

55 Coonara Avenue, West Pennant Hills

Vegetation Management Plan

Mirvac

16 February 2023

Final



Report No. 21108RP1

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Version	Date Issued	Amended by	Details
1	30/09/2021	GK/TM	Final
2	8/06/2022	GK	Final – updates for Council RFI
3	7/09/2022	GK	Updated APZ as per Council further RFI
4	16/02/2023	GK	Final for submission to Council as per Consent Condition 43

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Date: 16 February, 2023

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Glossary

APZ	Asset Protection Zone
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
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
FMP	Fuel Management Plan
HRC	Hazard Reduction Certificate
IPA	Inner Protection Area
LGA	Local Government Area
Locality	The area within a 5 km radius of the centre of the study area
NSW	New South Wales
NW Act	NSW Noxious Weeds Act 1993
STIF	Sydney Turpentine Ironbark Forest
Study area	The subject site (which is the focus of the VMP) and remainder of Lot 61 DP 737386
Subject site	The area subject to this VMP
TEC	Threatened Ecological Community
The Hills LEP 2012	The Hills Local Environment Plan 2012
the proposed development	Parts of Lot 61 DP 737386 proposed for future residential development (contained within lands zoned R3 and R4)
VMP	Vegetation Management Plan

1. Introduction

1.1. Purpose

Cumberland Ecology has been commissioned by Mirvac to prepare a Vegetation Management Plan in accordance with Consent Condition 43 of the approved Concept Masterplan Development Application DA 860/2022/JP for proposed works at 55 Coonara Avenue, West Pennant Hills NSW or Lot 61 DP 737386 (hereafter referred to as the study area).

The study area is located in the Hills Local Government Area (LGA) and is identified as Lot 61 DP 737386 (see **Figure 1**). Parts of the study area 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 Open Space DA (in preparation) to develop areas that previously formed part of the former IBM business park, for residential living. The study area contains significant areas of native bushland, parts of which are proposed to be dedicated to the NSW State Government and managed by NSW Forestry Commission with the remainder retained within a Community Lot and placed under community title. A Vegetation Management Plan (VMP) is required to guide the future management of the bushland areas retained within the Community Lot as well as adjacent vegetated Asset Protection Zones (APZs) and Hazard Reduction Areas (referred to in Consent conditions as 'Restricted Development Areas').

The aim of this VMP is to provide guidelines for the conservation, management and rehabilitation (if required) of vegetation retained in the Community Lot, with due consideration to requisite APZs as well as riparian areas subject to future controlled activity approvals, to a form that is broadly representative of the original plant communities present within the study area 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); and
- Planning for Bushfire Protection: Appendix 4 – Asset Protection Zone Standards (NSW Rural Fire Service, 2019).

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 7.2.1

Hills Vegetation Management Plan Component	Guideline Required	Where Component is Addressed within VMP
2.7 Determine Performance Criteria		Chapter 9 (Table 5, Table 6)
2.8 Define Monitoring and Reporting Methods		Chapter 8
2.9 Provide a Timeframe		Section 7.6 and Chapter 9
2.10 Costing		Section 7.5
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 7.2.2
3.2 Local Provenance		Section 7.3
3.3 Habitat Supplementation		Chapter 5, Chapter 7
3.4 Information Fact Sheet		Appendix D

1.2. Background

1.2.1. Site Description

The study area 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**).

The central parts of the study area was formerly a business park (now vacated and demolished) within prior B7 Business Park zoned land. The study area is currently rezoned as a mix of R3 – Medium Density Residential, R4 – High Density Residential and E2 – Environmental Conservation under *The Hills Shire Council Local Environment Plan 2019* (**Figure 2**).

1.2.2. Vegetation

The study area 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.

Studies to date within the study area have determined that the majority of the remnant/old regrowth vegetation within the broader study area 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 study area include exotic grasslands from historic agricultural/orchard uses, landscaped plantings for the former IBM business park and younger regrowth on modified soils from former land uses.

A first order stream is mapped within the subject site and runs from an existing dam in the north of the site to the south and south-west, before joining Bellamys Creek. Detailed investigations conducted for the BDAR prepared by Keystone, 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 approved works for DA860/2022/JP includes the development of 417 dwellings, comprising 252 apartments and 165 dwelling houses, including civil works comprising new roads, earthworks, stormwater and services infrastructure, landscaped areas and Asset Protection Zones (APZs). The approved works are contained within the R3 and R4 zoned land and includes the requisite APZs for the surrounding bushfire hazard.

Parts of the study area along the western border, comprising a mix of R3 and E2 zoned land, are also subject to a Fuel Management Plan based on Hazard Reduction Certificate 16121278913-2, as issued by the NSW Rural Fire Service (RFS) for the protection of properties located within the adjacent The Glades residential development (see **Figure 2**). This VMP has incorporated the required management actions of the Fuel Management Plan and once approved will supersede the Fuel Management Plan and create a single reference document for future management of vegetation.

As vegetation within the APZs is to be managed either as an Inner Protection Area or Outer Protection Area, these areas, along with the future Community title land, are also subject to this VMP.

The areas subject to this VMP therefore include parts of R3, R4 and E2 zoned land and are collectively referred to in this VMP as the 'subject site'. The location of the subject site within the wider study area is shown in **Figure 1** and **Figure 2**. The requisite Vegetated Riparian Zone for a first order stream, as required under the *Water Management Act 2000*, for future controlled activity approvals for works on waterfront land is contained within E2 zoned land of the subject site and therefore is accounted for within this VMP.

Areas of E2 zoned land proposed to be dedicated to the NSW State Government and managed by NSW Forestry Corporation lie outside the subject site and are not subject to this VMP.

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 with due consideration to bushfire hazard requirements. To accomplish this objective, the following measures are detailed within this VMP:

- Identification of management zones (**Chapter 4**);
- Vegetation clearing protocols (**Chapter 5**);
- Weed management strategies (**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 study area. This literature review involved a variety of sources including prior ecological studies and management plans for the study area, 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- Open Space DA, 55 Coonara Avenue West Pennant Hills (2022). (Cumberland Ecology – in preparation);
- Weed Management and Regeneration Plan for Additional Areas – 55 Coonara Avenue, West Pennant Hills (Bushland Management Solutions 2022); and
- Planning for Bushfire Protection – Appendix 4 Asset Protection Zone Standards (NSW Rural Fire Service, 2019).

2.2. Field Surveys

The study area 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 the Open Space DA on 11 March 2022 and 4 November 2022 and for the Forestry Dedication Areas on 2 December 2022.

The subject site was inspected 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 during the 18 May 2021 and 2 December 2022 surveys 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 Study Area.

3.1. Vegetation Communities

The vegetation on the subject site and wider study area has been impacted by a complex history of land use. Historical aerial imagery from 1943 to 1982 shows clearing over large sections of the study area 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 IBM 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 IBM 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 wider study area have been mapped in detail by Keystone Ecological as part of the Biodiversity Development Assessment Report (BDAR) prepared to support DA860/2022/JP. The vegetation communities occurring in the study area, as per the Keystone BDAR, is summarised in **Table 2** below.

Table 2 Vegetation Communities of the study area

Keystone Vegetation Mapping Unit	Keystone Vegetation Type	Allocated PCT (as per BDAR)	BC Act/EPBC Act status (as per BDAR)	Description
1a	Cleared Land	n/a	n/a	Exotic grassland on natural substrate. Comprises regularly mown/slashed areas dominated by exotic groundcovers, part of historic orchards
1b	Cleared Land	n/a	n/a	Exotic grassland on natural substrate. Comprises regularly mown/slashed areas dominated by exotic groundcovers with scattered occurrences of planted trees, part of historic orchards
2a	Basins and Dams	n/a	n/a	Built structures that intermittently contain water. Some exotic vegetation established around edges

Keystone Vegetation Mapping Unit	Keystone Vegetation Type	Allocated PCT (as per BDAR)	BC Act/EPBC Act status (as per BDAR)	Description
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 IBM facility. Locally native tree species include species that generally dominate in BGHF such as <i>Eucalyptus saligna</i> (Blue Gum) or <i>Eucalyptus pilularis</i> (Blackbutt)
4a	Landscaped Gardens	n/a	n/a	Planted gardens around IBM 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 <i>Corymbia maculata</i> (Spotted Gum), <i>Casuarina glauca</i> (Swamp Oak), <i>Eucalyptus tereticornis</i> (Forest Red Gum, <i>Pittosporum undulatum</i> (Sweet Pittosporum) and <i>Syncarpia glomulifera</i> (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 <i>Eucalyptus saligna</i> (Blue Gum) and <i>Eucalyptus pilularis</i> (Blackbutt)

Keystone Vegetation Mapping Unit	Keystone Vegetation Type	Allocated PCT (as per BDAR)	BC Act/EPBC Act status (as per BDAR)	Description
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 <i>Eucalyptus saligna</i> (Blue Gum) and <i>Eucalyptus pilularis</i> (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 <i>Eucalyptus saligna</i> (Blue Gum) and <i>Eucalyptus pilularis</i> (Blackbutt)
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 <i>Syncarpia glomulifera</i> (Turpentine) and <i>Eucalyptus paniculata</i> (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 <i>Syncarpia glomulifera</i> (Turpentine) and <i>Eucalyptus paniculata</i> (Grey Ironbark)

Further details of these communities are provided in the BDAR (Keystone Ecological, 2022). Further mapping refinement by Cumberland Ecology has largely been limited to the areas around permitted use area item 24 in the zone 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 3**.

Areas of planted/landscaped vegetation (as mapped by Keystone) around the demolished buildings have been cleared as part of approved works for the Demolition DA (DA 585/2021/HC) (**Figure 3**).

All Keystone BDAR vegetation zones occur within the subject site and therefore are subject to this VMP. 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 have been allocated to either BGHF or STIF for management purposes. This includes areas zoned 1a, 1b, 3a or 4a under the BDAR which currently do not conform to the TEC listing of either BGHF or STIF as well as zones 5a, 5b, 5c and 6b of the BDAR which conform to TEC listings of BGHF or STIF.

While proposed APZs will not be fully revegetated to a representative form of original plant communities (and therefore the TECs), for management purposes the different APZ areas have nonetheless been named BGHF – APZ or STIF – APZ to distinguish between areas with differing canopy species, management actions and/or adjacent areas of revegetation.

The vegetation along the western boundary has been subject to a series of Hazard Reduction Certificates (HRCs) designed to protect adjacent properties located within The Glade Residential Subdivision. This area has been subject to ongoing maintenance since the issue of a HRC in 2016 and more recently the Fuel Management Plan. As the current regime within this area is to be maintained in perpetuity in line with the Fuel Management Plan, the vegetation within this area (mapped as a mix of 6a, 4a and 3a in the BDAR) has not been allocated to either BGHF or STIF for the purposes of this VMP.

While the existing dam (Zone 2b as per Keystone mapping) to the south of the existing multi-storey carpark, will be subject to weed management, the dam will largely 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. As the current basin (Zone 2a as per Keystone mapping) within the south-west parts of the subject site is largely to be retained in the current form, this area has not been allocated to either BGHF or STIF for management purposes.

General descriptions of species recorded within areas of BGHF (5a, 5b, 5c) and STIF (6b) 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 northern parts of the subject site comprise the more degraded forms of BGHF/PCT 1237 (i.e. VZ3a and VZ5a), comprising native canopy trees over dense weed infestations whereas the southern parts of the subject site contain a mix of better quality BGHF (VZ 5b, VZ 5c) and degraded forms (VZ3a) interspersed with scattered landscape plantings and exotic areas.

The better quality BGHF 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 degraded forms of BGHF are largely limited to a canopy of *Eucalyptus saligna* (Blue Gum) over dense infestations of Lantana and/or Privet.

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

Photograph 1 Blue Gum High Forest within parts of the subject site



Photograph 2 Degraded BGHF in northern parts of the subject site



3.1.2. PCT 1281 – Sydney Turpentine - Ironbark Forest

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

Vegetation Class: Northern Hinterland Wet Sclerophyll Forests;

Sydney Turpentine-Ironbark Forest (STIF) dominates the 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 during surveys by Cumberland Ecology across the Concept DA, proposed Open Space area and Forestry Dedication Area surveys, the majority of which occur within the subject site. Species present consist 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 or wider study area 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 study area, 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 and study area

Scientific name	Common Name	Status
<i>Acetosa sagittata</i>	Rambling Dock	OWRC
<i>Anredera cordifolia</i>	Madeira Vine	SP, WoNS
<i>Araujia sericifera</i>	Moth vine, Moth plant	OWRC
<i>Asparagus aethiopicus</i>	Asparagus Fern	SP, WoNS
<i>Asparagus asparagoides</i>	Bridal Creeper	SP, WoNS
<i>Asparagus plumosus</i>	Climbing Asparagus Fern	SP, WoNS
<i>Cenchrus clandestinus</i>	Kikuyu	OWRC
<i>Cestrum parqui</i>	Green Cestrum	RP
<i>Lantana camara</i>	Lantana	SP, WoNS
<i>Ligustrum lucidum</i>	Large-leaved Privet	OWRC
<i>Ligustrum sinense</i>	Small-leaved Privet	OWRC
<i>Ludwigia peruviana</i>	Peruvian Water Primrose	RP
<i>Ochna serrulata</i>	Mickey Mouse Plant	OWRC
<i>Olea europaea subsp. cuspidata</i>	African olive	RP
<i>Passiflora suberosa</i>	Cork Passionfruit	OWRC
<i>Phoenix canariensis</i>	Phoenix palm, Canary Island date palm	OWRC
<i>Senna pendula var. glabrata</i>	-	OWRC
<i>Rubus fruticosus</i>	Blackberry	SP, WoNS
<i>Solanum seafortianum</i>	Climbing Nightshade	OWRC
<i>Sporobolus fertilis</i>	Giant Parramatta Grass	RP
<i>Tradescantia fluminensis</i>	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 and regrowth vegetation as well as planted vegetation present within the subject site and wider study area provides a range of fauna habitats. Habitat features within this vegetation community provides potential foraging, shelter and breeding opportunities for fauna.

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

- Fallen logs, debris and leaf litter – shelter habitat for invertebrates, amphibians, reptiles and terrestrial mammals;
- Hollow-bearing trees and stags – providing shelter and breeding habitat for a range of reptiles, birds, arboreal mammals and microchiropteran bats (microbats);
- Dams/basins – shelter and breeding habitat for amphibians; 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.

3.3.2. Threatened Fauna Species

Threatened fauna species recorded within or adjacent to the subject site include the Dural Land Snail (*Pommerhelix duralensis*) and Powerful Owl (*Ninox strenua*). Further details on the occurrence of habitat for these species within the subject site and wider study area is provided in the Keystone BDAR (2022).

4. Vegetation Management Zones

Under this VMP for the subject site, the vegetation areas to be managed have been divided into 11 management zones based on the existing condition of the vegetation (as per the Keystone BDAR), dominant canopy trees and, the specific management objectives required for vegetation within E2 zoned land, R3/R4 zoned land, development footprint APZs and the existing Hazard Reduction Certificate Area/Fuel Management Plan area. The vegetated riparian zone for riparian land as required under the *Water Management Act 2000* is comprised of a mix of Zones 1 – 4.

These zones are:

- Zone 1: BGHF – Good;
- Zone 2: BGHF – Poor;
- Zone 3: BGHF – Replanting;
- Zone 4a: BGHF- APZ (IPA);
- Zone 4b: BGHF- APZ (OPA);
- Zone 5: STIF – Good;
- Zone 6: STIF – APZ;
- Zone 7: Fuel Management Plan Area
- Zone 8: Landscaped Areas;
- Zone 9: Dams – Fringing vegetation; and
- Zone 10: Dams and Basins.

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 4**. It is expected that this VMP would be undertaken over a five year period.

4.1. Zone 1: BGHF - Good

Zone 1 covers an area of approximately 0.80 ha within the subject site. This management zone corresponds to areas mapped as 5b and 5c in the Keystone BDAR that occur within E2 zoned land. 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.

4.1.1. Objectives

- Retain and protect existing BGHF remnants in the zone;

- Control and reduce cover of exotic weed species 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
- 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 BGHF species can be planted as an assistive measure. A species list for BGHF planting is provided in **Appendix B**.

4.2. Zone 2: BGHF - Poor

Zone 2 covers an area of approximately 0.90 ha within the subject site. This management zone largely corresponds to areas mapped as 3a in the Keystone BDAR that occur within E2 zoned land with some areas mapped as 3a or 5a in the Keystone BDAR that occur within R3/R4 zoned land in the northern parts of the subject site. This management zone generally comprises areas dominated by BGHF canopy species over highly modified or exotic understorey. Although the areas mapped as 5a in the BDAR are considered to conform to the listed CEEC while 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 2 in the northern parts of the subject site also comprise potential roosting habitat/buffer to roosting habitat for the Powerful Owl.

4.2.1. Objectives

- Retain and protect existing BGHF canopy remnants in the zone;
- Control and reduce cover of exotic weed species 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 understorey with a diverse array of native shrub and ground layer species.

4.2.2. Actions

The vegetation in this management zone is largely limited to BGHF canopy species 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. Planting of diagnostic BGHF canopy species, other than *Eucalyptus saligna*, should also be considered to increase canopy species diversity. A species list for BGHF planting is provided in **Appendix B**.

4.3. Zone 3: BGHF - Replanting

Zone 3 covers an area of approximately 0.41 ha within the subject site. This management zone largely corresponds to areas mapped as 1a, 1b and 4a in the Keystone BDAR that occur within E2 zoned land with a small section of area mapped as 2a in the Keystone BDAR that occurs within R3/R4 zoned land. This management zone generally comprises areas with planted landscape trees (4a), exotic grassland or basins.

4.3.1. Objectives

- Control and reduce cover of exotic weed species 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.

4.3.2. 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**.

4.4. Zone 4a: BGHF – APZ (IPA)

Zone 4a covers an area of approximately 0.31 ha within the subject site. This management zone corresponds to areas mapped as a mix of 3a and 4a in the Keystone BDAR that occur within the APZs for the development on R3 or R4 zoned land. This management zone in the northern parts of the subject site also forms the outer extent of a gradual buffer of vegetated areas from a likely roosting site for the Powerful Owl. This zone comprises a mix of areas with BGHF canopy species over highly modified or exotic understorey or planted natives/ornamentals in gardens and landscaped areas.

4.4.1. Objectives

- Maintain vegetation density/cover of all strata at the requisite levels for an Inner Protection Area (IPA);
- Retain and protect canopy species characteristic of BGHF and minimise extent of trimming of these species where feasible;

- Control and reduce cover of exotic weed species with staged replacement planting within the limits allowed for an IPA; and
- Revegetate understorey with selective subset of characteristic BGHF ground layer species tolerant to IPA maintenance mowing.

4.4.2. Actions

The vegetation in this management zone has a mix of endemic and planted canopy trees and lacks a native understorey. Initial actions within this management zone will be clearing of any exotic trees, shrubs and ground covers present. If further canopy removal and/or trimming is required to attain requisite levels of canopy separation for an IPA, priority should be given to avoid tree species characteristic of BGHF and remove/trim tree species that are not characteristic of BGHF. Priority should also be given to avoiding removal/trimming of species that provide suitable habitat (foraging, roosting) for Powerful Owl.

Following the removal of exotic species, native shrubs and groundcovers characteristic of BGHF are to be planted. In accordance with Appendix 4 of the Planning for Bushfire Protection (NSW Rural Fire Service, 2019), the following criteria are required for the various strata within the IPA.

i. Trees

- Tree canopy cover should be less than 15% at maturity;
- Trees at maturity should not touch or overhang buildings;
- Lower limbs should be removed up to height of 2 metres above the ground;
- Tree canopies should be separated by 2 - 5 metres; and
- Preference should be given to smooth-barked and evergreen trees.

ii. Shrubs

- Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards the building should be provided;
- Shrubs should not be located under trees;
- Shrubs should not form more than 10% ground cover; and
- Clumps of shrubs should be separated from exposed windows and door by a distance of at least twice the height of the vegetation.

iii. Grass

- Grass should be kept mown (as a guide should be kept to no more than 100mm (10cm) in height and be discontinuous; and
- Leaves and vegetation debris should be removed off-site.

4.5. Zone 4b: BGHF – APZ (OPA)

Zone 4b covers an area of approximately 0.24 ha within the subject site. This management zone corresponds to areas mapped as a mix of 3a and 4a in the Keystone BDAR that occur within the APZs for the development on R3 or R4 zoned land. This management zone in the northern parts of the subject site also forms the central parts of a gradual buffer of vegetated areas from a likely roosting site for the Powerful Owl. This zone comprises a mix of areas with BGHF canopy species over highly modified or exotic understorey or planted natives/ornamentals in gardens and landscaped areas.

4.5.1. Objectives

- Maintain vegetation density/cover of all strata at the requisite levels for an Outer Protection Area (OPA);
- Retain and protect canopy species characteristic of BGHF and minimise extent of trimming of these species where feasible;
- Control and reduce cover of exotic weed species with staged replacement planting within the limits allowed for an OPA; and
- Revegetate understorey with selective subset of characteristic BGHF ground layer species tolerant to OPA maintenance mowing.

4.5.2. Actions

The vegetation in this management zone predominately contains endemic canopy trees with scattered occurrences of planted canopy trees and lacks a native understorey. Initial actions within this management zone will be clearing of any exotic trees, shrubs and ground covers present. If further canopy removal and/or trimming is required to attain requisite levels of canopy separation for an OPA, priority should be given to avoid tree species characteristic of BGHF and remove/trim tree species that are not characteristic of BGHF. Priority should also be given to avoiding removal/trimming of species that provide suitable habitat (foraging, roosting) for Powerful Owl.

Further management actions for this zone include planting of native shrubs and groundcovers characteristic of BGHF. In accordance with Appendix 4 of the Planning for Bushfire Protection (NSW Rural Fire Service, 2019), the following criteria are required for the various strata within the OPA.

i. Trees

- Tree canopy cover should be less than 30%; and
- Tree canopies should be separated by 2 - 5 metres.

ii. Shrubs

- Shrubs should not form a continuous canopy; and
- Shrubs should not form more than 20% ground cover.

iii. Grass

- Grass should be kept mown to a height of less than 100mm (10cm); and
- Leaves and vegetation debris should be removed.

4.6. Zone 5: STIF - Good

Zone 5 covers an area of approximately 0.28 ha within the subject site. This management zone corresponds to areas mapped as 6b in the Keystone BDAR and occurs within E2 zoned land. 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.

4.6.1. Objectives

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

4.6.2. 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**.

4.7. Zone 6: STIF - APZ

Zone 6 covers an area of 0.13 ha within the subject site. This management zone largely corresponds to areas mapped as 4a in the associated BDAR that occur within the APZs for the development immediately adjacent to areas of remnant STIF (6b). This management zone is comprised of areas of planted natives/ornamentals with natives not characteristic of STIF dominating the canopy.

4.7.1. Objectives

- Maintain vegetation density/cover of all strata at the requisite levels for an Outer Protection Area (OPA);
- Retain and protect locally endemic canopy species, including those not characteristic of STIF but characteristic of BGHF and minimise extent of trimming of these species where feasible;

- Control and reduce cover of exotic weed species with staged replacement planting within the limits allowed for an OPA;
- Replant additional characteristic STIF canopy species to the extent allowed for an OPA; and
- Revegetate understorey with selective subset of characteristic STIF ground layer species tolerant to OPA maintenance mowing.

4.7.2. Actions

The vegetation in this management zone comprises planted canopy trees and lacks a native understorey. As this management zone lies completely within the proposed construction footprint, it is assumed that all vegetation within this management zone will be cleared as part of construction works.

Although this management zone has been assigned to STIF due to its proximity to a patch of remnant STIF, any locally endemic native trees, such as those characteristic of BGHF, should be retained where feasible within this management zone. In addition to potentially retained locally endemic trees, further trees characteristic of STIF should be planted to the extent allowed for a future OPA.

Further management actions for this zone include planting of native shrubs and groundcovers characteristic of STIF. In accordance with Appendix 4 of the Planning for Bushfire Protection (NSW Rural Fire Service, 2019), the following criteria are required for the various strata within the OPA.

i. Trees

- Tree canopy cover should be less than 30%; and
- Tree canopies should be separated by 2 - 5 metres.

ii. Shrubs

- Shrubs should not form a continuous canopy; and
- Shrubs should not form more than 20% ground cover.

iii. Grass

- Grass should be kept mown to a height of less than 100mm (10cm); and
- Leaves and vegetation debris should be removed.

4.8. Zone 7: Fuel Management Area

Zone 7 covers an area of 0.33 ha within the subject site. This management zone largely corresponds to areas subject to the past Hazard Reduction Certificates issued by the NSW Rural Fire Service (RFS) and the current FMP and is located along the western boundary of the subject site. This management zone comprises a mix of vegetation zones 6a, 4a and 3a as per the BDAR.

The FMP 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. Thus, the official FMP Area does not encompass the entirety of the mapped vegetation located between the rear of The Glades residential area and the proposed development area. However, due to the narrow extent of vegetation between the official FMP Area and proposed development, the allowance within issued Hazard Reduction Certificates to clear up to 20m from adjacent dwelling and the fact that this remaining vegetation occurs within the proposed APZs for the development, for practical on-ground management purposes, this narrow band vegetation outside the official 15m FMP Area has been included in the Fuel Management Area management zone rather than delineation of a separate APZ zone.

4.8.1. Objectives

- Manage vegetation for bushfire safety purposes;
- 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 Hazard Reduction Certificates and current FMP;
- Control and reduce cover of exotic weed species; and
- Revegetate large bare patches with selective subset of STIF or BGHF ground layer species tolerant to hazard reduction maintenance levels.

4.8.2. Actions

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

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 Hazard Reduction Certificates and current FMP. As per the current FMP (based on issued Hazard Reduction Certificates) 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.

4.9. Zone 8 – Landscaped Area

Zone 8 consists of approximately 0.31 ha of planted vegetation along the Coonara Avenue frontage on the western part of the subjects site. This management zone largely corresponds to areas mapped as 4a in the Keystone BDAR and comprises an 8m wide band of landscaped areas that is to be retained in its current form.

4.9.1. Objectives

- Retain and protect existing landscape plantings in the zone; and
- Control and reduce cover of exotic weed species.

4.9.2. Actions

As the vegetation in this management zone comprises landscaped vegetation that is to be maintained in its current form, no further revegetation is proposed for this zone. Actions within this management zone will be comprise ongoing clearing of any high threat exotics.

4.10. Zone 9 – Dam – Fringing Vegetation

Zone 9 consists of approximately 0.09 ha of fringing vegetation around the dam to the south of the existing multistorey car park. This management zone largely corresponds to areas mapped as 2b in the Keystone BDAR and comprises vegetation on the 'banks' of the dam that is infested by a mix of *Ludwigia peruviana* (Water Primrose), vines and woody weeds. The central parts of the dam are to be retained as a waterbody and are not subject to any management actions under this VMP.

4.10.1. 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.

4.10.2. 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 weed infestation with a particular focus on *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**.

4.11. Zone 10 - Dams and Basins

Zone 10 consists of approximately 0.11 ha of existing dams and basins. This management zone largely corresponds to areas mapped as 2a or the central parts of dams (2b) in the associated BDAR, with areas mapped 2a comprising highly modified, concreted structures. These structures are not proposed to be removed/dewatered and will be retained in their current form within the subject site.

4.11.1. Objectives

- Retain existing dams/basins; and
- Control and reduce cover of exotic weed species from the dam/basin edges.

4.11.2. Actions

As this management zone comprises dams/basins that are to be maintained in their current form, no revegetation is proposed for this zone. However, as weeds/exotics can still establish around the edges of the dams/basins, actions within this management zone will be comprise ongoing clearing of exotics from the banks/edges of the dam/basins.

4.12. Long-term Management

The works prescribed by this VMP are to be carried out over a five-year timeframe.

After the life of this VMP, the maintenance measures implemented under this VMP are to be undertaken as ongoing management in the long-term with requisite APZs/FMP areas managed in perpetuity. Such long-term management should include ongoing weed control, assistive regeneration (if required) in areas where natural regeneration does not occur, ongoing hazard reduction/fuel reduction 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 by the community under the Community Title.

5. Vegetation Clearing Protocols

5.1. Introduction

Details for vegetation clearing protocols and fauna management during clearing are detailed in the Fauna Management Plan (FMP) prepared in accordance with Consent Condition 44 for DA 860/2022/JP.

This chapter provides a broad overview summary of the FMP protocols to be followed during vegetation clearing within approved areas to minimise the impacts on native flora and fauna within the subject site as well as additional considerations for weed management during clearing works. All vegetation clearing works should be conducted in accordance with the protocols outlined in this VMP as well as the associated FMP.

5.2. Marking Limits of Vegetation Clearing

Prior to any clearing being undertaken, the edge of the vegetation to be cleared needs to be clearly delineated. Clearing limits can be marked with high visibility tape, 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.

In addition to full clearing areas, areas subject to partial clearing, such as APZs should also be clearly delineated using separate markers to the full clearing areas of the development footprint with priority given to retaining locally endemic trees within APZ areas.

No stockpiling of equipment, soils, or machinery will occur beyond the full clearing boundary. The person responsible for the clearance activities will be responsible for ensuring that the boundary markers are installed to enable the suitable environmental and technical inspections of the proposed disturbance to be undertaken.

Further details on marking limits of Vegetation Clearing are provided in the FMP.

5.3. Pre-clearing Surveys

Prior to the commencement of any clearing, a pre-clearing survey will be undertaken by a certified ecological consultant in accordance with the protocols detailed in the FMP. During the survey, weeds present in the work sites and habitat for native fauna that have the potential to be disturbed during clearing will be identified.

5.3.1. Flora Pre-clearing Surveys

Prior to clearance, a pre-clearance survey will be conducted in the work sites to determine locations of any infestations of significant weeds (i.e. Priority weeds listed under the *Biosecurity Act 2015* or Weeds of National Significance (WONS)). If recommended by the ecologist, control of weeds will be undertaken to minimise the risk of spread of weeds during clearing. Weed control measures will be species specific.

5.3.2. Fauna Pre-clearing Surveys

A fauna pre-clearing survey will be undertaken by a qualified ecologist prior to any vegetation clearance. Habitat features that have a high potential to support native fauna species will be identified prior to any clearing activities. These include significant rock outcrops and in particular trees bearing hollows that have potential to contain species such as bats, gliders, possums, reptiles and birds. Trees to be cleared that contain hollows or

nests that have a high potential to contain fauna will be identified, recorded, flagged with fluorescent marking tape, and marked with a large (> 1 m) "H" using spray paint on two sides of the tree.

To determine fauna usage, the ground around each tree to be removed 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. The location of suitable nearby habitat for the release of fauna that may be encountered during the pre-clearing process will be identified and marked on a map. It is recommended that fauna pre-clearance surveys are conducted within two weeks of commencement of clearing and/or translocation activities to reduce risk of nesting by fauna.

5.3.3. Dural Land Snail Surveys

As individuals of the Dural Land Snail as well as Dural Land Snail habitat has been identified within the development footprint, targeted pre-clearance surveys to locate individuals within the development area for translocation into retained areas will be conducted. Suitable areas for relocation of any recorded individuals will be determined in consultation with expert Stephanie Clark prior to commencement of clearing works. Requisite permits/licences for translocation of threatened species will need to be obtained prior to commencement of the pre-clearance surveys and translocation works.

5.4. Clearing Supervision

Any trees that were identified as habitat items (see **Section 5.3.2** above) will be initially isolated by clearing all other non-habitat trees around them, then left in-situ for a 24-hour period prior to clearance under ecologist supervision. During clearance works standard clearance supervision protocols, as detailed in the FMP, will be observed. This will involve the ecologist inspecting habitat features immediately prior to disturbance for occupying fauna. Following the initial inspection, each habitat tree will be agitated prior to felling in the presence of an ecologist and then inspected by an ecologist once felled. Inspections will consist of a thorough examination of hollows, nests and decorticating bark to find any remaining resident fauna. A torch will be used to facilitate the inspection of deeper parts of hollows 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.

5.5. Weed Management during Construction

Prior to clearance, infestations of significant weeds (State listed priority weeds under the NSW *Biosecurity Act 2015* and Weeds of National Significance (WONS)) in the subject site will be recorded and mapped (see Section 5.3.1). If recommended by the ecologist, control of weeds will be undertaken to minimise the risk of spread of weeds during clearing. Weed control measures will be species specific as detailed in **Appendix C**.

Prior to clearing, all plant equipment entering the site will be inspected and recommended for wash down (in designated wash down areas) as required to ensure weed material from off-site locations do not establish or spread into native vegetation within the study area. Any weed materials will need to be carefully removed off site in a manner appropriate to the species or at the direction of the ecologist and The Hills Shire Council guidelines so as to prevent the spread of propagules to uncleared areas of native vegetation, both on and off

site. Machinery involved in weed management will also be washed down prior to removal from site to prevent weeds from spreading into off site areas.

5.6. Seed Collection / Harvest

Seed collection will be undertaken in the study area prior to bushland reconstruction of the subject site. Seeds collected must be germinated and grown in a nursery for later planting during bushland restoration works within the subject site. Use of seed sourced on site for plantings will maintain local genetic diversity of species occurring on site.

Seed collection will be undertaken by a company that specialises in growing endemic native plants from seed collected in bushland areas. This work can be undertaken by the Bush regeneration contractor (BRC) if the BRC chosen has a suitable native plant nursery. Seed collection visits must occur in each season across the study area to obtain a seed collection from as many native species as possible, as flowering and seed setting times vary with species. Seed must be collected from all strata including grass and herb species.

If the requisite quantum of seeds cannot be collected onsite, then seeds may be collected in the first instance within 10 km of the study area. If it can be shown that all reasonable steps have been taken to source from this radius unsuccessfully, then a larger area can be utilised provided:

- Seeds are sourced from the Cumberland Plain;
- Seeds are from species listed in the planting list in **Appendix B**; or
- Seeds are from species listed in the Final Determination for BGHF and STIF.

In the event that substitution of plant species is required due to supply shortages of species listed in **Appendix B**, the replacement/substitution species should be checked with the project ecologist to confirm suitability of the species. Council is also to be notified in the event of species substitution. The substitute species are not to utilised for planting without prior approval from Council.

6. Weed Management Plan

6.1. Introduction

6.1.1. Species Lists

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 Study area 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 study area, 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
<i>Anredera cordifolia</i>	Madeira Vine	SP
<i>Asparagus aethiopicus</i>	Asparagus Fern	SP
<i>Asparagus asparagoides</i>	Bridal Creeper	SP
<i>Asparagus plumosus</i>	Climbing Asparagus Fern	SP
<i>Cestrum parqui</i>	Green Cestrum	RP
<i>Lantana camara</i>	Lantana	SP
<i>Ludwigia peruviana</i>	Peruvian Water Primrose	RP
<i>Olea europaea subsp. cuspidata</i>	African olive	RP
<i>Rubus fruticosus</i>	Blackberry	SP
<i>Sporobolus fertilis</i>	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;
- weep 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 all management zones within 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. 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

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.

Manual removal will be an appropriate form of control for some species, and 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

The primary aquatic weed recorded from the dam in the subject site is *Ludwigia peruviana* (Water Primrose). The removal of *Ludwigia peruviana* is to be conducted in a staged manner to maintain aquatic habitat around the dam and 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.

6.3. Types of Weed Control

This section provides information on the types of weed control that will be undertaken, primarily in the revegetation areas. 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 bushland regeneration. Primary weeding 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 Privet (*Ligustrum lucidum*) 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.

6.3.1.2. Maintenance Weeding

Maintenance weeding is to be undertaken throughout the entire subject site 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, and then infestations of any weed species within reconstruction areas becoming established to the extent they threaten the viability of native plantings. The follow-up bushland reconstruction works are likely to be required at least every month until weeds are at negligible levels, whereby they do not compete with planted tubestock nor occur in densities greater than 10/m². Site visits may be more frequent or infrequent depending on weed levels.

It is recommended that any woody weeds, climbers, and key herbaceous weeds identified during reconstruction 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 reconstruction works. 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 preparation of the subject site for bushland reconstruction.

6.4.1.1. Sediment Fencing

The subject site would inevitably result in runoff of surface soil after initial weed management works. Temporary silt sediment fencing will need to be installed around the subject site to prevent soil runoff, especially after

heavy rainfall events into surrounding bushland areas and Cumberland State Forest. Fencing should remain during the construction (e.g. building houses) within the study area to help prevent weed and soil run off.

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.

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. These species are perennial and 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;
- 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 for the regeneration areas 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 (Zone 1, Zone 2, Zone 4, Zone 5 and Zone 6), whereas primary weeding in areas proposed for planting (such as Zone 3) can be implemented just before plantings are undertaken.

During site visits for primary weeding the bushland maintenance team should start from one end of each regeneration area and work towards the other end to achieve the aims listed above through the entirety of each area, 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 spraying of areas in which revegetation is to take place the 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, particularly across Management Zone 3 which largely comprises exotic grassland areas, weed suppression materials can be installed. 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. Weed suppression material can be a form of biodegradable matting such as jute matting.

Jute matting is a commonly used biodegradable form of matting for bushland regeneration works. The heavier available forms of this product suppress weed growth. Holes would be cut in the matting if used, to allow it to be placed around remnant native plant individuals occurring on the site. Holes would also need to be cut to plant 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 to establish the revegetation site while intensive weed control is needed, and be allowed to biodegrade over time without being reapplied, unless required during the establishment period. Following application of weed suppression materials the reconstructed bushland areas will be planted out with native plants as per **Appendix B**.

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.

6.5. Ongoing Weed Maintenance

Weed suppression methods such as jute matting will suppress mass regrowth of weeds in reconstruction areas initially, but not entirely prevent regrowth of weeds. The most cost and time effective method of controlling weed regrowth in a revegetation area or weedy bushland area 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 zones that have received past primary weeding treatments in the following months, to treat any regrowth of weeds. Ongoing maintenance of the reconstruction and regeneration areas should occur for a five year period by the contracted bushland regeneration company, and each area should be covered in its entirety once every month, to diminish the soil seed bank of exotic weed species present on site. In order to eliminate the occurrence of these species they need to be controlled before they have a chance to set seed, otherwise progress on the site will not be made.

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 each area of the 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 (**Table 4**) should be prioritised for control. Individual plants of these species on site should not be allowed to achieve a reproductive stage in their life cycles. 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 primary weeding and erosion control and revegetation 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 and an updated Vegetation Management Plan for the ongoing and in perpetuity management of the Community lot should be developed.

7. Restoration and Regeneration Plan

7.1. Objectives

The aim of restoration and regenerations actions within the vegetation on 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;
- Increase species diversity and percentage cover of native vegetation plant species in retained bushland areas;
- Improve the resistance of native vegetation within the retained bushland areas 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 comprises a mix of APZs, a landscaped frontage and bushland within a community title, no permanent fencing of bushland areas is proposed. Nonetheless, some areas of the subject site will be separated from residential lots via fencing for the residential development. These fencelines form part of the proposed residential development and the locations are indicated in **Figure 5**.

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 bushland within the adjacent Cumberland State Forest and areas that are to be dedicated to NSW State Government for management by NSW Forestry form a continuous area of native vegetation with that within the subject site and will not be subject to grazing or other similar activities, no fencing within the bushland subject to this VMP and adjacent lots to be dedicated to NSW State Government/NSW Forestry is proposed.

All temporary fencing installed to delineate clearing limits for the Demolition DA (approved DA 585/2021/HC) and the Concept Plan DA (approved DA 860/2022/JP) will be removed on completion of works. However, the existing boundary fence between the study area and Cumberland State Forest will be retained.

7.2.2. Signage

Signage should be installed at any public access points to the Community Lot 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 residents and 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). As a minimum, the signage should contain wording such as *"The vegetation within this bushland is protected. Activities such as firewood collection, bushrock removal, picking of native flowers and dumping of garden waste are prohibited"*

7.3. Recommended Revegetation Techniques

Appropriate plant species for BGHF and STIF within the subject site are provided in **Appendix B** and are to be used for selective re-vegetation of the subject site. As Zone 8 (Landscape Plantings) and Zone 9 (Dams and Basins) are not proposed to be revegetated but maintained in their current form (albeit with weed management), the revegetation techniques outlined in this chapter do not apply to Management Zone 8 and Management Zone 9. The subset of BGHF and STIF groundcover species suitable for use within APZs (Management Zone 4 and Management Zone 6) and the Fuel Management Area (Management Zone 7) is indicated in **Appendix B**.

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

Local native plant species 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 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, 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 5), APZ areas (Zone 4 and Zone 6) and the HRCA (Zone 7).

i. Bushland Areas

Although specific strata will be planted only in some bushland management zones (Zone 2, Zone 3), all bushland management zones should have the following indicative densities (or higher) for the various strata:

- Canopy Trees: 1 unit / 10 m²
- Shrubs: 1 unit / 10 m²
- Groundcovers: 3-4 units / 1 m² planted in clumps/thickets.

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

ii. APZ Areas

a. Zone 4a

While all existing canopy trees are to be retained within this APZ area, no further trees are to be planted. Retained trees are to be trimmed/pruned as required to achieve the following IPA requirements:

- Tree canopy cover should be less than 15%;
- Lower limbs should be removed up to height of 2 metres above the ground; and
- Tree canopies should be separated by 2 - 5 metres.

Shrubs and groundcovers can be planted between trees provided:

- Shrubs are not located within the canopy 'drip zone' of trees and form <10% cover; and
- Grass and other groundcovers are kept mown are kept mown to a height of no more than 100mm; and
- Leaves and vegetation debris are removed off-site.

b. Zone 4a

While all existing canopy trees are to be retained within this APZ area, no further trees are to be planted. Retained trees are to be trimmed/pruned as required to achieve the following OPA requirements:

- Tree canopy cover should be less than 30%; and
- Tree canopies should be separated by 2 - 5 metres.

Shrubs and groundcovers can be planted between trees provided:

- Shrubs form <20% cover and do not form a continuous canopy;
- Grass and other groundcovers are kept mown are kept mown to a height of no more than 100mm; and
- Leaves and vegetation debris are removed.

c. Zone 6

Locally endemic canopy trees are to be retained where feasible within this APZ area with further planting of trees to be adjusted based on the extent of trees retained. Retained trees are to be trimmed/pruned as required to achieve the following OPA requirements:

- Tree canopy cover should be less than 30%; and
- Tree canopies should be separated by 2 - 5 metres.

Shrubs and groundcovers can be planted between trees provided:

- Shrubs form <20% cover and do not form a continuous canopy;
- Grass and other groundcovers are kept mown are kept mown to a height of no more than 100mm; and
- Leaves and vegetation debris are removed.

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.

iv. Fringing Dam Vegetation

As the purpose of revegetation within Zone 9 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. Any existing native aquatic vegetation such as *Eleocharis sphacelata* should be allowed to colonise dam walls naturally with supplementary planting provided as required to stabilise the banks of the dam.

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 or known 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 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 bushland areas 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 in Zone 2 and Zone 3 with assistive supplemental planting of shrubs and groundcover in Zone 1 and Zone 5 as required; and
- Maintaining regeneration treatments (weeding, replacing dead plantings and repairing / replacing weed mat if need during the planting establishment period), as a part of an ongoing maintenance programme.
- Jute matting or a similar sturdy, biodegradable material should be used to curtail erosion.

7.5. Costings

Table 5 provides a very high level estimate of costings for the implementation and maintenance for the life of this VMP. All estimations are based on previous projects and prices quoted during the writing of this report. Although every effort has been made to provide accurate cost estimates, final costs are still subject to a high degree of variability based on the availability of resources and other unforeseen economic factors. Therefore, the costing provided should be considered a general guide as totals may vary over the life of the VMP and should be updated as required following receipt of formal quotes from bush regeneration contractors.

7.5.1.1. Inclusions

Although Zones 1 and 5 will be allowed to regenerate naturally, an allowance for assistive revegetation has been incorporated into the costing by calculating revegetation costs for 10% of the area of Zone 1 and Zone 5. The requirement for assistive regeneration will be determined during the initial monitoring periods and will be implemented in Year 1 if required. Allowance has also been made for some tree planting within Zone 6 and seeding of grasses in a proportion of the APZ areas.

Maintenance visits include ongoing weeding, watering until establishment, plant replacement at 5% of total plant costs in first year and 2.5% in second year. Maintenance visits also include CPI increases of 3% each year. However, the number of hours labour is assumed to decrease overtime as less maintenance is likely to be required.

7.5.1.2. Exclusions

Sediment fencing and temporary fencing for site delineation has not been included within this VMP as it is assumed these will form part of civil works.

Costings for seed collection have not included in these estimates as the full extent of area from which seed is to be collected is currently unknown as the collection of an adequate supply of seeds will vary with seasons and plant conditions.

Table 5 High Level Cost Estimate for VMP

Task	Establishment	Year 1	Year 2	Year 3	Year 4	Year 5
Primary Weeding (All zones): \$12/m ² for 39100 m ²	\$469,200.00					
Jute matting	\$25,000.00					
Hiko Planting Ground Cover (3 units/m ² for 800 m ²) (10% of Zone 1)		\$6,000.00				
Hiko Planting Shrub (1 unit/10 m ² for 800 m ²) (10% of Zone 1)		\$200.00				
Hiko Planting Ground Cover (3 units/m ² for 9000 m ²) (Zone 2)	\$67,500.00					
Hiko Planting Shrub (1 unit/10 m ² for 9000 m ²) (Zone 2)	\$2,250.00					
Hiko Planting Ground Cover (3 units/m ² for 4100 m ²) (Zone 3)	\$30,750.00					
Hiko Planting Shrub (1 unit/10 m ² for 4100 m ²) (Zone 3)	\$1,025.00					
Hiko Planting Canopy (1 unit/10 m ² for 4100 m ²) (Zone 3)	\$1,025.00					
Hiko Planting Ground Cover (assumed 1 unit/m ² for 5500 m ²) (Zone 4a & 4b)	\$13,750.00					
Hiko Planting Ground Cover (3 units/m ² for 280 m ²) (10% of Zone 5)		\$2,100.00				
Hiko Planting Shrub (1 unit/10 m ² for 280 m ²) (10% of Zone 5)		\$70.00				
Hiko Planting Ground Cover (assumed 1 unit/m ² for 1300 m ²) (Zone 6)	\$3,250.00					
Hiko Planting Canopy (1 unit/10 m ² for 130 m ²) (10% of Zone 6)	\$32.50					

Task	Establishment	Year 1	Year 2	Year 3	Year 4	Year 5
Direct Seeding of native grasses (50% of Zone 2 and Zone 3. 6550m ² @ \$3/m ²)	\$19,650.00					
Direct Seeding of native grasses (25% of Zone 4, 4a, 4b and Zone 6. 1700m ² @ \$3/m ²)	\$5,100.00					
Direct Seeding of native grasses (10% of Zone 7. 330m ² @ \$3/m ²)	\$990.00					
Tree guards (for trees and shrubs) (Zones 1, 2, 3 and 5)	\$2,500.00					
24 Star Pickets (Photo reference points)	\$600.00					
Maintenance Visits (Weeding and Plant Replacement)		\$32,204.11	\$16,102.05	\$8,240.00	\$6,180.00	\$4,120.00
Photomonitoring and reporting		\$4,120.00	\$3,347.50	\$2,575.00	\$2,575.00	\$2,575.00
Total Costs	\$642,622.50	\$44,694.11	\$19,449.55	\$10,815.00	\$8,755.00	\$6,695.00
		12	6	4	4	4
		Maintenance Visits	Maintenance Visits	Maintenance Visits	Maintenance Visits	Maintenance Visits
		4 Monitoring Visits	3 Monitoring Visits	2 Monitoring Visits	2 Monitoring Visits	2 Monitoring Visits

7.6. Schedule of Works

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

7.6.1. Year 1 and 2

- Weed control;
- Planting of canopy species (Zone 3, potentially Zone 2 and 6);
- Planting of shrub, and groundcover species (Zone 2, Zone 3, potentially Zone 1 and 5);
- Planting of selective subset of shrub and groundcover species in APZs (Zone 4a, Zone 4b, Zone 6);
- Replacement of any tube stock individuals that have died between site visits;
- Management fuel loads within APZs; and
- Monitoring, management and reporting.

7.6.2. Years 3, 4, and 5

- On-going weed control;
- Management of APZ fuel loads; and
- Monitoring, management and reporting.

Vegetation management and maintenance of the proposed Community Lot 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.

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

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

- Establish a series of fixed monitoring points. At least one monitoring location should be established for each management zone. Indicative locations for photo points are shown in **Figure 6**. Four photos will be taken at each 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 each 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;
- 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.

Monitoring will be conducted before weed control commences. Once initial plantings are complete in necessary locations, 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 from the 2nd year of the VMP and then to every three months in Years 3 – 5 following establishment of vegetation. This results in 12 maintenance visits in Year 1, six visits in Year 2 and 4 visits in Years 3 – 5.

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 the performance criteria outlined in **Table 6** and **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 in each quadrat 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 – APZ Establishment
- Phase 3 - Restoration Works Commence
- Phase 4 – Maintenance
- Phase 5 – 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.

Table 6 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					
Seed Collection	Bush Regeneration Contractor	Seed collected from native plants and germinated; or BRC to commission the propagation of plants required for VMP works to ensure adequate supply.	Species list of all seeds collected includes all species present on site prior to clearing.	Increase seed collection or source additional seed from local nursery if seed isn't available on-site.	Immediately
Delineation of clearing boundary	Property Owner or Subcontractor	Marking using GPS and high visibility tape, fencing and boundary markers.	All clearing boundaries have been clearly marked and photographs taken for documentation.	Delineate all clearing boundaries.	Before construction works commence
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 Reconstruction and Weeding works

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Flora Pre-clearing Surveys	Ecologist	Identify any locations of significant weed infestations requiring control.	Pre-clearing surveys are completed and results are documented.	Undertake pre-clearance surveys.	Prior to any vegetation clearing
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
Implementation of appropriate sediment/erosion controls	Property Owner or Subcontractor	Adequate controls are implemented so no erosion or sedimentation into areas of bush land reconstruction occurs	Photograph at each monitoring point.	Installation of additional sediment/erosion controls and or fix existing controls.	Prior to any vegetation clearing
Phase 2 – APZ/Fuel Management Area					
Pruning/Trimming of Canopy in APZ/Fuel Management areas	Property Owner, Bushfire consultant or other nominated contractor	Canopy cover is pruned/trimmed	Canopy cover meets requirements of an IPA (APZ areas) or hazard reduction requirements (fuel management area)	Additional pruning/trimming works in accordance with recommendations from bushfire consultant or per RFS requirements	Following primary weed removal but prior to revegetation works

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Determination of locations for shrub plantings	Bushfire consultant or other nominated contractor	Shrubs, if planted, are not located under retained trees (APZ areas only)	Shrub cover meets requirements of an IPA (zone 4) or OPA (Zone 6)	Additional pruning/trimming works in accordance with recommendations from bushfire consultant	Following primary weed removal and determination of retained tree extent
Phase 3 - Restoration 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 restoration works
Carry out initial weeding.	Bush Regeneration Contractor/ Botanist	Main weed infestations and priority weeds and WONS removed - Reproductively mature plants absent from site.	Primary weeding completed and documented.	Targeted weeding	First month of restoration works
Revegetate reconstruction areas. Canopy, small tree, shrub, and ground cover species are planted according to species list in Appendix B.	Bush Regeneration Contractor	Native plants have been planted in all vegetation strata.	Revegetation has occurred and been documented.	Undertake revegetation works.	Immediately upon establishment of reconstruction areas
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.	Every month in 1 st year of VMP, every two months in 2 nd

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
					year, then quarterly in years 3 - 5.
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 4 – 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)	Monitoring point 20x20 m quadrat data results.	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)	Monitoring point 20x20 m quadrat data results.		
		No new weed species or 'large scale / dense' weed infestations, including the encroachment of exotic lawn/vegetation into area of bush land regeneration.	Monitoring point 20x20 m quadrat data results.		

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		<p>Large scale/dense infestation = an area >2m x 2m without successfully established native plantings.</p> <p>New weed infestations = areas with infestation not previously recorded on the site in quarterly / annual monitoring reports</p>			
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	Monitoring point 20x20 m quadrat data 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	Monitoring point 20x20 m quadrat data 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.	
Mowing/Trimming within APZ/Fuel Reduction areas	Bush Regeneration	Ground cover is mown and tree cover/shrub cover is trimmed	Various strata cover are as per	Additional trimming or mowing to be conducted	As required across duration of 5 year

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
	Contractor or other nominated contractor. Bushfire consultant to advise as required		requirements for an IPA/OPA or fuel management area	until vegetation strata are at requisite levels for the zone	maintenance period under VMP. Frequency of maintenance dependent on growth exceeding relevant levels.
Phase 5 - 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	Monitoring point 20x20 m quadrat data results.	Undertake replanting, especially if natural recruitment does not occur	Annually for 5 year maintenance period of VMP
		Priority weeds cover is reduced annually, ranging from less than 2-10% cover over the 5 year period (see Table 7 for details)	Monitoring point 20x20 m quadrat data results.	Targeted weeding.	
		Non-priority weed cover is reduced annually, ranging from less than 4-15% cover over the 5	Monitoring point 20x20 m quadrat data results.	Targeted weeding.	

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		year period (see Table 7 for details)			
		Species diversity and density equal to or greater than previous inspection.	Monitoring point 20x20 m quadrat data results.	Undertake replanting and/or plant additional species.	
		No encroachment of exotic lawn/vegetation into area of bush land regeneration	Monitoring point 20x20 m quadrat data 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 the VMP via natural recruitment	Monitoring point 20x20 m quadrat data 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
		Priority weeds to be less than 2% cover.	Monitoring point 20x20 m quadrat data results.	Extend life of VMP until performance criteria is met.	
		Non-priority weeds to be less than 4% cover.	Monitoring point 20x20 m quadrat data results.	Extend life of VMP until performance criteria is met.	
		Species diversity and density equal to or greater than previous inspection.	Monitoring point 20x20 m quadrat data results.	Extend life of VMP until performance criteria is met.	
		No encroachment of exotic lawn/vegetation into area of bush land regeneration	Monitoring point 20x20 m quadrat data 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 7 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

10. References

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APPENDIX A :

Recorded Flora Species

Table 8 Flora Species recorded within subject site and wider study area during Cumberland Ecology surveys

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

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

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

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

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

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

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

APPENDIX B :

Planting Lists

Table 9 Species Planting List

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

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

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

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

Family	Scientific Name	Common Name	Growth Form	Sydney Turpentine Ironbark Forest	Blue Gum High Forest	Suitable groundcover for APZ/HRC areas
Oxalidaceae	<i>Oxalis exilis</i>		Forb (FG)	x	x	✓
Oxalidaceae	<i>Oxalis perennans</i>		Forb (FG)	x	x	✓
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily	Forb (FG)	x		
Phormiaceae	<i>Dianella longifolia</i>	Blueberry Lily	Forb (FG)	x	x	
Phormiaceae	<i>Dianella revoluta</i>	Blueberry Lily	Forb (FG)	x		
Phyllanthaceae	<i>Poranthera microphylla</i>	Small Poranthera	Forb (FG)	x	x	✓
Plantaginaceae	<i>Plantago debilis</i>	Shade Plantain	Forb (FG)		x	✓
Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell	Forb (FG)	x	x	✓
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock	Forb (FG)		x	✓
Rubiaceae	<i>Galium propinquum</i>	Maori Bedstraw	Forb (FG)		x	✓
Rubiaceae	<i>Pomax umbellata</i>	Pomax	Forb (FG)	x		✓
Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade	Forb (FG)	x	x	✓
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern	Fern (EG)		x	
Blechnaceae	<i>Doodia aspera</i>		Fern (EG)		x	
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken	Fern (EG)		x	
Pteridaceae	<i>Adiantum aethiopicum</i>	Common Maidenhair	Fern (EG)	x	x	
Pteridaceae	<i>Cheilanthes sieberi subsp. sieberi</i>	Rock Fern	Fern (EG)	x		✓
Cyperaceae	<i>Cyperus gracilis</i>	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 APZ/HRC areas
Cyperaceae	<i>Cyperus laevis</i>		Grass & grasslike (GG)		x	✓
Cyperaceae	<i>Gahnia aspera</i>	Rough Saw-sedge	Grass & grasslike (GG)	x		
Cyperaceae	<i>Lepidosperma laterale</i>	Variable Sword-sedge	Grass & grasslike (GG)	x		
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Matt-rush	Grass & grasslike (GG)	x	x	✓
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Grass & grasslike (GG)	x	x	
Lomandraceae	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush	Grass & grasslike (GG)	x		
Lomandraceae	<i>Lomandra obliqua</i>		Grass & grasslike (GG)	x		✓
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass	Grass & grasslike (GG)	x		
Poaceae	<i>Austrostipa rudis</i>		Grass & grasslike (GG)	x		
Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass	Grass & grasslike (GG)	x		✓
Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass	Grass & grasslike (GG)	x	x	
Poaceae	<i>Digitaria parviflora</i>	Small-flowered Finger Grass	Grass & grasslike (GG)	x	x	
Poaceae	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	Grass & grasslike (GG)	x	x	✓
Poaceae	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	<i>Entolasia marginata</i>	Bordered Panic	Grass & grasslike (GG)	x	x	
Poaceae	<i>Entolasia stricta</i>	Wiry Panic	Grass & grasslike (GG)	x		
Poaceae	<i>Eragrostis leptostachya</i>	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 APZ/HRC areas
Poaceae	<i>Imperata cylindrica var. major</i>	Blady Grass	Grass & grasslike (GG)	x	x	
Poaceae	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	<i>Oplismenus aemulus</i>	Australian Basket Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	<i>Oplismenus imbecillis</i>	Creeping Beard Grass	Grass & grasslike (GG)	x	x	✓
Poaceae	<i>Panicum simile</i>	Two-colour Panic	Grass & grasslike (GG)	x		✓
Poaceae	<i>Poa affinis</i>		Grass & grasslike (GG)	x	x	
Poaceae	<i>Rytidosperma racemosum</i>	Wallaby Grass	Grass & grasslike (GG)	x		
Poaceae	<i>Rytidosperma tenuius</i>		Grass & grasslike (GG)	x		
Poaceae	<i>Themeda australis</i>	Kangaroo Grass	Grass & grasslike (GG)	x	x	✓
Apocynaceae	<i>Parsonsia straminea</i>	Common Silkpod	Other (OG)	x		
Apocynaceae	<i>Tylophora barbata</i>	Bearded Tylophora	Other (OG)	x	x	✓
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Wonga Vine	Other (OG)	x	x	
Dicksoniaceae	<i>Calochlaena dubia</i>	Rainbow Fern	Other (OG)	x	x	
Dilleniaceae	<i>Hibbertia dentata</i>	Twining Guinea Flower	Other (OG)	x	x	
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	Other (OG)	x	x	✓
Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining glycine	Other (OG)	x	x	✓
Fabaceae (Faboideae)	<i>Glycine microphylla</i>	Small-leaf Glycine	Other (OG)	x	x	✓
Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Variable Glycine	Other (OG)	x	x	✓

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

APPENDIX C :

Weed Control Methods

Table 10 Weed Control Methods

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

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

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

Family	Scientific Name	Common Name	Treatment Method
Solanaceae	<i>Solanum sisymbriifolium</i>	Sticky Nightshade	
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop	
Asparagaceae	<i>Asparagus aethiopicus</i>	Asparagus Fern	<ul style="list-style-type: none"> - 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	<i>Asparagus asparagoides</i>	Bridal Creeper	<ul style="list-style-type: none"> - 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	<i>Asparagus plumosus</i>	Climbing Asparagus fern	<ul style="list-style-type: none"> - 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	<i>Lantana camara</i>	Lantana	<ul style="list-style-type: none"> - 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	<i>Rubus fruticosus</i>	Blackberry	<ul style="list-style-type: none"> - 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	<i>Anredera cordifolia</i>	Madeira Vine	<ul style="list-style-type: none"> - Hand pull juvenile vines, or remove with hand tools taking care to remove roots and tubers

Family	Scientific Name	Common Name	Treatment Method
Onagraceae	<i>Ludwigia peruviana</i>	Peruvian water primrose	<ul style="list-style-type: none"> - 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 <hr/> <ul style="list-style-type: none"> - 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	<i>Tradescantia fluminensis</i>	Wandering jew	<ul style="list-style-type: none"> - 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	<i>Lonicera japonica</i>	Japanese Honeysuckle	<ul style="list-style-type: none"> - 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	<i>Cardiospermum grandiflorum</i>	Balloon Vine	<ul style="list-style-type: none"> - 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	<i>Ligustrum lucidum</i>	Large-leaved Privet	<ul style="list-style-type: none"> - Hand weed juveniles
Oleaceae	<i>Ligustrum sinense</i>	Small-leaved Privet	<ul style="list-style-type: none"> - 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	<i>Olea europaea subsp. cuspidata</i>	African Olive	<ul style="list-style-type: none"> - 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	<i>Solanum seaforthianum</i>	Climbing Nightshade	<ul style="list-style-type: none"> - 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	<i>Cestrum parqui</i>	Green Cestrum	<ul style="list-style-type: none"> - 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	<i>Araujia sericifera</i>	Moth Vine	<ul style="list-style-type: none"> - 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	<i>Cinnamomum camphora</i>	Camphor Laurel	<ul style="list-style-type: none"> - Hand weed seedlings - Spray seedlings and coppice regrowth with

Family	Scientific Name	Common Name	Treatment Method
			<p>glyphosate 10mL/1L</p> <ul style="list-style-type: none"> - 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	<i>Ochna serrulata</i>	Ochna/Mickey mouse plant	<ul style="list-style-type: none"> - 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	<i>Passiflora suberosa</i>	Corky passionflower	<ul style="list-style-type: none"> - Hand weed - Scrape stems with knife and paint exposed surface with undiluted glyphosate - Spray foliage with glyphosate 10mL/1L plus non-ionic surfactant
Polygonaceae	<i>Acetosa sagittata</i>	Turkey rhubarb	<ul style="list-style-type: none"> - 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	<i>Senna pendula var glabrata</i>	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	<i>Sida rhombifolia</i>	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	<i>Jasminum polyanthum</i>	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	<i>Datura stramonium</i>	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.
Areaceae	<i>Phoenix canariensis</i>	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	<i>Cotoneaster glaucophyllus</i>		- 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	<i>Alternanthera philoxeroides</i>	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	<i>Tecoma capensis</i>	Cape Honeysuckle	<ul style="list-style-type: none"> - 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	<i>Juncus acutus subsp. acutus</i>	Sharp Rush	<ul style="list-style-type: none"> - 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	<i>Juncus cognatus</i>		<ul style="list-style-type: none"> - 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	<i>Solanum mauritianum</i>	Wild Tobacco Bush	<ul style="list-style-type: none"> - 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
Salviniaceae	<i>Salvinia molesta</i>		<ul style="list-style-type: none"> - Hand weed juveniles - Mature individuals can be cut and painted with glyphosate 10mL/1L <hr/> <ul style="list-style-type: none"> - 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.

APPENDIX D :

Fact Sheet



Coonara Avenue, West Pennant Hills

BIODIVERSITY VALUES - FACT SHEET

Introduction

The redevelopment of the former commercial site at 55 Coonara Avenue will provide a new residences within close proximity to environmentally significant areas consisting of threatened ecological communities that are protected under both state and commonwealth legislation. As all land owners within the community have a responsibility to contribute to the maintenance and improvement of biodiversity values, this information fact sheet has been prepared to ensure that retained vegetation is managed and maintained to protect biodiversity values. The retained vegetation provides opportunities for community members to enjoy passive recreation activities such as bushwalking and photography.

Vegetation

The two communities that will be retained and revegetated in areas adjacent to the development are Blue Gum High Forest and Sydney Turpentine Ironbark Forest.

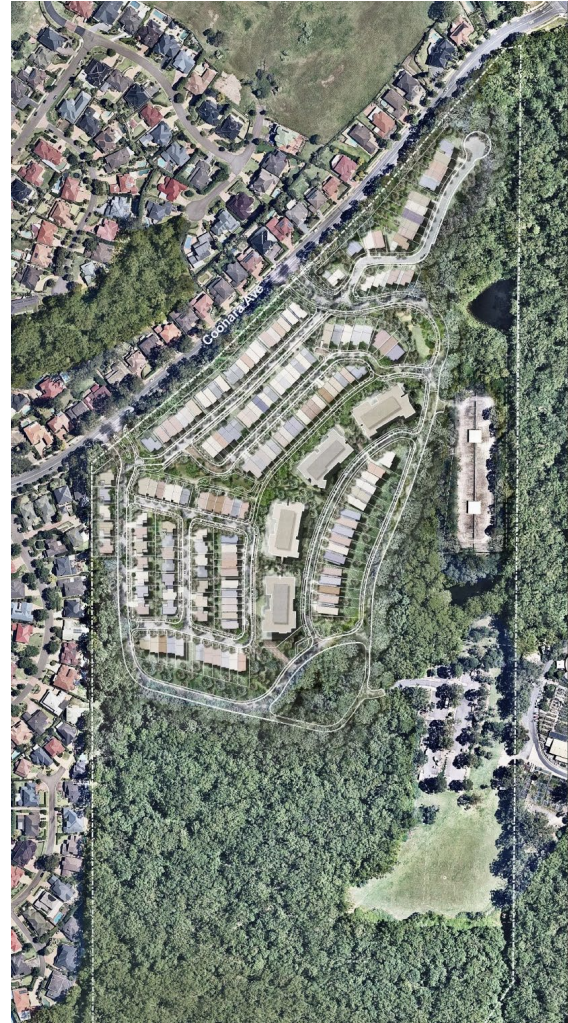
Blue Gum High Forest is a tall open forest (also called wet sclerophyll forest) restricted to the north shore and northern suburbs of Sydney, in particular the local government areas of Lane Cove, Willoughby, Ku-ring-gai, Hornsby, The Hills, Ryde and Parramatta.

Sydney Turpentine Ironbark Forest mainly occurs on the rim of the Cumberland Plain and the lower Blue Mountains, with the largest extents in the local government areas of The Hills, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Hurstville.

These communities are comprised of Australian native plants that occur in Sydney's northern and western suburbs and offer food and shelter for a range of native birds, reptiles and mammals. These communities were once found throughout northern and western Sydney but now only about 5% of their original extent remains. Although mostly only small patches of the community remain, several species depend on them for survival.

The protection of existing patches and revegetation of new patches of the community is an important step to ensure threatened and native species continue to persist in the Sydney region.

Illustrative Masterplan



Threatened Fauna

- Dural Land Snail (*Pommerhelix duralensis*)
- Powerful Owl (*Ninox strenua*)
- Southern Myotis (*Myotis macropus*)

Other Native Fauna

- Echidna (*Tachyglossus aculeatus*)
- Sugar Glider (*Petaurus breviceps*)
- Ring-tailed Possum (*Pseudocheirus peregrinus*)

Common Plants

- Sydney Blue Gum (*Eucalyptus saligna*)
- Blackbutt (*Eucalyptus pilularis*)
- Turpentine (*Syncarpia glomulifera*)
- Grey Ironbark (*Eucalyptus paniculata*)
- Sweet Pittosporum (*Pittosporum undulatum*)
- Wonga Wonga Vine (*Pandorea pandorana*)

Coonara Avenue, West Pennant Hills

BIODIVERSITY VALUES - FACT SHEET

Blue Gum High Forest © Cumberland Ecology



Sydney Turpentine Ironbark Forest © Cumberland Ecology



Dural Land Snail (credit: Stephanie Clark)



Powerful Owl (credit: Corev Mead)

Conservation Measures

A Vegetation Management Plan has been prepared that details responsibilities for the conservation areas including:

- Fencing
- Signage
- Vegetation management and monitoring, including weed control and maintenance of these areas

A Fauna Management Plan is also in place that details habitat supplementation measures including installation of nest boxes

What can I do to help?

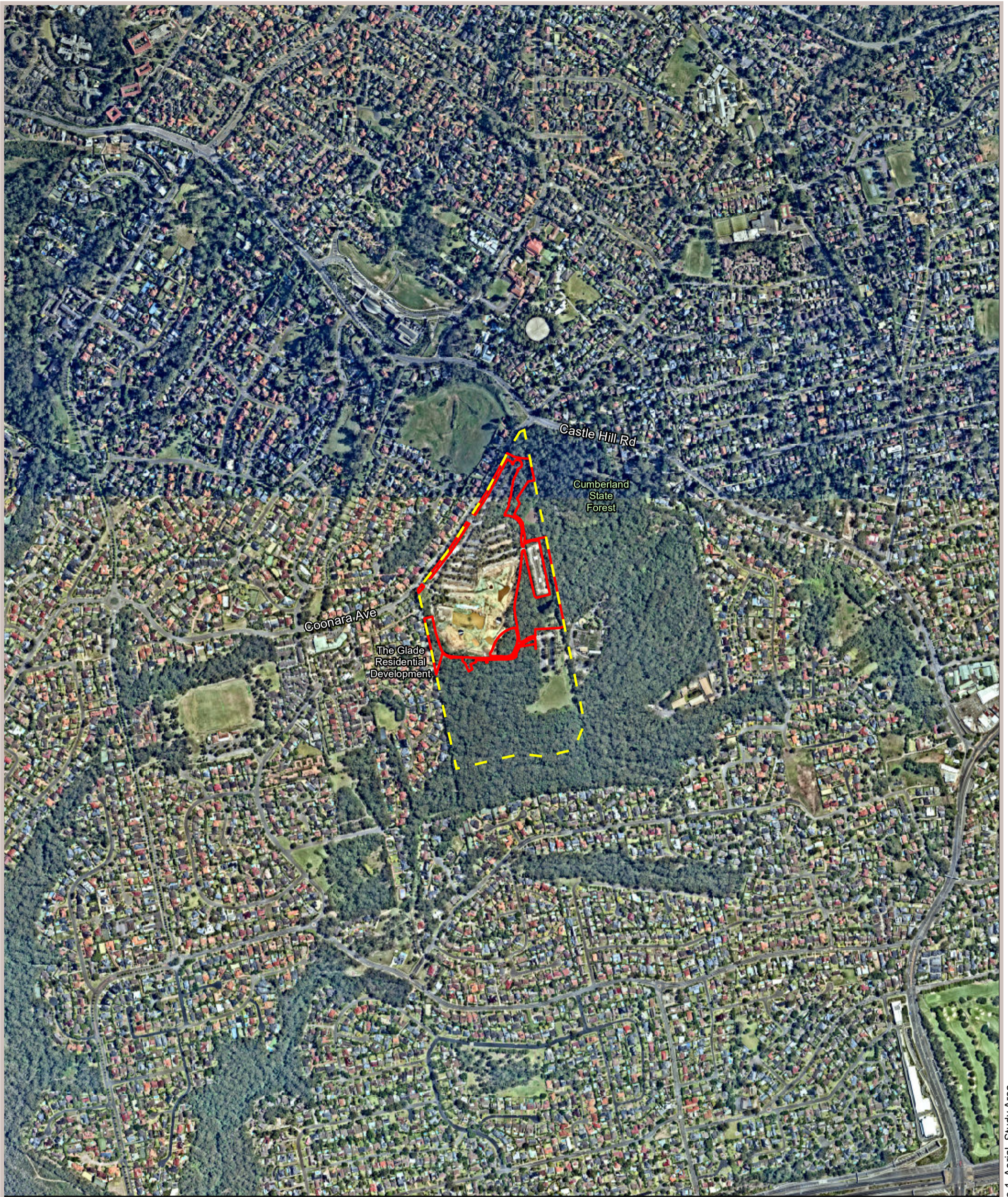
- Plant native plants that are approved for the area and community
- Obey all signage and keep out of environmentally significant areas and areas of revegetation.
- Keep to designated bush tracks.
- Keep domestic pets out of bushland areas.
- Do not pick native flowers.
- Do not remove bush rock.
- Dispose of all waste, including grass clippings in the appropriate bins.
- Educate your neighbours about the importance of the biodiversity present in your area.

Want to learn more?

For further information on the management and maintenance of the bushland, please refer to the Vegetation Management Plan prepared by Cumberland Ecology (2023).

Other useful resources are NSW Threatened Species Profiles:
<https://www.environment.nsw.gov.au/threatenedSpeciesApp/>

FIGURES



Legend

-  Subject Site
-  Study Area

Coordinate System: MGA Zone 56 (GDA 94)



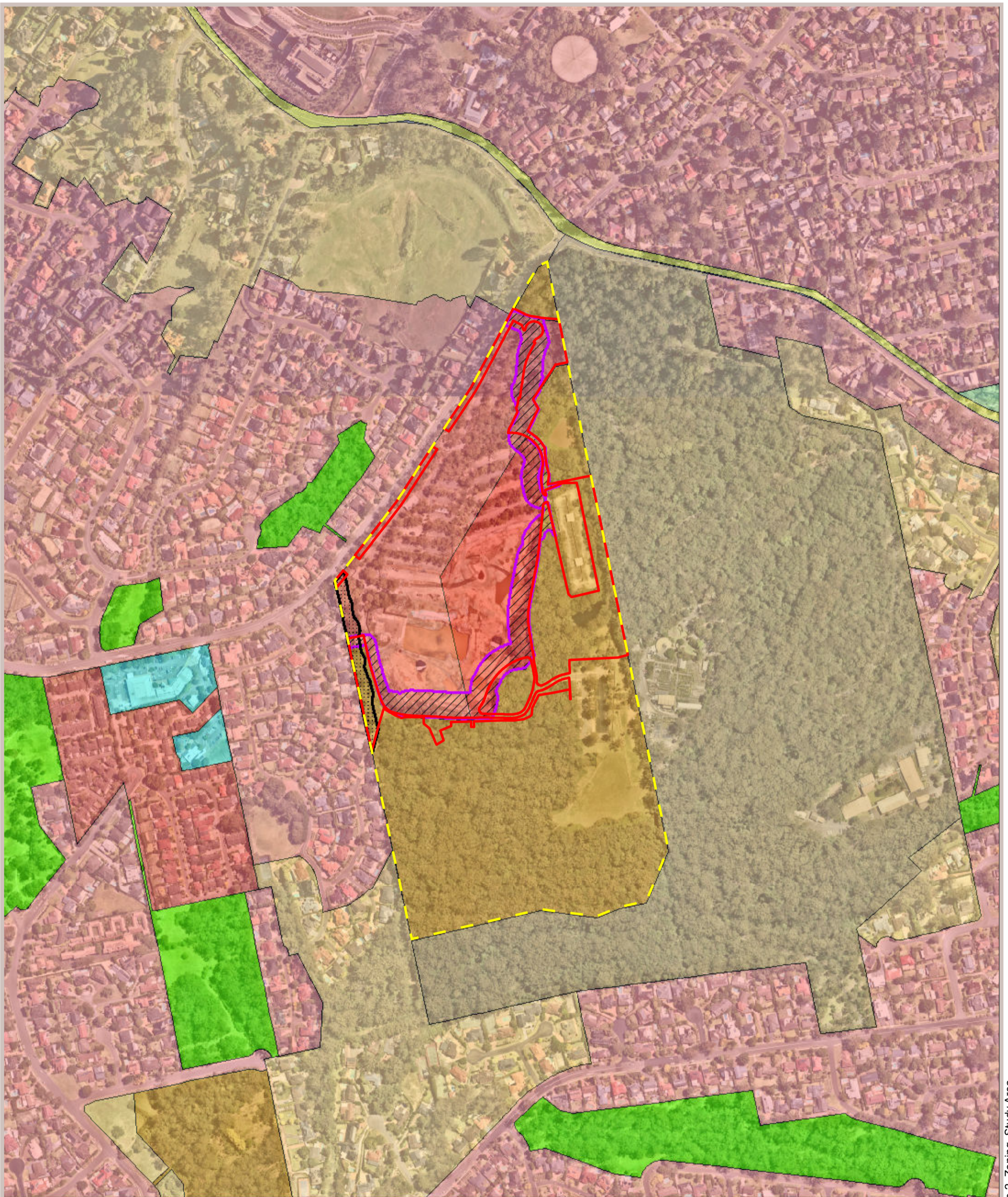
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












Figure 1. Aerial View of the Study Area

0 100 200 300 400 m



Legend

- | | | |
|---|---|---|
|  Subject Site | Land Use Zoning |  R4 - High Density Residential |
|  Study Area |  B2 - Local Centre |  RE1 - Public Recreation |
|  Asset Protection Zone |  E2 - Environmental Conservation |  RE2 - Private Recreation |
|  Existing Hazard Reduction Certificate (HR16121278913-2) Area |  E4 - Environmental Living |  RU3 - Forestry |
| |  R2 - Low Density Residential |  SP2 - Infrastructure |
| |  R3 - Medium Density Residential | |

Coordinate System: MGA Zone 56 (GDA 94)



Image Source:
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Dated: 18/01/2023

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Figure 2. Zoning of the Subject site and Study area





Legend

- Subject Site
- Study Area
- Approved Demolition DA (DA 585/2021/HC) footprint
- Vegetation cleared as part of approved DA 585/2021/HC works

Vegetation Community (Cumberland Ecology)

- Blue Gum High Forest_Low
- Blue Gum High Forest_Scattered Trees
- Sydney Turpentine-Ironbark Forest_Moderate
- Sydney Turpentine-Ironbark Forest_Weedy
- Planted Natives
- Exotic Vegetation
- Cleared/Hardstand

Vegetation Community (Keystone Ecological)

- VZ1a – Cleared Land

- VZ1b – Cleared Land
- VZ2a – Dams and Basins
- VZ2b – Dams and Basins
- VZ3a – Highly Modified Edges
- VZ4a – Landscaped Gardens
- VZ5a – BGHF
- VZ5b – BGHF
- VZ5c – BGHF
- VZ6a – STIF
- VZ6b – STIF

Coordinate System: MGA Zone 56 (GDA 94)



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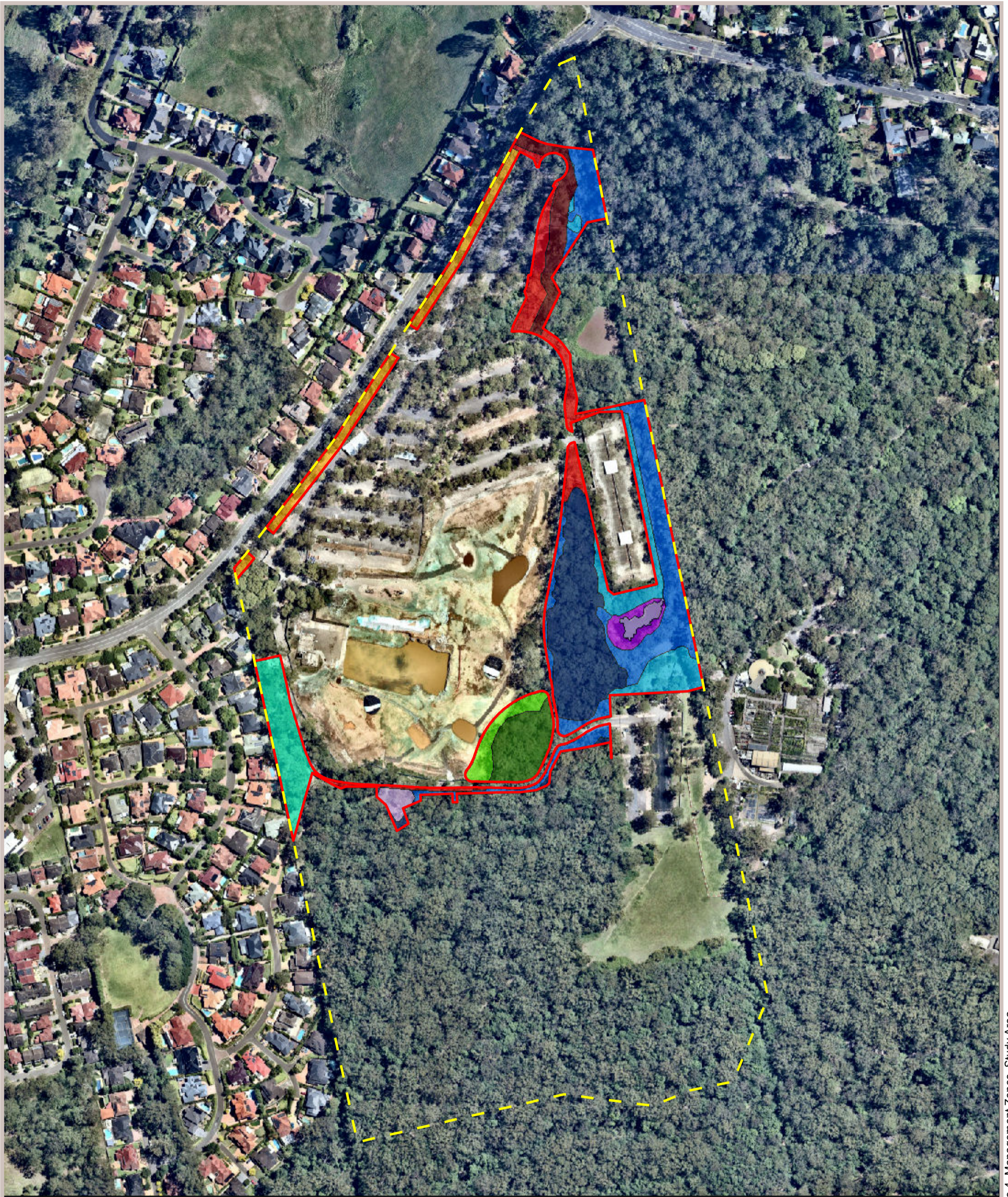
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







Figure 3. Vegetation mapping of the Study Area

0 50 100 150 m





Legend

	Subject Site	Vegetation Management Zones		Zone 5: STIF - Good	
	Study Area		Zone 1: BGHF - Good		Zone 6: STIF - APZ (OPA)
			Zone 2: BGHF - Poor		Zone 7: Fuel Management Area
			Zone 3: BGHF - Replanting		Zone 8: Landscaped Areas
			Zone 4a: BGHF - APZ (IPA)		Zone 9: Dam - fringing vegetation
			Zone 4b: BGHF - APZ (OPA)		Zone 10: Dams and Basins

Coordinate System: MGA Zone 56 (GDA 94)



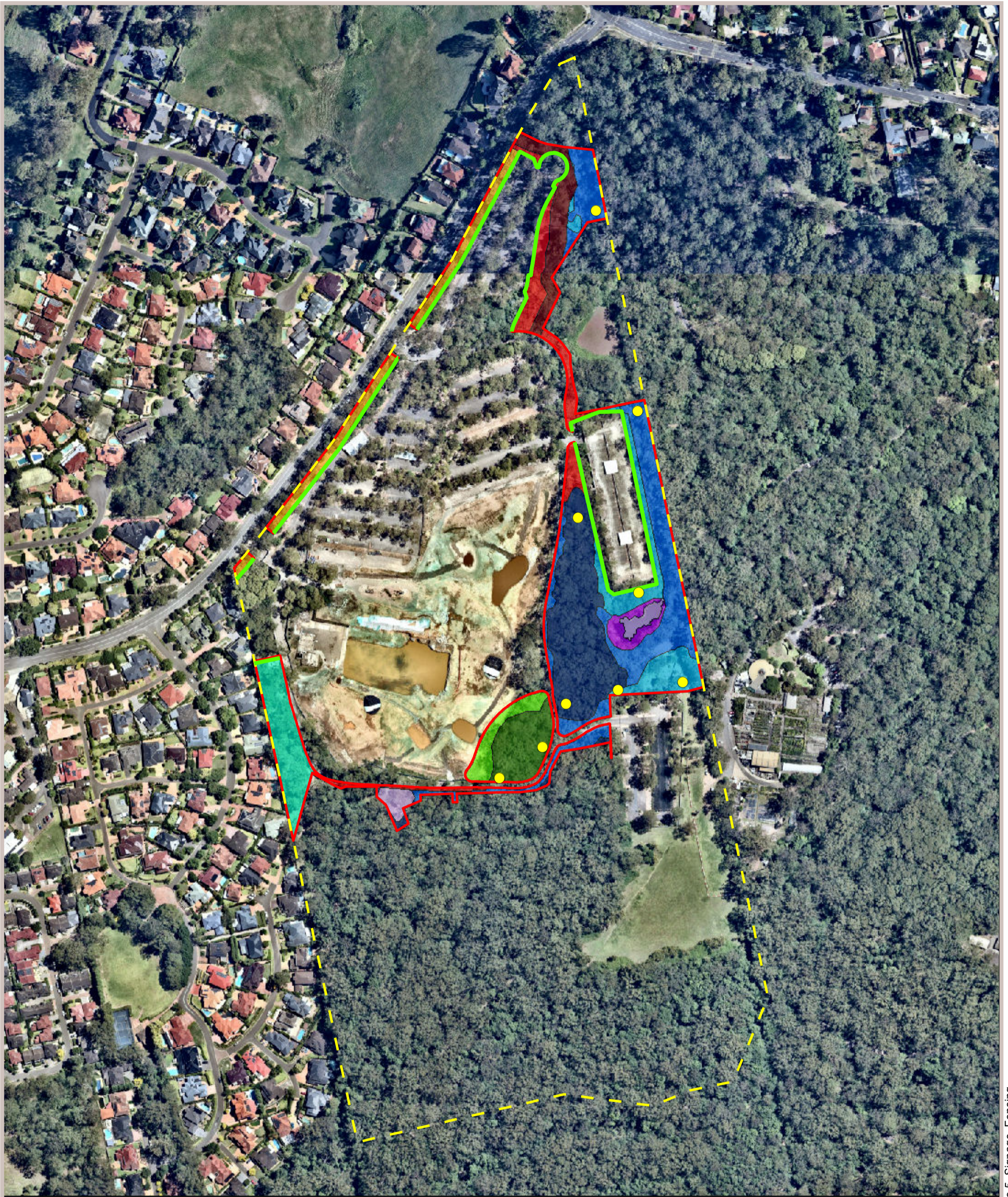
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Dated: 18/01/2023

Data Source:
Sixmaps Clip and Ship (2021)
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Figure 4. Vegetation Management Zones within the Subject Site

0 50 100 m



Legend

- Subject Site
- Study Area
- New fencing associated with proposed development
- Signage Locations

Vegetation Management Zones

- | | |
|---|---|
| Zone 1: BGHF - Good | Zone 5: STIF - Good |
| Zone 2: BGHF - Poor | Zone 6: STIF - APZ (OPA) |
| Zone 3: BGHF - Replanting | Zone 7: Fuel Management Area |
| Zone 4a: BGHF - APZ (IPA) | Zone 8: Landscaped Areas |
| Zone 4b: BGHF - APZ (OPA) | Zone 9: Dam - fringing vegetation |
| | Zone 10: Dams and Basins |

Coordinate System: MGA Zone 56 (GDA 94)



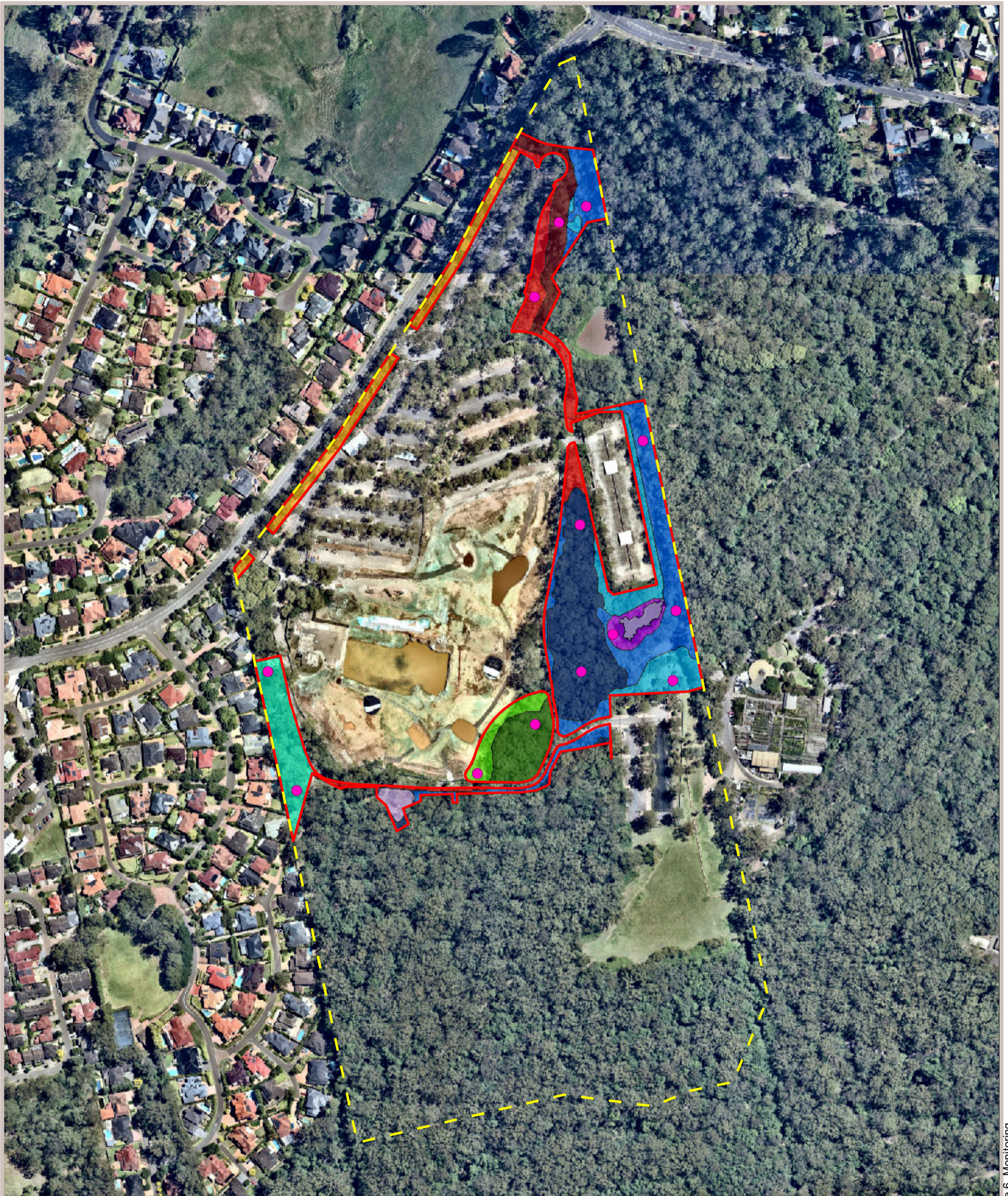
Image Source:
Image © Nearmap (2023)
Dated: 18/01/2023

Data Source:
Sixmaps Clip and Ship (2021)
Spatial Services
NSW Department of
Finance and Services



Figure 5. Indicative locations of Signage and fencing for the subject site

0 50 100 m



Legend

- Subject Site
- Study Area
- Monitoring Locations

Vegetation Management Zones

- | | |
|---|---|
| Zone 1: BGHF - Good | Zone 5: STIF - Good |
| Zone 2: BGHF - Poor | Zone 6: STIF - APZ (OPA) |
| Zone 3: BGHF - Replanting | Zone 7: Fuel Management Area |
| Zone 4a: BGHF - APZ (IPA) | Zone 8: Landscaped Areas |
| Zone 4b: BGHF - APZ (OPA) | Zone 9: Dam - fringing vegetation |
| | Zone 10: Dams and Basins |

Coordinate System: MGA Zone 56 (GDA 94)

Image Source:
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Figure 6. Indicative locations of monitoring points for the subject site

