exotic species, native groundcovers characteristic of STIF or BGHF tolerant of hazard reduction maintenance are to be planted in significant patches of bare ground to achieve groundcover limits specified in issued HRCs. Based on issued HRCs, the following hazard reduction standards are required:

- Clearing works are permitted to a maximum distance of 20m from the rear of adjacent buildings;
- All trees greater than 3m in height or greater than 300mm in girth (measured at 1.3m above ground) are to be retained;
- Skirting of trees (removal of branches within 2m of the ground) is permitted to a maximum distance of 20m from the rear of adjacent buildings;
- At least 75% ground cover should be maintained; and
- Clearing works are to be conducted in a manner that ensures retention of all topsoil.

4.7. Basin

It is noted that the outer edges of a concrete basin located in Lot 1 (developer lot) extends into FA1 at the boundary of the subject site and Lot 1 (mapped as VZ2a). As the basin is being retained for stormwater purposes in Lot 1, the concrete outer edges of the basin will remain within FA1. These minor areas are not assigned to a vegetation management zone. While understorey planting is not feasible in these minor areas, the canopy spread from adjacent trees is still likely to cover these areas.

5. Vegetation and Habitat Clearing Protocols

5.1. Introduction

This chapter outlines the protocols to be followed during management of the high risk trees and replacement of the two bridges within the subject site to minimise the impacts on native flora and fauna. These include pre-clearance inspections for potential fauna species presence and clearing supervision to rescue and relocate any fauna that may be present.

The locations of the high risk trees identified for management and the two bridges to be replaced are shown in **Figure 4**.

As per the report by ArborScan (2022), the recommended actions for the specific identified high risk trees listed below include:

- 70 – reduce height and retain as stag;
- 77 – reduce height and retain as stag;
- 89 – reduce height and retain as stag;
- 104 – leave as 1m stump;
- 120 – maintain as ground habitat;
- 153 – reduce height and retain as stag;
- 241 – trim crown and lateral branches;
- 256 – reduce height and retain as stag;
- 259 – reduce height and retain as stag; and
- 317 – complete pruning and retain as hollow bearing tree

5.2. Marking Limits of Vegetation Clearing

Prior to any tree management works or bridge demolition being undertaken, the boundary of the works area is to be clearly delineated. Clearing limits can be marked with high visibility tape, temporary 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.

5.3. Pre-clearing Surveys

Prior to the commencement of any tree management or bridge demolition, a due diligence pre-clearing survey will be undertaken of the trees and bridges by a certified ecological consultant.

To determine fauna usage, the ground around each tree and the bridge to be replaced will be inspected for scats, and each tree trunk will be inspected for scratch marks and tree hollows. Any fauna utilising the area will be recorded, and where possible, these will be encouraged to leave the area prior to clearing. It is

recommended that fauna pre-clearance surveys are conducted within two weeks of commencement the relevant activities to reduce risk of nesting by fauna.

5.4. Clearing Supervision

All tree management/tree felling works will be undertaken under ecologist supervision to minimise impacts to any fauna that are present. During clearance works standard clearance supervision protocols will be observed. This will involve the ecologist inspecting the trees immediately prior to disturbance for occupying fauna. Following the initial inspection, the trees will be pruned or felled as per the recommendations of the project arborist under ecological supervision. Following any requisite felling, inspections of the felled tree will be conducted, consisting of a thorough examination of any hollows, nests or decorticating bark to find any potentially remaining resident fauna. A torch will be used to facilitate the inspection of deeper parts of any hollows present for fauna such as microbats. For each species captured and identified after felling, an experienced ecologist will place the animal in an appropriate container/calico bag and relocate it to an appropriate area outside the disturbance footprint.

Any branches/limbs removed from trees to be pruned will also be inspected for suitability for use as ground habitat.

6. Weed Management Plan

6.1. Introduction

6.1.1. Weed Species

Under the NSW *Biosecurity Act 2015*, state listed Priority Weeds have specific legal requirements for management and have higher management priorities. State listed Priority Weeds and Regional Priority weeds recorded within the subject site and wider Property during surveys by Cumberland Ecology are listed in **Table 4** below.

A full list of flora species recorded within the subject site, including exotic species is provided in **Appendix A**. Control methods for Priority weeds and other introduced species are detailed in **Appendix C.** Note that as a precautionary measure, the Weed Control Table in **Appendix C** also includes control measures for weed species not specifically recorded within the subject site but known to occur in the Property, locality and wider Sydney area.

Table 4 State-listed Priority Weeds and Regional Priority weeds recorded in the subject site

Scientific name	Common Name	Status
Anredera cordifolia	Madeira Vine	SP
Asparagus aethiopicus	Asparagus Fern	SP
Asparagus asparagoides	Bridal Creeper	SP
Asparagus plumosus	Climbing Asparagus Fern	SP
Cestrum parqui	Green Cestrum	RP
Lantana camara	Lantana	SP
Ludwigia peruviana	Peruvian Water Primrose	RP
Olea europaea subsp. cuspidata	African olive	RP
Rubus fruticosus	Blackberry	SP
Sporobolus fertilis	Giant Parramatta Grass	RP

Key: SP – State Priority; RP – Regional Priority

6.1.2. Best Management Practice

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

- The main principles of the Bradley Method of bush regeneration, i.e. not over-clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter;
- Sweep from one end of the weeding zone to the other. During this sweep regrowth individuals of harder to manage weeds that require other techniques such as sawing, digging, drilling etc. should be targeted;
- Removal of fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;

- Spot spray weeds in open areas with no natives with herbicide. Use of chemicals and sprays only during suitable weather conditions (i.e. not during wet or windy conditions), and only during appropriate seasons;
- Use of chemicals and sprays only during suitable weather conditions (i.e. not during wet or windy conditions), and only during appropriate seasons;
- All equipment must be thoroughly cleaned prior to entering the site to minimise contamination;
- Proximity to watercourses and swampy areas; and
- Presence of native fauna or nesting/breeding sites.

6.2. Weed Control Methods

Weed control is to be implemented across the subject site. All weed removal works must be approached using the strategies outlined below.

6.2.1.1. Manual Weed Removal

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) and site. This technique is likely to only be effective on relatively small weeds and is not suitable for larger weeds such as mature Lantana. 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 the unviable plant material will be retained on site to provide mulch and natural leaf litter to protect the soil surface.

6.2.1.2. Use of Herbicides

In some situations, herbicides are the most appropriate form of weed control. For example, the aquatic weeds present in the dam in the subject site (e.g. Water Primrose and Water Lily) will need to be controlled using herbicide as it will be difficult to access the plants to physically remove them as they are underwater. The preferred herbicide for this application is Vigilant. Secondly, these plants spread readily from fragments, and physical removal is likely to result in fragmentation and further spread of these species.

All herbicides must be used according to recommendations on the herbicide label. Appropriate Personal Protective Equipment (PPE) must 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 must be used to minimise impact to aquatic life and amphibians. Herbicide use must be avoided within 2m of the riparian edges. 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 must 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 **Appendix C** 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.

All chemical treatment must be carried out according to best practice guidelines. Planting must not occur within 10 days of herbicide application.

6.2.1.3. Removal of Aquatic Weeds

Two aquatic weeds have been recorded from the dam in the subject site; *Ludwigia peruviana* (Water Primrose) and Water Lily (*Nymphaea sp*.). Due to the extent of infestation, a high priority for weeding works will be removal of *Ludwigia peruviana* in a staged manner to maintain aquatic habitat around the dam. The removal of *Ludwigia peruviana* will require implementation of the following:

- Small plants can be manually pulled or hoed from the ground;
- Larger infestations will require treatment using herbicide. For this, the dam water level will need to be lowered by up to 1 m if possible. This will allow access to the larger sections of stem for the application of the stem scrape technique and subsequent painting where possible using Vigilant herbicide.
- There is a risk of oxygen depletion after treatment caused by the decomposition of the dead plant material which can kill fish. It may be necessary to treat the dam in sections and let the weeds in each section decompose for approximately two weeks before treating another section;
- As it reproduces readily from fragments, utmost care must be taken when handling this species to avoid fragmenting the plant and spreading the infestation. All plants and fragments removed must be bagged and removed from the subject site and disposed of appropriately; and
- Follow up treatments and ongoing maintenance will be required to control this species in the subject site. Ideally, seedlings should be controlled in the first 18 months of growth, before flowering to manage the soil seed bank.

Control of Water Lily will need to be accomplished using herbicide, due to the difficulty in accessing the roots and stems. Several herbicides are known to control this species including Diquat and Glyphosate. See **Section 6.2.1.2** for procedures to be followed when utilising herbicides in the subject site.

6.3. Types of Weed Control

This section provides information on the types of weed control that will be undertaken in the subject site. Further information on effective methods for controlling specific weed species present within the subject site and legal and environmentally safe use of herbicides is included in **Appendix C**. Note the weed control methods outlined in **Appendix C** also include control methods for weeds not specifically recorded within the subject site but known to occur in the wider locality as a precautionary measure.

6.3.1.1. Primary Weeding

Primary weeding is the first stage of weeding and may involve techniques such as:

- The selective spraying of large weed infestations of weeds or cleared areas with no natives present, with selective and non-selective herbicides;
- Cutting/scraping/drilling deep rooted woody weeds and climbers with hand tools, chainsaws and brush cutters and painting cut stumps and scraped surfaces, or filling drilled holes with herbicides containing Glyphosate or Picloram; and
- Selective hand removal of weeds and wicker wiping of tall herbaceous weeds in situations where damage to proximate, low growing native plants can be avoided.

In order to maintain understorey density levels such that vegetation remains suitable as habitat for resident fauna, in particular the Powerful Owl, removal of dense areas of widespread weeds such as Lantana or Privet, should be conducted in a staged manner to avoid creation of large unvegetated gaps. This could include removal of small patches of the weeds at selected spots within a grid followed by immediate replacement with fast-growing/colonising natives such as *Pittosporum undulatum*. Once natives are established in the small gaps created from removal of weeds, further small patches of weeds can be removed from other locations within the grid thereby maintaining a relatively consistent level of understorey density. This staged methodology will largely be required in FA 2 and potentially FA 3 given the high weed density in these areas. This staged methodology is not required within FA 1 given the relatively lower proportion of weed infestations.

6.3.1.2. Maintenance Weeding

Maintenance weeding is to be undertaken throughout the entire subject site for a minimum period of five years to treat any regrowth of weeds.

Maintenance weeding involves the selective removal or treatment of weeds, whilst allowing planted native plants to increase in size, abundance and percentage cover. Weed control during each site visit must target Priority Weeds and Weeds of National Significance, followed by environmental weeds. Follow-up weeding is likely to be required at least every month until weeds are at negligible levels, whereby they do not compete with any planted tubestock nor occur in densities greater than $10/m^2$. Site visits may be more frequent or infrequent depending on weed levels.

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

Follow-up weeding must be implemented for a minimum period of five continuous years, upon the completion of the initial weeding. After the five-year follow-up and maintenance period has been completed, a review must be conducted to determine on-site maintenance requirements.

6.4. Weed Management in the Subject Site

6.4.1. Site Preparation

The directions under the following headings must be undertaken sequentially during weed management of the subject site.

6.4.1.1. Sediment Fencing

There is potential for runoff of surface soil to occur after initial weed management works. Temporary silt sediment fencing will be installed around the subject site to prevent soil runoff into surrounding bushland areas and Cumberland State Forest, especially after heavy rainfall events.

6.4.1.2. Installation of Tree Guards around Native Plants

Prior to commencing the initial weed management, remnant, endemic native herbs, grasses and shrubs in areas adjacent to weeding should have a plastic tree guard around them (with the exception of the large native shrubs/trees). 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.

6.4.1.3. Priority Weeds

The first priority for weed treatment in the subject site will be targeting mature individuals of the Priority Weed species and other weeds of regional concern recorded on the site. Perennial species can take several years to reach reproductive maturity so are easily controlled providing juveniles are continuously eradicated before reaching maturity.

It is recommended that all woody exotic shrubs and midstorey be cut at the base with a chainsaw, brush cutters or other suitable equipment. Immediately after cutting, the base of the stump should be sprayed with Glyphosate. A marker dye should be used in the herbicide solution to ensure areas are not missed. This and other methods to be used to treat exotic species are outlined in detail in **Appendix C**. Knapsack sprayers with a spray cone to direct the spray towards the ground should be used to prevent herbicide drift into adjacent vegetated areas.

6.4.1.4. Initial Weed Treatment

Following control of mature individuals of the main Priority Weed species and other weeds of regional concern, primary weeding should be undertaken throughout the regeneration areas. The aims of primary weeding will be:

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

The goal of primary weeding will be to eliminate all the larger weed infestations to allow planting to take place to fill gaps in the understorey and canopy without competition from weed species.

Primary weeding may involve techniques such as:

- The selective spraying of weeds, with selective and non-selective herbicides;
- Cutting/scraping and painting deep rooted woody weeds and climbers with hand tools, chainsaws and brush cutters and painting cut stumps with herbicides containing Glyphosate or Picloran; and
- Selective hand removal of weeds and wicker wiping of tall herbaceous weeds in situations where damage to proximate, low growing native plants can be avoided.

Primary weeding in the areas supporting remnant native vegetation can be implemented over the course of the first year in all zones where native vegetation is retained whereas primary weeding in areas proposed for supplementary planting can be implemented just before plantings are undertaken.

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

Following the initial weed spraying the subject site should be left for three weeks to allow time for treated weeds to die back. After this period the entire area should be resprayed with Glyphosate again, with a focus made on treating any exotic plant species that still have green colouring left in foliage.

6.4.1.5. Laying of Weed Suppression Materials

Several days after the second application of herbicide, weed suppression materials can be installed if required in areas with significant weed infestations. 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 to prevent erosion.

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 tube stock.

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 if required where intensive weed control is needed. Following application of weed suppression materials (if required) the subject site will be planted out with native plants from the list provided in **Appendix B**.

6.5. Ongoing Weed Maintenance

The most cost and time effective method of controlling weed regrowth is by spraying a non-selective glyphosate herbicide. A list of effective methods for control of weeds on site is found in **Appendix C**.

Follow-up weeding should be undertaken in all areas that have received past primary weeding treatments, to treat any regrowth of weeds. Ongoing maintenance of the subject site should occur for a five year period by the contracted bushland regeneration company to diminish the soil seed bank of exotic weed species present. In order to eliminate the occurrence of these species they need to be controlled before they have a chance to set seed, otherwise progress on the site will not be made.

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

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

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

2. A member of the team should then sweep the entire area, spraying all regrowth weeds between native plantings/remnant natives in open areas with herbicide, and spot spraying where possible in regeneration areas.

It is important during site visits for ongoing weed maintenance that as many weeds as possible are controlled so individuals are not able to achieve maturity and set seed between site visits. Some weed species such as *Bidens pilosa* (Cobbler's Pegs) 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 occurrences of exotic species it is important that individuals are not allowed to set seed.

During site visits for weed control, Priority Weeds, other weeds of regional concern, and WoNS (**Tables 3 - 4**) should be prioritised for control. For the subject site, control of Lantana and Privet should be given the highest priority given the extent of infestation. *Ludwigia peruviana* (Water Primrose) is also a priority around the dam in FA 2. Individual plants of these species on site should not be allowed to achieve a reproductive stage in their life cycles. Temporary sediment fencing should be retained until it is determined plants have established enough to prevent surface soil runoff.

Follow-up weeding should be implemented under this VMP for a minimum period of five continuous years, after initial works have been completed. After the initial five-year follow-up and maintenance period has been completed, a review should be conducted to determine on-going on-site maintenance requirements, especially following dedication of the area to NSW Forestry.

7. Restoration and Regeneration Plan

7.1. Objectives

The aim of restoration and regeneration actions within the subject site is to achieve the following performance based outcomes:

- Control threats affecting the health of regenerating native vegetation and inhibiting the future regeneration potential of these plant communities such as weed invasion;
- Increase species diversity and percentage cover of native vegetation plant species;
- Improve the resistance of native vegetation to future weed colonisation and establishment and related threats, by initiating the two above aims; and
- Use measurable indicators to monitor regeneration responses and to assist in prioritising bushland regeneration works during the proposed works program.

7.2. Vegetation Protection Measures

7.2.1. Fencing

As the vegetation subject to this VMP will be dedicated to NSW Forestry and will be connected to vegetation in Cumberland State Forest, no permanent fencing of bushland areas is proposed. Fencing will be limited to areas where the subject site borders parts of the approved residential development in Lot 1. As these fencelines form part of the proposed residential development, the locations of these are not shown within this VMP.

In accordance with Hills Shire Council guidelines, no fencing is required at the boundary of an association lot and adjoining lot/s that form a continuous area of native vegetation, unless the adjoining bushland is subject to grazing activities or similar that would pose a threat to biodiversity. As the vegetation within the subject site is to be dedicated to NSW Forestry and will form a continuous area of native vegetation with bushland within the adjacent Cumberland State Forest and will not be subject to grazing or other similar activities, no fencing is proposed for this VMP.

New fencing will be limited to areas where the subject site borders parts of the approved residential development in Lot 1. However, these fencelines form part of the proposed residential development and therefore do not form part of this VMP.

7.2.2. Signage

As the subject site will be dedicated to NSW Forestry and existing tracks/paths will be open to the public, installation of signage should be installed at any public access points to the bushland, such as at gates and tracks. **Figure 5** provides an indicative layout for signage although this is subject to change. The aim of the signage is to inform the public of the presence of environmentally significant vegetation and should be designed based on the following rules:

- A limited text count and simple language;
- Focus on visually attractive images to draw in readers;

- Highlight the nature and importance of the remnant bushland fragments in an urban landscape; and
- Made of a durable material with permanent and legible wording.

Signs should have a minimum size of A3 (297 mm x 420 mm).

7.3. Recommended Revegetation Techniques

As discussed previously, the subject site is proposed to be managed to encourage the enhancement of STIF and BGHF. If natural regeneration does not occur, then supplementary planting of species characteristic of STIF and BGHF will be undertaken. Appropriate plant species for STIF/BGHF within the subject site are provided in **Appendix B** and are to be used for selective re-vegetation of the subject site if required. Given the vegetation condition, it is expected that minimal supplementary planting will be required in FA1. Due to high weed density in the understorey, replanting in FA2 and FA3 will be required.

Plantings to be planted will be sourced from local provenance stock. The subset of BGHF and STIF groundcover species suitable for use within the Fuel Management Area (Zone 6) is indicated in **Appendix B**.

Plants 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 Bush Regeneration Contractor (BRC).

Local native plant species (seeds and propagules) should be collected using principles prescribed in 'Bringing the Bush back to Western Sydney' (DIPNR 2003). Seeds and vegetative propagules should be of local provenance from within the Hills Shire Council LGA, and not more than 10 kilometres from the site, be used for collection and propagation in a local commercial or community nursery.

It may be necessary to get the required amounts of seed and vegetative material contract-collected and grown-on by specialist nurseries. Local native plants should be grown in "Hiko" tube, maxi cell or viro-tube, or Forestry Tube-type containers.

7.3.1. Species Selection and Planting Densities

7.3.1.1. Species Selection

It is recommended that a mix of local native trees, shrubs, and ground layer plants are replanted, where required, at the specified densities outlined below. Lists of suitable plant species for revegetation of BGHF and STIF are provided in **Appendix B**. All plants must 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.

In order to maintain understorey density levels such that vegetation remains suitable as habitat for resident fauna, in particular the Powerful Owl, within the more weed infested areas of FA 2 and FA 3, fast-growing/colonising natives such as *Pittosporum undulatum* should be utilised to establish a degree of native understorey cover upon removal of dense patches of weeds. Subsequent revegetation should have due consideration to the initial colonising species utilised with species selection adjusted accordingly.

7.3.1.2. Plant Densities

Densities of the various strata for BGHF and STIF will differ between Bushland areas (Zone 1, Zone 2, Zone 3 and Zone 4), dam walls (Zone 5) and the Fuel Management area (Zone 6).

i. Bushland Areas

Although specific strata will be planted only in some bushland management zones (Zone 3, Zone 4), all bushland management zones should have the following indicative densities (or higher) for the various strata:

- Canopy Trees: 1 unit / 10 m^2
- Shrubs: 1 unit / 10 m^2
- Groundcovers: 3-4 units / 1 m^2 planted in clumps/thickets.

Revegetation should have due consideration to the initial colonising species utilised following primary weeding with species selection and density adjusted accordingly to maintain adequate plant densities.

ii. Dam walls

As the purpose of revegetation within Zone 5 is primarily to allow for stabilisation of dam banks via planting of fringing aquatic vegetation rather than creation of BGHF or STIF, no specific planting densities are provided. The existing *Eleocharis sphacelata* should be allowed to colonise dam walls naturally with supplementary planting provided as required to stabilise the banks of the dam.

iii. Fuel Management Area

While all existing canopy trees are to be retained within the Fuel Management Area, no further trees are to be planted. Retained trees are to be trimmed/pruned as required to achieve the issued hazard reduction requirements:

- All trees greater than 3m in height or greater than 300mm in girth (measured at 1.3m above ground) are to be retained;
- Skirting of trees (removal of branches within 2m of the ground) is permitted to a maximum distance of 20m from the rear of adjacent buildings; and
- At least 75% ground cover should be maintained.

7.3.2. 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 may be particularly planted in clumps to aid fertilisation and to create a natural grassland understorey within the bushland areas.

7.3.3. Re-vegetation Objectives to Maximise Fauna Utilisation

Native canopy, shrub and ground cover species can also establish and enhance habitat for local fauna species with the potential to occur within the subject site. Species considerations to maximise fauna utilisation of the subject site include:

- Increase winter flowering species;
- Include marsupial feed trees;
- Increase trees and groundcovers favoured by arboreal mammals such as flowering Eucalypts; and
- Include species that mature to form tree hollows (such as Eucalypts) for hollow-dependent fauna.

In particular, staging of revegetation in FA 2 and FA 3 (Zone 3 and Zone 4) should be closely aligned with staged primary weeding, using fast-growing/colonising natives such as *Pittosporum undulatum* to establish a degree of native understorey cover upon removal of dense patches of weeds such that vegetation remains suitable as habitat for resident fauna, in particular the Powerful Owl.

7.4. Site Preparation

Site preparation activities for the subject site will include preliminary weed control. Areas with existing native vegetation will largely be left to regenerate naturally with ongoing and sustained weed eradication.

Recommended strategies should include:

- Initial and ongoing control of weeds and competing grasses using bushland regeneration techniques and conventional best practice chemical and physical strategies;
- Stabilising soils within areas (if required) using square jute fibre mats, or a similar sturdy biodegradable material, in areas following initial weed control;
- Planting of trees, shrubs, and ground cover species; and
- Ongoing maintenance (weeding, replacing dead plantings and repairing / replacing weed mat if need during the planting establishment period), as a part of an ongoing maintenance programme.

7.5. Schedule of Works

The measures that are planned over the five-year time period of this VMP are as follows:

7.5.1. Year 1

- Primary weed control, focussing on large woody weeds, shrubs over 50 cm in height and vines;
- Planting of canopy species to increase canopy diversity in Zone 3 and Zone 4;

- Planting of shrub, and groundcover species;
- Replacement of any tube stock individuals that have died between site visits; and
- Monitoring, management and reporting.

7.5.2. Years 2 and 3

- Control of weed regrowth in areas that have had primary weed control;
- Reduce ground layer and mid storey weed density;
- Targeted planting where required on boundaries or where recruitment is minimal; and
- Monitoring, management and reporting.

7.5.3. Years 4 and 5

- On-going weed control; and
- Monitoring, management and reporting.

Vegetation management and maintenance of the subject site will be ongoing and in perpetuity. After the initial five-year follow-up and maintenance period has been completed, a review will be conducted to determine on-going on-site maintenance and management requirements, particularly following dedication to the NSW Forestry Commission.

8. Monitoring and Reporting

It is recommended that a project manager/supervisor with the Bush Regeneration Contractor (BRC) be assigned to coordinate, supervise and manage all works and correspondence with respect to the restoration and management of 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). Regular monitoring and feedback from personnel will assist in the allocation of labour relative to available funds.

8.1. Monitoring Program

An annual monitoring program will be implemented in the subject site to document the progress of the activities outlined in this VMP. The following activities are to be conducted as part of the annual monitoring program:

- Establish a series of fixed monitoring points in the subject site. Indicative locations for photo points are shown in **Figure 6**. Four photos will be taken at the monitoring point prior to commencement of the restoration works in a north, south, east, and west direction to establish a baseline visual assessment of the site. Four photos should also be taken from the monitoring point during each monitoring survey to visually document the progression of the restoration works;
- Conduct random meanders across the site, noting species diversity of different strata and significant areas of failed plantings;
- Note any other weed outbreaks in the regeneration and restoration areas. This can be done while walking between monitoring points;
- Annual mapping will be undertaken to reflect changes in weed density for the works program for each year;
- Note survival percentage of any planting undertaken for each management zone;
- Note areas where erosion control is inadequate and needed; and
- Note areas where natural regeneration of native species is not occurring and planting is needed.

Baseline monitoring will be conducted before weed control commences. Once initial plantings are complete in necessary locations and weed control has commenced, monitoring will be conducted every year for the life of the VMP.

Maintenance visits will initially be conducted once every month in the 1st year of the VMP. This can be reduced to once every two months for the 2nd and 3rd year of the VMP and then to every three months in Years 4 – 5 following establishment of vegetation. This results in 12 maintenance visits in Year 1, six visits in Years 2-3 and 4 visits in Years 4 – 5. Alternatively, a monthly regime with progressively smaller teams from Year 2 to Year 5 can be implemented, particularly for weeding works in areas around the dam.

8.2. Reporting

Based on the results of annual monitoring inspections a brief and concise annual report will be prepared documenting the progress of restoration works against required planting/strata densities and the performance criteria listed in **Table 7**. Each annual report is to be submitted to The Hills Shire Council. The annual reports will:

- Describe any rehabilitation and revegetation 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 for the next year's works.

Each annual report should contain the photographs, as well as a short description of weeds present and a short comparison of the photographs to the previous years. Any other notable occurrences of weeds should also be reported. The reports 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 of this VMP documenting the success of the works against performance criteria. This report should also provide recommendations for ongoing and in perpetuity management and monitoring strategies based on the vegetation condition at the end of the duration of this VMP.

9. Timing and Responsibilities

The subject site is to be managed in a series of phases as follows:

- Phase 1 – Site Preparation
- Phase 2 - Restoration Works Commence
- Phase 3 – Maintenance
- Phase 4 – Monitoring and Reporting

Timing and responsibilities at each phase of management within the subject site are shown within **Table 6**. These tables assign each activity for the subject site within each phase to those responsible. The required performance criteria are provided in **Table 7**.

Table 5 Timing and Responsibilities for VMP work

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Phase 1 Site Preparation					
Establish fixed monitoring points	Bush Regeneration Contractor or Ecologist	Using star pickets and GPS establish a series of monitoring sites that can be used for photograph comparison, measuring weed and plant retention.	All monitoring points have a star picket installed and photographs taken for documentation.	Install star picket at all monitoring points.	Prior to commencement of management works
Installation of signage identifying areas of bushland reconstruction	Property Owner or Subcontractor	All areas adjacent to native vegetation to be planted.	Signs have been installed and locations documented.	Install signs in appropriate area.	Prior to commencement of Phase 2
Phase 2 - Works Commence					
Baseline Condition records.	Bush Regeneration Contractor	Photographs of fixed monitoring sites before initial weeding	Photograph have been taken.	Take photographs.	Prior to commencement of management works
Carry out initial weeding.	Bush Regeneration Contractor/ Botanist	Woody weed infestations and priority weeds and WONS removed - Reproductively mature plants absent from site.	Primary weeding completed and documented.	Targeted weeding	First month of management works
Revegetate where required. Canopy, small tree, shrub, and ground cover species are	Bush Regeneration Contractor	Native plants have been planted in all vegetation strata where required.	Planting has occurred and been documented.	Undertake planting works.	First month of management works

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
planted according to species list in **Appendix B**.					
Fixed Point Monitoring.	Bush Regeneration Contractor	Photographs of fixed monitoring sites to compare the survival and retention of plantings.	Photographs have been taken.	Take photographs.	Before commencement and then annually
Carry out maintenance weeding.	Bush Regeneration Contractor	Weed regrowth following primary weeding removed. Work has commenced on control of annual weed species.	Weeding of regrowth following primary weeding completed and documented.	Targeted weeding.	Following primary weeding, site visits monthly.
Phase 3 – Maintenance					
Carry out maintenance weeding throughout the site	Bush Regeneration Contractor	Priority weeds cover is reduced annually, ranging from less than 2-10% cover over the 5 year period (see Table 7 for details)	Maintenance weeding completed and documented	Undertake maintenance weeding.	Monthly for the duration of 5 year maintenance period under VMP
		Non-priority weed cover is reduced annually, ranging from less than 4-15% cover over the 5 year period (see Table 7 for details)	Photomonitoring, meander survey results.		
		No new weed species or 'large scale / dense' weed infestations, including the encroachment of exotic lawn/vegetation into area of bush land regeneration.	Photomonitoring, meander survey results.		

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		Large scale/dense infestation = an area >2m x 2m without successfully established native plantings. New weed infestations = areas with infestation not previously recorded on the site in quarterly / annual monitoring reports			
Maintenance of plantings	Bush Regeneration Contractor	Survival rate of plantings is 90-95% in earlier years. or stratum density is similar to that specified in the VMP via natural recruitment	Photomonitoring, meander survey results.	Any dead plantings replaced, especially if natural recruitment does not occur	Annually for the duration of 5 year maintenance period under VMP
		Species diversity and density equal to or greater than baseline data	Photomonitoring, meander survey results.	Additional plantings where required due to observed gaps in any strata.	
		Plants watered when drought stressed	Plants are watered during times of drought and documented.	Water plants in times of drought.	
Phase 4 - Monitoring and reporting					
Inspection of site completed as outlined in Chapter 8	Bushland Management or Ecologist	Survival rate of plantings is 90-95% in earlier years. or stratum density is similar to that specified in the VMP via natural recruitment	Photomonitoring, meander survey results.	Undertake replanting, especially if natural recruitment does not occur	Annually for 5 year maintenance period of VMP

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		Priority weeds cover is reduced annually, ranging from less than 2-10% cover over the 5 year period (see Table 7 for details)	Photomonitoring, meander survey results.	Targeted weeding.	
		Non-priority weed cover is reduced annually, ranging from less than 4-15% cover over the 5 year period (see Table 7 for details)	Photomonitoring, meander survey results.	Targeted weeding.	
		Species diversity and density equal to or greater than previous inspection.	Photomonitoring, meander survey results.	Undertake replanting and/or plant additional species.	
		No encroachment of exotic vegetation into area of bush land regeneration	Photomonitoring, meander survey results.	Targeted weeding and/or installation of physical barrier.	
		No erosion or sedimentation into areas of bush land regeneration.	Photographic evidence	Installation of further sediment/erosion controls.	
Progress report preparation.	Bushland Management or Ecologist	Annual Report prepared on progress of restoration works including all data collected in biannual inspections.	Results of data analysis of all data collected in biannual inspections.	Undertake corrective measures including: targeted weeding, replanting or additional species plantings and install additional sediment/erosion controls.	Once a year for the 5 year maintenance period of VMP
Final Inspection of Site carried out at completion of VMP.	Bushland Management or Ecologist	Survival rate of plantings is 95% or stratum density is similar to that specified in	Photomonitoring, meander survey results.	Extend life of VMP until performance criteria is met.	After 5 years of maintenance under VMP

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		the VMP via natural recruitment			
		Priority weeds to be less than 2% cover.	Photomonitoring, meander survey results.	Extend life of VMP until performance criteria is met.	
		Non-priority weeds to be less than 4% cover.	Photomonitoring, meander survey results.	Extend life of VMP until performance criteria is met.	
		Species diversity and density equal to or greater than previous inspection.	Photomonitoring, meander survey results.	Extend life of VMP until performance criteria is met.	
		No encroachment of exotic lawn/vegetation into area of bush land regeneration	Photomonitoring, meander survey results.	Extend life of VMP until performance criteria is met.	
Final Report.	Bushland Management or Ecologist	Final report detailing success of restoration or outlining further works needed.	Results of data analysis of all data collected for the life of the VMP.	Extend life of VMP until performance criteria are met.	After 5 years of maintenance under VMP

Table 6 Performance Criteria for Weed Cover and Planting density

Performance Criteria	Year 1	Year 2	Year 3	Year 4	Year 5
Priority weed cover	<15%	<10%	<7.5%	<5%	<2.5%
Non-priority weed cover	<20%	<15%	<12%	<10%	<5%
Presence of new weed species or 'large scale / dense' weed infestations, (Large scale/dense infestation = an area >2m x 2m without successfully established native plantings. New weed infestations = areas with infestation not previously recorded on the site in quarterly / annual monitoring reports)	2 - 3 scattered patches maximum	1-2 scattered patches maximum	None	None	None
Survival rate of plantings	80%	85%	Survival rate of plantings is 90% or stratum density is similar to that specified in the VMP via natural recruitment	Survival rate of plantings is 95% or stratum density is similar to that specified in the VMP via natural recruitment	Survival rate of plantings is 95% or stratum density is similar to that specified in the VMP via natural recruitment

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APPENDIX A :
Recorded Flora Species List

Table 7 Flora species recorded within the subject site and adjacent parts of Concept DA VMP area/Open Space DA VMP area

Scientific Name	Common Name	Status	BAM Growth Form Group
Acacia elata	Mountain Cedar Wattle	Native	Tree (TG)
Acacia falciformis	Broad-leaved Hickory	Native	Shrub (SG)
Acacia floribunda	White Sally	Native	Shrub (SG)
Acacia implexa	Hickory Wattle	Native	Shrub (SG)
Acacia longifolia var. longifolia	Sydney Golden Wattle	Native	Shrub (SG)
Acacia parramattensis	Parramatta Wattle	Native	Tree (TG)
Acacia parvipinnula	Silver-stemmed Wattle	Native	Shrub (SG)
Acacia podalyriifolia	Queensland Silver Wattle	Native	Shrub (SG)
Acacia spp.	Wattle	Native	Shrub (SG)
Adiantum aethiopicum	Common Maidenhair	Native	Fern (EG)
Allocasuarina littoralis	Black She-Oak	Native	Tree (TG)
Allocasuarina torulosa	Forest Oak	Native	Tree (TG)
Alphitonia excelsa	Red Ash	Native	Tree (TG)
Alternanthera denticulata	Lesser Joyweed	Native	Forb (FG)
Angophora costata	Sydney Red Gum	Native	Tree (TG)
Asplenium australasicum	Bird's Nest Fern	Native	Fern (EG)
Brachychiton acerifolius	Illawarra Flame Tree	Native	Tree (TG)
Breynia oblongifolia	Coffee Bush	Native	Shrub (SG)
Bursaria spinosa	Native Blackthorn	Native	Shrub (SG)
Callistemon salignus	Willow Bottlebrush	Native	Shrub (SG)
Callistemon viminalis	Weeping Bottlebrush	Native	Tree (TG)
Calochlaena dubia	Rainbow Fern	Native	Other (OG)
Carex inversa	Knob Sedge	Native	Grass & grasslike (GG)
Carex longebrachiata		Native	Grass & grasslike (GG)
Casuarina cunninghamiana	River Oak	Native	Tree (TG)
Casuarina glauca	Swamp Oak	Native	Tree (TG)
Cayratia clematidea	Native Grape	Native	Other (OG)
Cissus antarctica	Water Vine	Native	Other (OG)
Clematis aristata	Old Man's Beard	Native	Other (OG)
Clematis glycinoides	Headache Vine	Native	Other (OG)
Commelina cyanea	Native Wandering Jew	Native	Forb (FG)
Cordyline stricta	Narrow-leaved Palm Lily	Native	Other (OG)
Corymbia maculata	Spotted Gum	Native	Tree (TG)
Cupaniopsis anacardioides	Tuckeroo	Native	Tree (TG)

Scientific Name	Common Name	Status	BAM Growth Form Group
Cymbopogon refractus	Barbed Wire Grass	Native	Grass & grasslike (GG)
Cynodon dactylon	Common Couch	Native	Grass & grasslike (GG)
Cyperus gracilis	Slender Flat-sedge	Native	Grass & grasslike (GG)
Cyperus spp.		Native	Grass & grasslike (GG)
Denhamia silvestris	Narrow-leaved Orangebark	Native	Shrub (SG)
Dianella caerulea var. producta		Native	Forb (FG)
Dichondra repens	Kidney Weed	Native	Forb (FG)
Doodia aspera		Native	Fern (EG)
Doryanthes excelsa	Gymea Lily	Native	Other (OG)
Echinopogon ovatus	Forest Hedgehog Grass	Native	Grass & grasslike (GG)
Einadia hastata	Berry Saltbush	Native	Forb (FG)
Elaeocarpus reticulatus	Blueberry Ash	Native	Shrub (SG)
Entolasia marginata	Bordered Panic	Native	Grass & grasslike (GG)
Eragrostis leptostachya	Paddock Lovegrass	Native	Grass & grasslike (GG)
Eucalyptus amplifolia	Cabbage Gum	Native	Tree (TG)
Eucalyptus botryoides	Bangalay	Native	Tree (TG)
Eucalyptus microcorys	Tallowood	Native	Tree (TG)
Eucalyptus paniculata	Grey Ironbark	Native	Tree (TG)
Eucalyptus pilularis	Blackbutt	Native	Tree (TG)
Eucalyptus resinifera	Red Mahogany	Native	Tree (TG)
Eucalyptus saligna	Sydney Blue Gum	Native	Tree (TG)
Eucalyptus tereticornis	Forest Red Gum	Native	Tree (TG)
Eustrephus latifolius	Wombat Berry	Native	Other (OG)
Exocarpos cupressiformis	Cherry Ballart	Native	Shrub (SG)
Ficus coronata	Creek Sandpaper Fig	Native	Shrub (SG)
Geitonoplesium cymosum	Scrambling Lily	Native	Other (OG)
Geranium homeanum		Native	Forb (FG)
Glochidion ferdinandi	Cheese Tree	Native	Tree (TG)
Glycine clandestina	Twining glycine	Native	Other (OG)
Glycine microphylla	Small-leaf Glycine	Native	Other (OG)
Glycine tabacina	Variable Glycine	Native	Other (OG)
Grevillea robusta	Silky Oak	Native	Tree (TG)
Gynochthodes jasminoides	Sweet Morinda	Native	Other (OG)
Hardenbergia violacea	False Sarsaparilla	Native	Other (OG)
Hibiscus heterophyllus	Native Rosella	Native	Shrub (SG)

Scientific Name	Common Name	Status	BAM Growth Form Group
Homalanthus populifolius		Native	Shrub (SG)
Hydrocotyle tripartita	Pennywort	Native	Forb (FG)
Imperata cylindrica	Blady Grass	Native	Grass & grasslike (GG)
Kennedia rubicunda	Dusky Coral Pea	Native	Other (OG)
Lepidosperma laterale	Variable Sword-sedge	Native	Grass & grasslike (GG)
Leptospermum petersonii	Lemon-scented Teatree	Native	Shrub (SG)
Leucopogon juniperinus	Prickly Beard-heath	Native	Shrub (SG)
Lobelia purpurascens	whiteroot	Native	Forb (FG)
Lomandra longifolia	Spiny-headed Mat-rush	Native	Grass & grasslike (GG)
Melaleuca bracteata	Black Tea-tree	Native	Shrub (SG)
Melaleuca styphelioides	Prickly-leaved Tea Tree	Native	Shrub (SG)
Melia azedarach	White Cedar	Native	Tree (TG)
Microlaena stipoides	Weeping Grass	Native	Grass & grasslike (GG)
Microlaena stipoides var. stipoides	Weeping Grass	Native	Grass & grasslike (GG)
Morinda jasminoides	Sweet Morinda	Native	Other (OG)
Myrsine variabilis		Native	Shrub (SG)
Nephrolepis cordifolia	Fishbone Fern	Native	Fern (EG)
Notelaea longifolia	Large Mock-olive	Native	Tree (TG)
Notelaea longifolia f. longifolia		Native	Tree (TG)
Oplismenus aemulus		Native	Grass & grasslike (GG)
Oplismenus imbecillis		Native	Grass & grasslike (GG)
Oxalis perennans		Native	Forb (FG)
Ozothamnus diosmifolius	White Dogwood	Native	Shrub (SG)
Pandorea pandorana	Wonga Wonga Vine	Native	Other (OG)
Parsonsia straminea	Common Silkpod	Native	Other (OG)
Passiflora herbertiana		Native	Other (OG)
Pellaea falcata	Sickle Fern	Native	Fern (EG)
Persicaria decipiens	Slender Knotweed	Native	Forb (FG)
Pittosporum revolutum	Rough Fruit Pittosporum	Native	Shrub (SG)
Pittosporum undulatum	Sweet Pittosporum	Native	Shrub (SG)
Plantago debilis	Shade Plantain	Native	Forb (FG)
Platylobium formosum		Native	Shrub (SG)
Plectranthus parviflorus		Native	Forb (FG)
Poa affinis		Native	Grass & grasslike (GG)
Polyscias sambucifolia	Elderberry Panax	Native	Shrub (SG)

Scientific Name	Common Name	Status	BAM Growth Form Group
Pseuderanthemum variabile	Pastel Flower	Native	Forb (FG)
Pteridium esculentum	Bracken	Native	Fern (EG)
Pteris vittata	Chinese Brake	Native	Fern (EG)
Rubus parvifolius	Native Raspberry	Native	Shrub (SG)
Rumex brownii	Swamp Dock	Native	Forb (FG)
Sarcopetalum harveyanum	Pearl Vine	Native	Other (OG)
Senecio diaschides		Native	Forb (FG)
Sigesbeckia orientalis	Indian Weed	Native	Forb (FG)
Solanum aviculare	Kangaroo Apple	Native	Shrub (SG)
Solanum prinophyllum	Forest Nightshade	Native	Forb (FG)
Sporobolus creber	Slender Rat's Tail Grass	Native	Grass & grasslike (GG)
Stephania japonica	Snake vine	Native	Other (OG)
Stephania japonica var. discolor	Snake Vine	Native	Other (OG)
Syncarpia glomulifera	Turpentine	Native	Tree (TG)
Tetragonia tetragonoides	New Zealand Spinach	Native	Forb (FG)
Trema aspera	Native Peach	Native	Shrub (SG)
Trema tomentosa	Native Peach	Native	Shrub (SG)
Tristaniopsis laurina	Kanooka	Native	Tree (TG)
Tylophora barbata	Bearded Tylophora	Native	Other (OG)
Typha orientalis	Broad-leaved Cumbungi	Native	Grass & grasslike (GG)
Veronica plebeia	Trailing Speedwell	Native	Forb (FG)
Viola hederacea	Ivy-leaved Violet	Native	Forb (FG)
Zieria smithii	Sandfly Zieria	Native	Shrub (SG)
Acetosa sagittata	Rambling Dock	Exotic	-
Anredera cordifolia	Madeira Vine	Exotic	-
Araujia sericifera	Moth Vine	Exotic	-
Arundo donax	Giant Reed	Exotic	-
Asparagus aethiopicus	Asparagus Fern	Exotic	-
Asparagus asparagoides	Bridal Creeper	Exotic	-
Asparagus plumosus	Climbing Asparagus Fern	Exotic	-
Axonopus fissifolius	Narrow-leafed Carpet Grass	Exotic	-
Bidens pilosa	Cobbler's Pegs	Exotic	-
Briza minor	Shivery Grass	Exotic	-
Bromus catharticus	Praire Grass	Exotic	-
Callisia fragrans	Inch Plant	Exotic	-

Scientific Name	Common Name	Status	BAM Growth Form Group
Camelina spp.		Exotic	-
Celtis sinensis	Japanese Hackberry	Exotic	-
Cenchrus clandestinus	Kikuyu Grass	Exotic	-
Cerastium glomeratum	Mouse-ear Chickweed	Exotic	-
Cestrum parqui	Green Cestrum	Exotic	-
Cinnamomum camphora	Camphor Laurel	Exotic	-
Cirsium vulgare	Spear Thistle	Exotic	-
Conyza bonariensis	Flaxleaf Fleabane	Exotic	-
Conyza sumatrensis	Tall fleabane	Exotic	-
Cordyline australis	Cabbage Tree	Exotic	-
Corymbia citriodora	Lemon-scented Gum	Exotic	-
Crassocephalum crepidioides	Thickhead	Exotic	-
Cyperus brevifolius		Exotic	-
Cyperus eragrostis	Umbrella Sedge	Exotic	-
Dietes grandiflora		Exotic	-
Digitaria sanguinalis	Crab Grass	Exotic	-
Echinochloa crus-galli	Barnyard Grass	Exotic	-
Ehrharta erecta	Panic Veldtgrass	Exotic	-
Eleusine tristachya	Goose Grass	Exotic	-
Fumaria muralis	Wall Fumitory	Exotic	-
Gamochaeta americana	Purple Cudweed	Exotic	-
Harpephyllum caffrum		Exotic	-
Hedera helix	English Ivy	Exotic	-
Hypochaeris radicata	Catsear	Exotic	-
Hypochoeris radicata	Catsear	Exotic	-
Jacaranda mimosifolia	Jacaranda	Exotic	-
Juncus bufonius	Toad Rush	Exotic	-
Lantana camara	Lantana	Exotic	-
Ligustrum lucidum	Large-leaved Privet	Exotic	-
Ligustrum sinense	Small-leaved Privet	Exotic	-
Liquidambar styraciflua	Sweetgum	Exotic	-
Liriope muscari	big blue lilyturf	Exotic	-
Lotus uliginosus	Birds-foot Trefoil	Exotic	-
Ludwigia peruviana		Exotic	-
Lysimachia arvensis	Scarlet Pimpernel	Exotic	-

Scientific Name	Common Name	Status	BAM Growth Form Group
Medicago polymorpha	Burr Medic	Exotic	-
Megathyrsus maximus		Exotic	-
Modiola caroliniana	Red-flowered Mallow	Exotic	-
Monstera deliciosa	Fruit Salad Plant	Exotic	-
Nandina domestica	Japanese Sacred Bamboo	Exotic	-
Ochna serrulata	Mickey Mouse Plant	Exotic	-
Olea europaea subsp. cuspidata	African Olive	Exotic	-
Oxalis corniculata	Creeping Oxalis	Exotic	-
Paspalum dilatatum	Paspalum	Exotic	-
Paspalum urvillei	Vasey Grass	Exotic	-
Passiflora edulis	Common Passionfruit	Exotic	-
Passiflora suberosa	Cork Passionfruit	Exotic	-
Phoenix canariensis	Canary Island Date Palm	Exotic	-
Phyllanthus tenellus	Hen and Chicken	Exotic	-
Phytolacca octandra	Inkweed	Exotic	-
Plantago lanceolata	Lamb's Tongues	Exotic	-
Poa annua	Winter Grass	Exotic	-
Rhaphiolepis indica	Indian Hawthorn	Exotic	-
Rubus fruticosus	Blackberry complex	Exotic	-
Rumex crispus	Curled Dock	Exotic	-
Schefflera arboricola		Exotic	-
Senecio madagascariensis	Fireweed	Exotic	-
Senna pendula		Exotic	-
Senna pendula var. glabrata		Exotic	-
Setaria parviflora		Exotic	-
Sida rhombifolia	Paddy's Lucerne	Exotic	-
Solanum capsicoides	Devil's Apple	Exotic	-
Solanum mauritianum	Wild Tobacco Bush	Exotic	-
Solanum nigrum	Black-berry Nightshade	Exotic	-
Solanum pseudocapsicum	Madeira Winter Cherry	Exotic	-
Solanum seaforthianum	Climbing Nightshade	Exotic	-
Soliva sessilis	Bindyi	Exotic	-
Sonchus asper	Prickly Sowthistle	Exotic	-
Sonchus oleraceus	Common Sowthistle	Exotic	-
Sporobolus africanus	Parramatta Grass	Exotic	-

Scientific Name	Common Name	Status	BAM Growth Form Group
Sporobolus fertilis	Giant Parramatta Grass	Exotic	-
Stachys arvensis	Stagger Weed	Exotic	-
Stellaria media	Common Chickweed	Exotic	-
Strelitzia nicolai		Exotic	-
Strelitzia reginae		Exotic	-
Taraxacum officinale	Dandelion	Exotic	-
Tradescantia fluminensis	Wandering Jew	Exotic	-
Triadica sebifera	Chinese Tallowood	Exotic	-
Trifolium repens	White Clover	Exotic	-
Verbena bonariensis	Purpletop	Exotic	-
Verbena quadrangularis		Exotic	-
Veronica arvensis	Wall Speedwell	Exotic	-
Vicia sativa	Common vetch	Exotic	-
Viola odorata	Sweet Violet	Exotic	-

APPENDIX B :
Planting List

Table 8 Species Planting List

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Casuarinaceae	*Allocasuarina littoralis*	Black She-Oak	Tree (TG)	x		
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	Tree (TG)	x	x	
Fabaceae (Mimosoideae)	*Acacia decurrens*	Black Wattle	Tree (TG)	x	x	
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle	Tree (TG)	x	x	
Lamiaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum	Tree (TG)	x	x	
Meliaceae	*Melia azedarach*	White Cedar	Tree (TG)	x	x	
Myrtaceae	*Acmena smithii*	Lilly Pilly	Tree (TG)		x	
Myrtaceae	*Angophora costata*	Sydney Red Gum	Tree (TG)	x		
Myrtaceae	*Angophora floribunda*	Rough-barked Apple	Tree (TG)	x	x	
Myrtaceae	*Eucalyptus globoidea*	White Stringybark	Tree (TG)	x		
Myrtaceae	*Eucalyptus paniculata*	Grey Ironbark	Tree (TG)	x	x	
Myrtaceae	*Eucalyptus pilularis*	Blackbutt	Tree (TG)	x	x	
Myrtaceae	*Eucalyptus punctata*	Grey Gum	Tree (TG)	x		
Myrtaceae	*Eucalyptus resinifera subsp. resinifera*		Tree (TG)	x	x	
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum	Tree (TG)	x	x	
Myrtaceae	*Syncarpia glomulifera*	Turpentine	Tree (TG)	x	x	

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Oleaceae	*Notelaea longifolia f. longifolia*		Tree (TG)	x	x	
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree	Tree (TG)	x	x	
Rhamnaceae	*Alphitonia excelsa*	Red Ash	Tree (TG)		x	
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax	Shrub (SG)	x	x	
Asteraceae	*Ozothamnus diosmifolius*	White Dogwood	Shrub (SG)	x	x	
Celastraceae	*Denhamia silvestris*	Narrow-leaved Orangebark	Shrub (SG)	x	x	
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower	Shrub (SG)	x	x	
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash	Shrub (SG)	x	x	
Ericaceae	*Leucopogon juniperinus*	Prickly Beard-heath	Shrub (SG)	x	x	
Euphorbiaceae	*Homalanthus populifolius*		Shrub (SG)	x	x	
Fabaceae (Faboideae)	*Daviesia ulicifolia*	Gorse Bitter Pea	Shrub (SG)	x		
Fabaceae (Faboideae)	*Indigofera australis*	Australian Indigo	Shrub (SG)		x	
Fabaceae (Faboideae)	*Platylobium formosum*		Shrub (SG)	x	x	
Fabaceae (Mimosoideae)	*Acacia falciformis*	Broad-leaved Hickory	Shrub (SG)	x	x	
Fabaceae (Mimosoideae)	*Acacia floribunda*	White Sally	Shrub (SG)	x	x	
Fabaceae (Mimosoideae)	*Acacia implexa*	Hickory Wattle	Shrub (SG)	x	x	
Fabaceae (Mimosoideae)	*Acacia linifolia*	White Wattle	Shrub (SG)	x		
Fabaceae (Mimosoideae)	*Acacia longifolia var. longifolia*	Sydney Golden Wattle	Shrub (SG)	x		

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Fabaceae (Mimosoideae)	*Acacia ulicifolia*	Prickly Moses	Shrub (SG)	x		
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush	Shrub (SG)		x	
Myrtaceae	*Kunzea ambigua*	Tick Bush	Shrub (SG)	x		
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	Shrub (SG)	x	x	
Phyllanthaceae	*Phyllanthus hirtellus*	Thyme Spurge	Shrub (SG)	x		
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn	Shrub (SG)	x	x	
Pittosporaceae	*Pittosporum revolutum*	Rough Fruit Pittosporum	Shrub (SG)	x	x	
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	Shrub (SG)	x	x	
Primulaceae	*Myrsine variabilis*		Shrub (SG)	x	x	
Proteaceae	*Hakea sericea*	Needlebush	Shrub (SG)	x		
Proteaceae	*Lomatia silaifolia*	Crinkle Bush	Shrub (SG)	x		
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung	Shrub (SG)	x	x	
Rosaceae	*Rubus parvifolius*	Native Raspberry	Shrub (SG)		x	
Rutaceae	*Correa reflexa*	Native Fuschia	Shrub (SG)	x		
Rutaceae	*Zieria smithii*	Sandfly Zieria	Shrub (SG)	x	x	
Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart	Shrub (SG)	x	x	
Sapindaceae	*Dodonaea triquetra*	Large-leaf Hop-bush	Shrub (SG)	x	x	
Thymelaeaceae	*Pimelea linifolia*	Slender Rice Flower	Shrub (SG)	x		

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Ulmaceae	*Trema tomentosa var. aspera*	Native Peach	Shrub (SG)		x	
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower	Forb (FG)	x	x	✓
Apiaceae	*Centella asiatica*	Indian Pennywort	Forb (FG)	x	x	✓
Apiaceae	*Hydrocotyle peduncularis*		Forb (FG)	x	x	✓
Asteraceae	*Senecio hispidulus*	Hill Fireweed	Forb (FG)		x	
Asteraceae	*Sigesbeckia orientalis subsp. orientalis*	Indian Weed	Forb (FG)		x	
Campanulaceae	*Lobelia purpurascens*	Whiteroot	Forb (FG)	x	x	✓
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	Forb (FG)		x	✓
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	Forb (FG)	x	x	
Commelinaceae	*Commelina cyanea*	Native Wandering Jew	Forb (FG)	x	x	✓
Convolvulaceae	*Dichondra repens*	Kidney Weed	Forb (FG)	x	x	✓
Fabaceae (Faboideae)	*Desmodium rhytidophyllum*		Forb (FG)		x	✓
Geraniaceae	*Geranium homeanum*		Forb (FG)		x	✓
Goodeniaceae	*Brunoniella australis*	Blue Trumpet	Forb (FG)		x	✓
Goodeniaceae	*Goodenia hederacea*	Ivy Goodenia	Forb (FG)	x		
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort	Forb (FG)	x	x	
Lamiaceae	*Plectranthus parviflorus*		Forb (FG)		x	

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Oxalidaceae	*Oxalis exilis*		Forb (FG)	x	x	✓
Oxalidaceae	*Oxalis perennans*		Forb (FG)	x	x	✓
Phormiaceae	*Dianella caerulea*	Blue Flax-lily	Forb (FG)	x		
Phormiaceae	*Dianella longifolia*	Blueberry Lily	Forb (FG)	x	x	
Phormiaceae	*Dianella revoluta*	Blueberry Lily	Forb (FG)	x		
Phyllanthaceae	*Poranthera microphylla*	Small Poranthera	Forb (FG)	x	x	✓
Plantaginaceae	*Plantago debilis*	Shade Plantain	Forb (FG)		x	✓
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell	Forb (FG)	x	x	✓
Polygonaceae	*Rumex brownii*	Swamp Dock	Forb (FG)		x	✓
Rubiaceae	*Galium propinquum*	Maori Bedstraw	Forb (FG)		x	✓
Rubiaceae	*Pomax umbellata*	Pomax	Forb (FG)	x		✓
Solanaceae	*Solanum prinophyllum*	Forest Nightshade	Forb (FG)	x	x	✓
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern	Fern (EG)		x	
Blechnaceae	*Doodia aspera*		Fern (EG)		x	
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	Fern (EG)		x	
Pteridaceae	*Adiantum aethiopicum*	Common Maidenhair	Fern (EG)	x	x	
Pteridaceae	*Cheilanthes sieberi subsp. sieberi*	Rock Fern	Fern (EG)	x		✓
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	Grass & grasslike (GG)		x	✓

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Cyperaceae	*Cyperus laevis*		Grass & grasslike (GG)		x	✓
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge	Grass & grasslike (GG)	x		
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge	Grass & grasslike (GG)	x		
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush	Grass & grasslike (GG)	x	x	✓
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	Grass & grasslike (GG)	x	x	
Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush	Grass & grasslike (GG)	x		
Lomandraceae	*Lomandra obliqua*		Grass & grasslike (GG)	x		✓
Poaceae	*Aristida vagans*	Threeawn Speargrass	Grass & grasslike (GG)	x		
Poaceae	*Austrostipa rudis*		Grass & grasslike (GG)	x		
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass	Grass & grasslike (GG)	x		✓
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass	Grass & grasslike (GG)	x	x	
Poaceae	*Digitaria parviflora*	Small-flowered Finger Grass	Grass & grasslike (GG)	x	x	
Poaceae	*Echinopogon caespitosus*	Bushy Hedgehog-grass	Grass & grasslike (GG)	x	x	✓
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	*Entolasia marginata*	Bordered Panic	Grass & grasslike (GG)	x	x	
Poaceae	*Entolasia stricta*	Wiry Panic	Grass & grasslike (GG)	x		
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass	Grass & grasslike (GG)	x	x	✓

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Poaceae	*Imperata cylindrica var. major*	Blady Grass	Grass & grasslike (GG)	x	x	
Poaceae	*Microlaena stipoides var. stipoides*	Weeping Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	*Oplismenus aemulus*	Australian Basket Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	*Oplismenus imbecillis*	Creeping Beard Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	*Panicum simile*	Two-colour Panic	Grass & grasslike (GG)	x		✓
Poaceae	*Poa affinis*		Grass & grasslike (GG)	x	x	
Poaceae	*Rytidosperma racemosum*	Wallaby Grass	Grass & grasslike (GG)	x		
Poaceae	*Rytidosperma tenuius*		Grass & grasslike (GG)	x		
Poaceae	*Themeda australis*	Kangaroo Grass	Grass & grasslike (GG)	x	x	✓
Apocynaceae	*Parsonsia straminea*	Common Silkpod	Other (OG)	x		
Apocynaceae	*Tylophora barbata*	Bearded Tylophora	Other (OG)	x	x	✓
Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine	Other (OG)	x	x	
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern	Other (OG)	x	x	
Dilleniaceae	*Hibbertia dentata*	Twining Guinea Flower	Other (OG)	x	x	
Fabaceae (Faboideae)	*Desmodium varians*	Slender Tick-trefoil	Other (OG)	x	x	✓
Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine	Other (OG)	x	x	✓
Fabaceae (Faboideae)	*Glycine microphylla*	Small-leaf Glycine	Other (OG)	x	x	✓
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine	Other (OG)	x	x	✓

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for Fuel Management area
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla	Other (OG)	x	x	✓
Fabaceae (Faboideae)	*Kennedia rubicunda*	Dusky Coral Pea	Other (OG)	x	x	
Lauraceae	*Cassytha pubescens*	Downy Dodder-laurel	Other (OG)	x		
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	Other (OG)	x	x	
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	Other (OG)		x	
Menispermaceae	*Sarcopetalum harveyanum*	Pearl Vine	Other (OG)		x	
Menispermaceae	*Stephania japonica*	Snake vine	Other (OG)		x	
Passifloraceae	*Passiflora herbertiana subsp. herbertiana*	Native Passionfruit	Other (OG)		x	
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry	Other (OG)	x	x	
Ranunculaceae	*Clematis aristata*	Old Man's Beard	Other (OG)	x	x	✓
Ranunculaceae	*Clematis glycinoides*	Headache Vine	Other (OG)	x	x	✓
Smilacaceae	*Smilax glyciphylla*	Sweet Sarsparilla	Other (OG)	x	x	✓
Vitaceae	*Cayratia clematidea*	Native Grape	Other (OG)		x	✓
Vitaceae	*Cissus antarctica*	Water Vine	Other (OG)		x	
Vitaceae	*Cissus hypoglauca*	Giant Water Vine	Other (OG)		x	

APPENDIX C :
Weed Control Methods

Table 9 Weed Control Methods

Family	Scientific Name	Common Name	Treatment Method
Amaranthaceae	*Amaranthus retroflexus*	Redroot Amaranth	- Handweed, Spot spray with 10m/L Glyphosate
Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed	
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	
Apiaceae	*Foeniculum vulgare*	Fennel	
Asteraceae	*Arctotheca calendula*	Capeweed	
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	
Asteraceae	*Cirsium vulgare*	Spear Thistle	
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	
Asteraceae	*Conyza sumatrensis*	Tall fleabane	
Asteraceae	*Cotula coronopifolia*	Water Buttons	
Asteraceae	*Gamochaeta americanum*		
Asteraceae	*Gamochaeta pensylvanica*	Cudweed	
Asteraceae	*Gamochaeta purpurea*	Purple Cudweed	
Asteraceae	*Hypochaeris microcephala* var. *albiflora*	White Flatweed	
Asteraceae	*Hypochaeris radicata*	Catsear	
Asteraceae	*Senecio madagascariensis*	Fireweed	
Asteraceae	*Soliva sessilis*	Bindyi	
Asteraceae	*Sonchus asper*	Prickly Sowthistle	
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	

Family	Scientific Name	Common Name	Treatment Method
Asteraceae	*Taraxacum* officinale	Dandelion	
Asteraceae	*Xanthium spinosum*	Bathurst Burr	
Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse	
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	
Caryophyllaceae	*Polycarpon tetraphyllum*	Four-leaved Allseed	
Caryophyllaceae	*Silene gallica*	French Catchfly	
Caryophyllaceae	*Spergularia rubra*	Sandspurry	
Caryophyllaceae	*Stellaria media*	Common Chickweed	
Chenopodiaceae	*Atriplex prostrata*		
Cyperaceae	*Cyperus rotundus*	Nutgrass	
Fabaceae (Faboideae)	*Lotus uliginosus*	Birds-foot Trefoil	
Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic	
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	
Fumariaceae	*Fumaria muralis* subsp. *muralis*	Wall Fumitory	
Gentianaceae	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	
Malvaceae	*Malva parviflora*	Small-flowered Mallow	
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	
Malvaceae	*Pavonia hastata*		
Myrsinaceae	*Lysimachia arvensis*	Scarlet Pimpernel	
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	
Oxalidaceae	*Oxalis debilis* var. *corymbosa*		

Family	Scientific Name	Common Name	Treatment Method
Phytolaccaceae	*Phytolacca octandra*	Inkweed	
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	
Plantaginaceae	*Veronica anagallis-aquatica*	Blue Water-speedwell	
Poaceae	*Avena barbata*	Bearded Oats	
Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	
Poaceae	*Bromus catharticus*	Praire Grass	
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	
Poaceae	*Digitaria sanguinalis*	Crab Grass	
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	
Poaceae	*Eleusine indica*	Crowsfoot Grass	
Poaceae	*Eragrostis curvula*	African Lovegrass	
Poaceae	*Lolium perenne*	Perennial Ryegrass	
Poaceae	*Paspalum dilatatum*	Paspalum	
Poaceae	*Setaria parviflora*		
Poaceae	*Sporobolus fertilis*	Giant Parramatta Grass	
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	
Poaceae	*Vulpia bromoides*	Squirrel Tail Fesque	
Polygonaceae	*Rumex conglomeratus*	Clustered Dock	
Solanaceae	*Salpichroa origanifolia*	Pampas Lily-of-the-valley	
Solanaceae	*Solanum linnaeanum*	Apple of Sodom	
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	

Family	Scientific Name	Common Name	Treatment Method
Solanaceae	*Solanum sisymbriifolium*	Sticky Nightshade	
Verbenaceae	*Verbena bonariensis*	Purpletop	
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	- 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
Asparagaceae	*Asparagus asparagoides*	Bridal Creeper	- Dig out with hand tools - Care needs to be taken to remove all tuberous masses and rhizomes. Tuberous masses need soil excavation around and careful levering with hand tools to remove without leaving plant material behind to resprout. - July-September - Spray foliage with glyphosate 10mL/1L + surfactant - May to June - Spray foliage with metsulfuron methyl (e.g. Brush Off) 5g/100L + non-ionic surfactant

Family	Scientific Name	Common Name	Treatment Method
Asparagaceae	*Asparagus plumosus*	Climbing Asparagus fern	- Dig out with hand tools - Care needs to be taken to remove all tuberous masses and rhizomes. Tuberous masses need soil excavation around and careful levering with hand tools to remove without leaving plant material behind to resprout. - July-September - Spray foliage with glyphosate 10mL/1L + surfactant - May to June - Spray foliage with metsulfuron methyl (e.g. Brush Off) 5g/100L + non-ionic surfactant
Verbenaceae	*Lantana camara*	Lantana	- Hand weed juveniles and regrowth from small pieces - Spot spray with glyphosate 10mL/1L - Slash using brushcutter, 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
Rosaceae	*Rubus fruticosus*	Blackberry	- It is possible to spray with 10mL/1L glyphosate however it will leave dangerous thorned stems - Wearing thick clothing and leather glove uses loppers to cut close to base and apply undiluted glyphosate to cut stems (remove cut foliage and stems cautiously) - Spray regrowth foliage with glyphosate 10mL/1L
Basellaceae	*Anredera cordifolia*	Madeira Vine	- Hand pull juvenile vines, or remove with hand tools taking care to remove roots and tubers

Family	Scientific Name	Common Name	Treatment Method
			- Skirting vines is not recommended as plant can remain alive for up to 2 years without roots - Pulling vines down from canopy is similarly not recommended as it will result in fall of aerial tubers and bulbils which will sprout new plants - Scrape and paint stems with undiluted glyphosate, scrape both sides of stem and scrape from ground to as high as can be reached, taking care not to completely ringbark stem which will stop herbicide dispersal through plant - Spray seedlings with glyphosate 10 mL/1L + surfactant - When removing vines all bulbils and aerial tubers should be bagged and removed from site, and fallen tubers collected and removed from the ground beneath mature vines
Onagraceae	*Ludwigia peruviana*	Peruvian water primrose	- Hand weed juveniles - Carefully remove and bag seeding material - Hand pull, or dig mature individuals out with tools, taking care not to remove all root material - Spray foliage of large infestations with 10mL/1L glyphosate (using a formula with an environmentally friendly surfactant near waterways)

Family	Scientific Name	Common Name	Treatment Method
Commelinaceae	*Tradescantia fluminensis*	Wandering jew	- Small infestations can be removed by hand weeding - Care needs to be taken not to leave behind any plant material which will resprout. - Large infestations can be controlled by spraying with glyphosate 10mL/1L, and the use of a surfactant will increase the efficacy of herbicide. Spraying needs to be repeated during every site visit. It can take several months before the mature plants appear to be affected but a sudden die off will occur after several months of treatment. Any regrowth material following die off of mature plants needs to be sprayed or removed by hand. - Large infestations can be raked up and bagged and removed from site. This is time consuming and labour intensive due to the large mass and weight of heavy infestations of healthy plants. - Large infestations can be covered with black plastic sheets for several months. The plants will die eventually due to lack of required sunlight. This method is not recommended for bushland regeneration as it also inhibits regrowth form seed of native plant species.
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle	- Cut and scrape vine stems with undiluted glyphosate - Hand weed seedlings - Spray low lying foliage, regrowth foliage, and seedlings with 20mL/1L Glyphosate & metsulfuron methyl(e.g. Brush-Off) 10.5g/10L + non ionic surfactant - Roots of plant can be dug up with mattock or shovel

Family	Scientific Name	Common Name	Treatment Method
Sapindaceae	*Cardiospermum grandiflorum*	Balloon Vine	- Hand weed juveniles or spray with glyphosate 10mL/1L - Hand pull roots of mature vines - Vines growing over trees, shrubs, or other objects should be skirted with shears as close to the ground as possible - Spray remaining ground coverage with glyphosate 10mL/1L, or treat cut stems with undiluted glyphosate - Bag and remove seed cases where possible
Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	- Hand weed juveniles - Drill holes with power drill with thick drill bit into mature trees, around base of trunk and fill holes with undiluted glyphosate. Once glyphosate has been absorbed refill holes with undiluted glyphosate several times. - Cut shrub and mature individuals as close to ground as possible with loppers or hand saw (or chainsaw) and treat stump with undiluted glyphosate - Spray juveniles and regrowth foliage of cut and painted individuals with glyphosate 10mL/1L
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	
Oleaceae	*Olea europaea subsp. cuspidata*	African Olive	- Spray juveniles with glyphosate 10mL/1L - Cut mature individuals with saw or loppers near ground level and paint stump with undiluted glyphosate or Triclopyr (600g/L formulation)/diesel at 4L/60L concentration (as per Garlon 600 label) - Use a power drill (9mm drill bit with dowelling tip) to drill holes less than 20 mm apart throughout lignotuber

Family	Scientific Name	Common Name	Treatment Method
			of mature trees and fill holes with glyphosate a 1:5 mixture with water. After all holes have been filled with herbicide mixture refill holes with herbicide mixture a second time (plant will have absorbed herbicide by this time). Check trees monthly for regrowth and repeat treatment if resprouting foliage is observed
Solanaceae	*Solanum seaforthianum*	Climbing Nightshade	- Hand weed juveniles - Hand weed mature individuals; species is shallow rooted and generally pulls from the ground easily in soft soils - Dig roots out of ground for larger individuals (if required) or use secateurs to cut the vine near the base and treat cut surface with undiluted glyphosate
Solanaceae	*Cestrum parqui*	Green Cestrum	- Hand weed juveniles - Scrape stem and paint with undiluted glyphosate - Cut all above ground suckering individuals with loppers or saw and paint stumps with undiluted glyphosate - Spray regrowth foliage with glyphosate 10mL/1L
Apocynaceae	*Araujia sericifera*	Moth Vine	- Hand Weed Juveniles - Spray juveniles with glyphosate 10mL/1L - Skirt mature vines (cut through plant close to root) and then pull root manually or apply undiluted glyphosate to cut surface - Scrape and paint vine with undiluted glyphosate
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	- Hand weed seedlings - Spray seedlings and coppice regrowth with

Family	Scientific Name	Common Name	Treatment Method
			glyphosate 10mL/1L - Drill and inject stem with, or chisel and apply, undiluted glyphosate - Cut and paint stump with undiluted glyphosate (will require an arborist for large trees) - Cut and grind stump of large trees (arborist)
Ochnaceae	*Ochna serrulata*	Ochna/Mickey mouse plant	- Stems of all juvenile and mature plants should be scraped and painted with undiluted glyphosate - follow up treatment may be needed on regrowth stems around base of plant in following monthly site visits - Mature fruits on plants should be bagged and removed from site
Passifloraceae	*Passiflora suberosa*	Corky passionflower	- Hand weed - Scrape stems with knife and paint exposed surface with undiluted glyphosate - Spray foliage with glyphosate 10mL/1L plus non-ionic surfactant
Polygonaceae	*Acetosa sagittata*	Turkey rhubarb	- Bag and remove seed present on mature plants - Cut vines close to the ground and dig out as much as of root system and tubers as possible - Juvenile plants growing from seed can be dug out or hand pulled - Tuber at base of plant needs to be removed - On individuals with deep and difficult to remove tubers, stems can be scraped on one side with a blade for a length of 45cm and scraped area painted with

Family	Scientific Name	Common Name	Treatment Method
			undiluted glyphosate - This treatment may need to be repeated on subsequent site visits - On plants with difficult and deep to remove tubers the tubers close to the surface can also be scraped and painted with undiluted glyphosate
Fabaceae	*Senna pendula var glabrata*	Cassia	- Pull or dig out small plants when soil is damp or soft. Dig out the roots so the plants do not reshoot. Mulching can suppress new growth. - Spot spraying is effective on seedlings and plants less than 2 m tall in dense infestations. - Taller or individual plants can be cut and herbicide applied to the cut stem.
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	- Hand weed - Spray with glyphosate 10mL/1L - Cut large, firmly rooted individuals at the base with secateurs and paint with undiluted glyphosate
Oleaceae	*Jasminum polyanthum*	White Jasmine	- Hand weed, taking care to dig out all root material - Cut stems back to roots and apply undiluted glyphosate to cut surfaces - Plant can be cut back to roots and then in subsequent months regrowth foliage sprayed with glyphosate (10mL/1L) + penetrant , or metsulfuron-methyl 600g/kg (5g/10L) + penetrant - Any cut plant material should be bagged and removed from site as plant will resprout roots from cut stems

Family	Scientific Name	Common Name	Treatment Method
Solanaceae	*Datura stramonium*	Common Thornapple	- Highly toxic to humans livestock and pets, capable of causing serious illness or death. Avoid ingestion of nectar, seeds and flowers. - Herbicidal treatment - spray with 2,4-D Amine 1.6-2.4L/ha. Do not allow livestock to graze for 7 days after application.
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	- Large trees require an arborist to safely remove - PPE including thick leather gloves and eye protection should be used when handling small individuals due to dangerous spines at leaf bases - Cut all leaves off at base with long handles loppers - Remove leaves from site for safety of other site users (handle with caution due to spines) - Cut tree below crown and leave stump to rot - Use hand tools such as a trowel or knife to dig up seedlings
Malaceae	*Cotoneaster glaucophyllus*		- Mildly toxic to humans and mild symptoms can occur if small amounts are consumed. Cut stumps and paint or drill and fill with 1 part glyphosate per 1.5 parts water.
Amaranthaceae	*Alternanthera philoxeroides*	Alligator Weed	- Spotspray with Metsulfuron-methyl 10g/100L herbicide (for aquatic applications under permit), 10g/100L (for terrestrial applications). Manually remove terrestrial and aquatic infestations where possible by digging up roots and disposing of all material into bags. Be sure to bag all materials as small fragments can remain viable. Placing a boom or rope along the water to contain fragments is useful while

Family	Scientific Name	Common Name	Treatment Method
			physical removal takes place and avoids spread downstream.
Bignoniaceae	*Tecoma capensis*	Cape Honeysuckle	- Spray juveniles with glyphosate 10mL/1L - Cut mature individuals with loppers near ground level and paint stump with undiluted glyphosate - Spray foliage of mature and regrowth individuals with glyphosate 10mL/1L
Juncaceae	*Juncus acutus subsp. acutus*	Sharp Rush	- Tips of foliage are sharply pointed so appropriate PPE should be worn including gloves and eye protection while managing individuals - Use a hand mattock to dig individuals out, taking care to remove all below ground vegetative material. Follow up treatment will be needed for new seedlings, and regrowth from missed rhizomes - Spray foliage with glyphosate 20 mL/1L (of environmentally sensitive solution in waterways)
Juncaceae	*Juncus cognatus*		- Use a hand mattock to dig individuals out, taking care to remove all below ground vegetative material. Follow up treatment will be needed for new seedlings, and regrowth from missed rhizomes '- Spray foliage with glyphosate 20 mL/1L (of environmentally sensitive solution in waterways)
Solanaceae	*Solanum mauritianum*	Wild Tobacco Bush	- When working with this plant additional PPE may be required as some individuals are sensitive to the shedding fine hairs of the species - Recommended PPE is a dustmask, long sleeve shirt and pants + gloves

Family	Scientific Name	Common Name	Treatment Method
			- Hand weed juveniles - Mature individuals can be cut and painted with glyphosate 10mL/1L
Salviniaceae	*Salvinia molesta*		- Where infestations are large, small scale manual removal is appropriate. Scoop out large infestations and place onto land - this species cannot survive terrestrially or in saltwater. Herbicidal applications may only be done so with herbicides registered for the control of salvinia. Registered herbicides include: Reglone, Vegetrol and Watrol. Use as instructed on the labels.

FIGURES

Figure 1. Aerial view of the subject site and Property

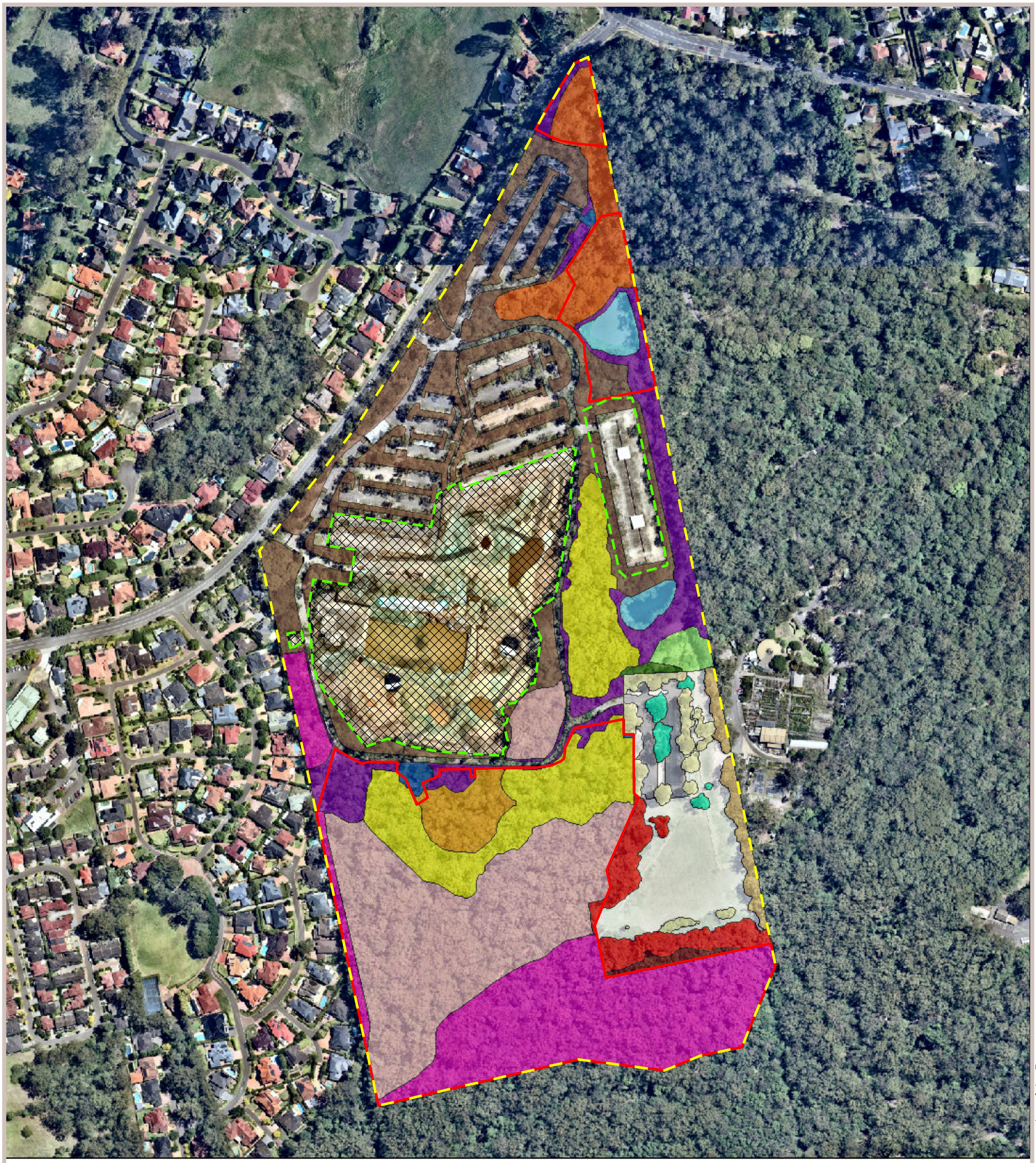

Figure 2. Vegetation mapping of the Property

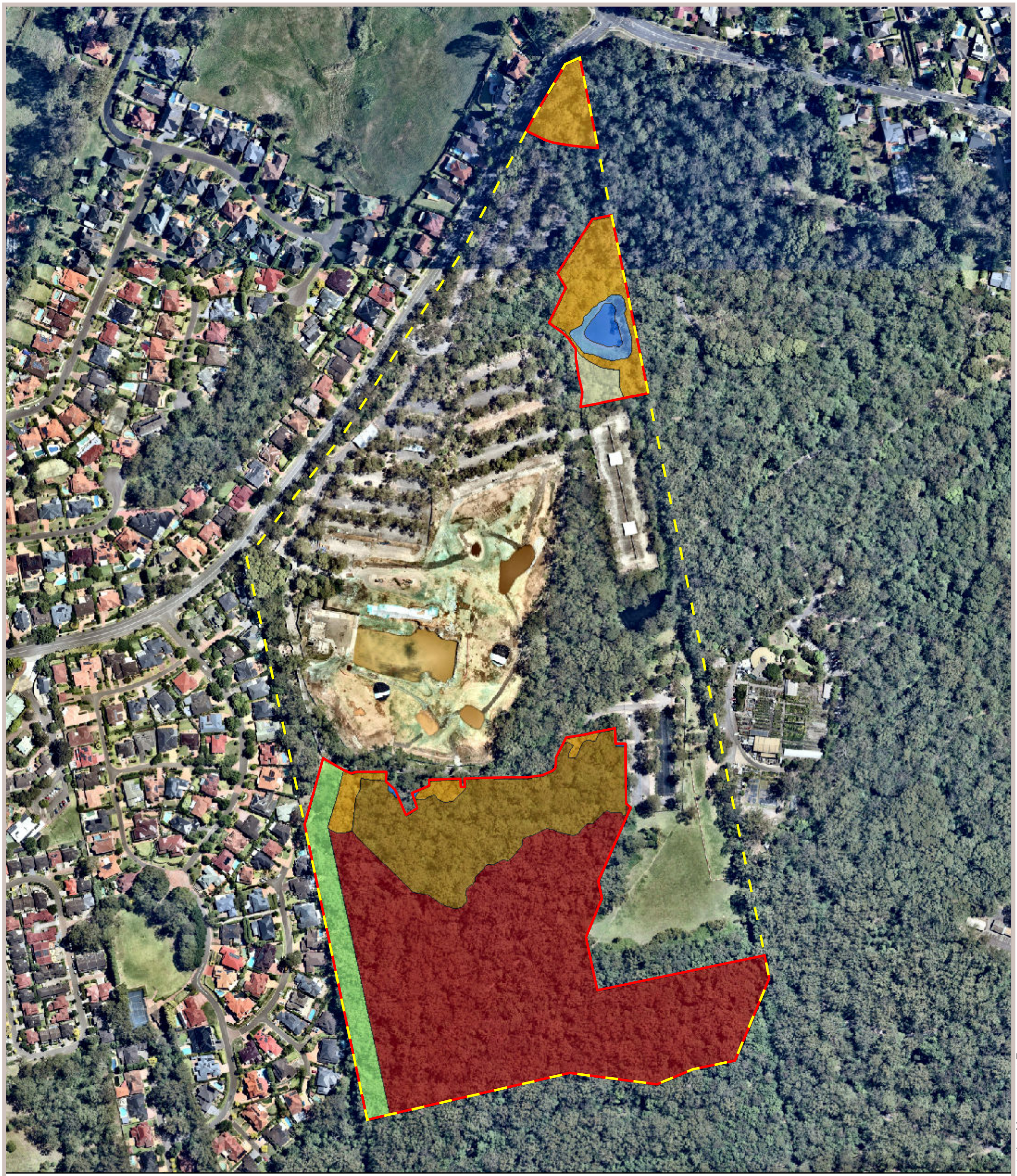

Figure 3. Vegetation Management Zones within the subject site

Legend

- Subject Site
- The Property
- High Risk Trees
- Timber Bridge Locations

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
Image © Nearmap (2023)
Dated: 18/01/2023

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I:\...\21108\Figures\RP6\20230221\Figure 4. Location of High Risk trees to be removed and timber bridges to be replaced

Figure 4. Location of High Risk trees to be removed and timber bridges to be replaced

0 50 100 m

Figure 5. Indicative locations of signage within the subject site

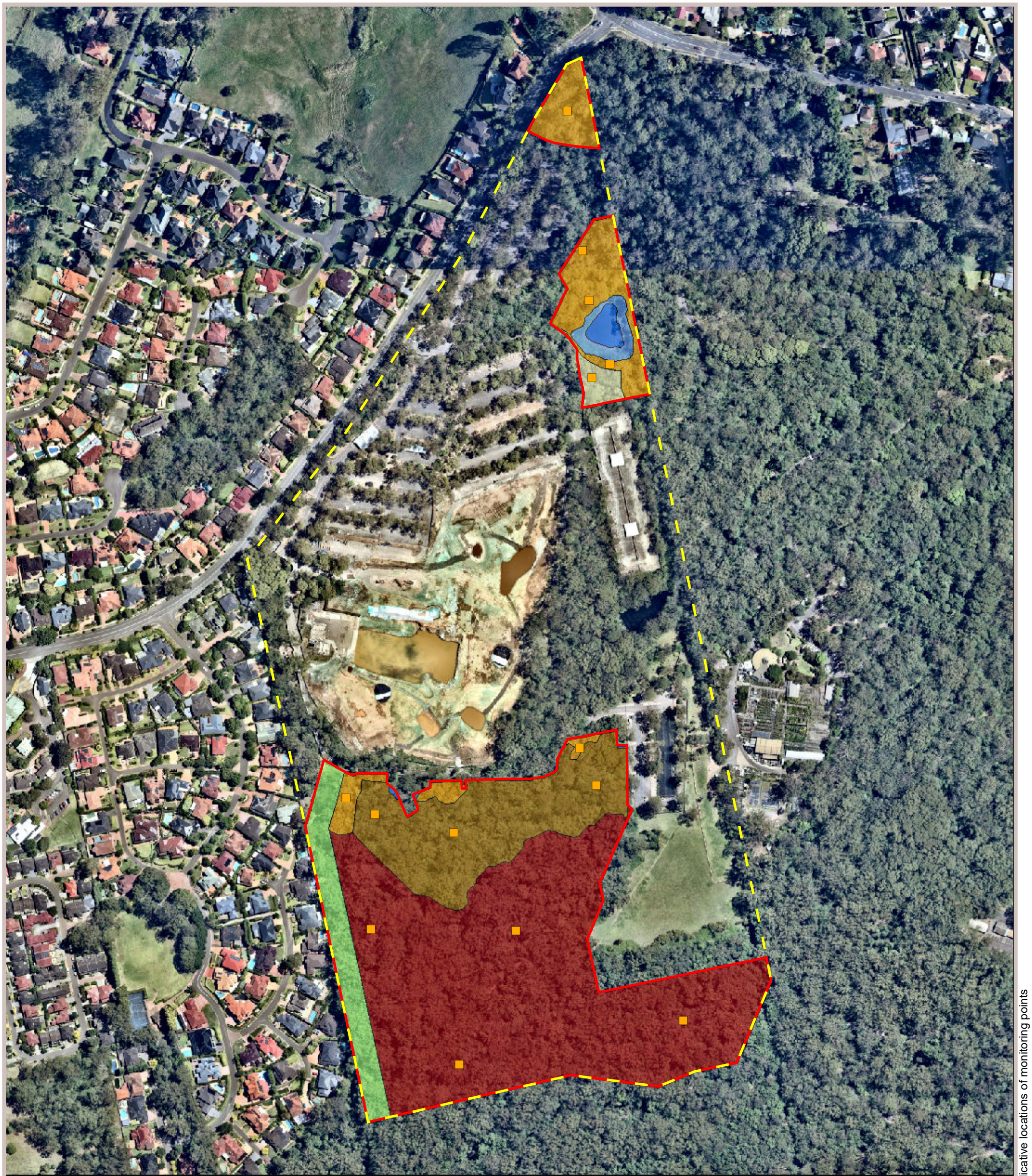

Figure 6. Indicative locations of monitoring points within the subject site