

Western Sydney University, Milperra Campus

Vegetation Management Plan

Mirvac Residential

19 December 2024

Final

cumberland
ecology

PART OF  SLR

Report No. 23021RP5

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

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Glossary

Abbreviation	Definition
BAM	Biodiversity Assessment Method
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	<i>NSW Biosecurity Act 2015</i>
CEEC	Critically Endangered Ecological Community
Client	Mirvac
DA	Development Application
DBH	Diameter at Breast Height
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
DPE	(former) Department of Planning and Environment
EEC	Endangered Ecological Community
EHG	NSW Environment and Heritage Group
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i>
GPS	Global Positioning System
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 5 km radius of the study area
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
OEH	NSW Office of Environment and Heritage (former)
PCT	Plant Community Type
the project	The Western Sydney University Milperra Campus Redevelopment
the study area	Western Sydney University, Milperra Campus (see Figure 1)
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VMP	Vegetation Management Plan
VMP Area	Areas subject to the VMP (see Figure 1)
WoNS	Weed of National Significance
WSU	Western Sydney University

1. Introduction

1.1. Background

Cumberland Ecology was commissioned by Mirvac (the 'client') to prepare a Vegetation Management Plan (VMP) to support a development application (DA) for the Western Sydney University (WSU), Milperra, New South Wales (NSW) (the 'study area'). Specifically, this VMP applies to an area in the northeast of the study area (hereafter referred to as the 'VMP Area') (**Figure 1**). The DA involves the subdivision of land into residential lots, park areas, a business area that will contain a childcare centre, sales office, café, and associated infrastructure (roads, drainage basins) within the study area (the 'project'). This VMP will form part of the documentation to support an application for Development Consent under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The management and revegetation measures described in this VMP apply to the VMP Area that is zoned a mix of C2 – Environmental Conservation and B1 – Neighbourhood Centre under the *Canterbury-Bankstown Local Environmental Plan 2023* (LEP) (**Figure 2**).

1.1.1. Proposed Development

The project will be conducted in several stages and will ultimately result in the development of residential lots and parkland areas with associated infrastructure (roads, drainage basins) within the final development footprint. The staged project will comprise the following components:

- Subdivision and construction of residential dwellings;
- Construction of a main 'connector' road to the existing road network;
- Vegetation removal;
- Tree protection works for retained trees within the residential sub-division;
- Earthworks (including cut and fill works) and remediation of contaminated soil;
- Construction of roads and infrastructure;
- Construction of bio-detention basins for stormwater management; and
- Landscaping.

1.2. Purpose

The purpose of this VMP is to provide guidelines to:

- Prescribe management of vegetation within the VMP Area;
- Reconstruct areas of the VMP Area currently mapped as exotic groundcover to native vegetation, using bushland regeneration and revegetation techniques; and
- Promote regeneration of areas of the VMP Area currently mapped as remnant native vegetation through appropriate weed control techniques.

The objectives of the VMP are as follows:

- To improve the biodiversity values of the VMP Area;
- To re-establish native vegetation that is representative of the original plant communities in the VMP Area, comprising three strata including canopy (mature trees), understorey (small trees/shrubs) and groundcovers (herbs, sedges, and grasses);
- To establish and enhance habitat for local fauna species with the potential to occur or known to occur within the VMP Area;
- To enhance the ecological character of the VMP Area through removal and routine control of weeds and other exotic species present; and
- To protect the vulnerable flora species *Acacia pubescens* (Downy Wattle).

1.2.1. Canterbury-Bankstown DCP 2023

Following the approval of the Planning Proposal lodged by the client for the rezoning of the WSU Milperra Campus, it was rezoned R1 – General Residential, B1 – Neighbourhood Centre, C2 – Environmental Conservation and RE1 – Public Recreation. Parts of the R1 and RE1 zones, particularly in the north, and all of the C2 zone, are currently mapped as Biodiversity under the Canterbury-Bankstown LEP.

The NSW Environment and Heritage Group (EHG) provided advice and recommendations for the rezoning following approval, a number of which are applicable to biodiversity and have been included in the Canterbury-Bankstown Development Control Plan (DCP) 2023, which includes a specific clause (Clause 11.13) that applies to the entire study area. The ecological objectives of the clause are to ensure that any proposed development will not detrimentally affect the environment and ensure that satisfactory measures are incorporated to mitigate any impacts arising from the proposed development.

The following mitigation measures relevant to the VMP have been listed in the DCP:

- A 35% tree canopy target through retention of existing trees and the planting of the following tree species:
 - *Eucalyptus moluccana* (Grey Box);
 - *Eucalyptus tereticornis* (Forest Red Gum);
 - *Eucalyptus crebra* (Narrow-leaved Iron Bark);
 - *Eucalyptus eugeniodes* (Thin-leaved Stringy Bark);
 - *Eucalyptus maculata*/*Corymbia maculata* (Spotted Gum); and
 - *Eucalyptus fibrosa* (Red Ironbark).
- A VMP should be prepared and implemented for all retained Cumberland Plain Woodland for the rehabilitation, management and long-term maintenance of the community;

- Any trees requiring consent for removal (as per Chapter 2.3 of the Canterbury-Bankstown LEP) must be replaced at a 3:1 ratio using a mix of local provenance large trees that conform with the Cumberland Plain Woodland within the study area;
- Native seed from the trees proposed for removal should be collected and propagated to be used in revegetating the study area;
- Juvenile native plants proposed to be removed should be salvaged and transplanted to areas that are to be conserved within the study area;
- Vegetation clearing should not take place in late winter/spring during the breeding period of birds, and a suitably qualified ecologist must be present during all tree removal; and
- Habitat that has the potential to be salvaged (e.g. tree hollows, tree trunks and root balls) should be reused within the study area for habitat enhancement.

This VMP has been prepared in accordance with Clause 11.13 and the Canterbury-Bankstown DCP.

1.3. Site Description

1.3.1. The Study Area

The study area is located entirely within the suburb of Milperra in the Canterbury-Bankstown Council Local Government Area (LGA) (**Figure 1**) and is located approximately 20 kilometres (km) west of the Sydney Central Business District. It is located at 2 and 2A Bullecourt Avenue, Milperra NSW, which is legally known as Lot 2 DP1291984 and Lot 1 DP101147. It has an area of approximately 19.7 hectares (ha), which comprises a patch of a native woodland, a childcare centre, a sport's field and the disused university campus. It is generally bounded by an industrial estate to the north and east, the M5 Southwest Motorway to the south, and residential development to the west. A patch of good-quality remnant Cumberland Plain Woodland is positioned in the northeast corner of the study area, in the area zoned C2 – Environmental Conservation, and it is a conservation area referred to as the VMP Area in this report.

The study area has a relatively flat topography, with elevations ranging between approximately 3 m Australian Height Datum in the north to about 10 m above the Australian Height Datum in the south (**Figure 1**). There are no mapped or unmapped watercourses within the study area. The Soil Landscapes of the Penrith 1:100 000 Sheet Map (Hazelton et al. 1989) and soil landscapes available on eSpade (DPIE 2020a) indicates that the study area is mapped as the Blacktown soil landscape. The Blacktown soil landscape comprises gently undulating rises on Wianamatta Group shales with red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines.

Two (2) Plant Community Types (PCTs) have been recorded in the study area, PCT 3320 Cumberland Shale Plains Woodland which occurs in varying condition states throughout and PCT 4025 Cumberland Red Gum Riverflat Forest. Cumberland Shale Plains Woodland conforms to the threatened ecological community (TEC) Cumberland Plain Woodland in the Sydney Basin Bioregion (Cumberland Plain Woodland) which is listed as a Critically Endangered Ecological Community (CEEC) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Cumberland

Red Gum Riverflat Forest conforms to the TEC River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (River-Flat Eucalypt Forest) which is listed as an Endangered Ecological Community (EEC) under the BC Act and a CEEC under the EPBC Act. Approximately 3.03 ha of Cumberland Shale Plains Woodland in varying condition states and 0.06 ha of Cumberland Red Gum Riverflat Forest occurs in the study area.

Further details of the vegetation communities present in the study area and VMP Area are provided in **Chapter 3**, and the extent of the vegetation communities in the study area and VMP Area are depicted in **Figure 3**.

1.3.2. VMP Area

The VMP Area refers to the area within the study area that is currently zoned as C2 – Environmental Conservation and the area within the B1 – Neighbourhood Centre containing Cumberland Plain Woodland under the LEP (**Figure 2**). It has an approximate area of 2.8 ha and currently contains approximately 2.16 ha of Cumberland Shale Plains Woodland. The VMP Area is shown on **Figure 1**, but the VMP only applies to the areas already mapped as containing Cumberland Plain Woodland and does not apply to the cleared areas (**Figure 3**).

1.4. The VMP

This VMP has been prepared to provide management guidelines for the revegetation of native vegetation characteristic of Cumberland Plain Woodland within the VMP Area to satisfy the requirements of the Canterbury-Bankstown DCP.

The objectives of the VMP include the following:

- Weed removal from the areas of Cumberland Plain Woodland in the VMP Area;
- Revegetation of approximately 0.85 ha of native vegetation characteristic of Cumberland Plain Woodland; and
- Maintain and monitor the vegetation subject to this VMP in order to document the success of revegetation/weeding works, as well as make recommendations to improve the revegetation/weeding works if required.

In order to accomplish the aims of the VMP, two separate management plans have been developed that apply to the entire VMP area. The two separate management plans are as follows:

- Weed Management Plan (see **Chapter 5**); and
- Revegetation Plan – applies to all areas to be revegetated within the VMP Area with Cumberland Plain Woodland species (see **Chapter 6**).

1.5. Relevant Legislation

Legislation relevant to this VMP includes:

- NSW EP&A Act;

- *NSW Biosecurity Act 2015* (Biosecurity Act);
- *NSW Pesticides Act 1999*; and
- NSW BC Act 2016 and associated regulations.

2. Methodology

2.1. Desktop Assessment

2.1.1. Literature Review

This section provides details of the information sources utilised in the preparation of this VMP, including databases, literature, and aerial photography. Existing information on biodiversity values within the VMP Area was reviewed, which includes:

- Western Sydney University, Milperra Campus - Stage 1 Flora and Fauna Assessment (our reference: 23021RP1) (Cumberland Ecology 2024c);
- Western Sydney University, Milperra – Campus Stage 2 Biodiversity Development Assessment Report (our reference: 23021RP2) (Cumberland Ecology 2024a);
- Cumberland Ecology: Western Sydney University, Milperra Campus – Commercial Area Stage Biodiversity Development Assessment Report (our reference: 23021RP6) (Cumberland Ecology 2024b);
- Western Sydney University, Milperra Campus - Arboricultural Impact Assessment (Temporal Tree Management 2024);
- Greater Sydney Regional Strategic Weed Management Plan (LLS: Greater Sydney 2022);
- Canterbury-Bankstown Local Environmental Plan (LEP) 2023 (Canterbury-Bankstown LGA 2023b);
- Canterbury-Bankstown Development Control Plan 2023 (Canterbury-Bankstown LGA 2023a);
- NSW Environment and Heritage (2011): Final Determination – Cumberland Plain Woodland in the Sydney Basin Bioregion;
- Department of Climate Change, Energy, Environment and Water (2010): Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest;
- Department of Climate Change, Energy, Environment and Water (2009): Listing Advice – Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest;
- Department of Climate Change, Energy, Environment and Water (2008): Conservation Advice - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community;
- NSW Environment and Heritage (2011): Final Determination – River-flat Eucalypt Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions; and
- Department of Climate Change, Energy, Environment and Water (2020): Conservation Advice – River-flat Eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.

The literature review also identified the most up to date methods of weed control for weed species that are present in the study area and included a review of government fact sheets and websites. Cumberland Ecology staff with expertise in bushland regeneration were also consulted on current best practice methods and techniques. To prepare species planting lists for revegetation, and determine revegetation strategies, relevant

documents were reviewed in conjunction with a review of data obtained during field surveys undertaken for the works previously completed on the study area.

2.1.2. Databases

Several databases were utilised during the preparation of this VMP, including:

- NSW Environment and Heritage Group (EHG) BioNet Atlas (EHG 2024a);
- EHG BioNet Vegetation Classification database (EHG 2024b);
- EHG Threatened Biodiversity Data Collection (TBDC) (EHG 2024c);
- NSW State Vegetation Type Map (DPE 2024);
- The NSW SEED Database (NSW Government 2024); and
- Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Species Profile and Threat Database (DCCEEW 2024).

2.2. Field Surveys

Flora surveys were undertaken by Cumberland Ecology on 20-23 August 2024 and included vegetation mapping and plot-based vegetation survey. The surveys were guided by the following:

- NSW Government (2020a): Biodiversity Assessment Method 2020 (BAM); and
- NSW Government (2020b): Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method.

2.2.1. Vegetation Mapping

The vegetation within the VMP Area was ground-truthed by Cumberland Ecology to examine and verify the mapping of the condition and extent of the different plant communities. Mapping of plant communities within the VMP Area was undertaken by random meander searches throughout each patch of vegetation, noting key characteristics of areas in similar broad condition states such as similar tree cover, shrub cover, ground cover, weediness, or a combination of these. Soils were also inspected.

Records of plant community boundaries were made using a hand-held Global Positioning System (GPS) and mark-up of aerial photographs. The resultant information was synthesised using GIS to create a spatial database that was used to interpret and interpolate the data to produce a vegetation map of the VMP Area and study area (**Figure 3**).

2.2.2. Plot-based Floristic Survey

A plot-based floristic survey was undertaken within the VMP Area. The survey was conducted in accordance with the BAM and included establishment of a 20 m x 50 m plot within which the following data was collected:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m plot;

- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20m plot;
- Cover of 'High Threat Exotic' weed species;
- Assessment of function attributes within a 20 m x 50 m plot, including:
 - Count of number of large trees;
 - Tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
 - Regeneration based on the presence of living trees with stems <5 cm DBH;
 - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and
- Number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

All vascular plants recorded or collected were identified using keys and nomenclature provided in PlantNET (Botanic Gardens Trust 2021).

2.2.3. Threatened Flora Species Searches

Targeted threatened flora surveys were undertaken in conjunction with collection of floristic plot data as well as vegetation mapping surveys. Surveys were targeted towards threatened species that were identified as candidate species credit species under the BAM Calculator and were conducted in areas considered to provide potential habitat for these species. Targeted surveys were conducted using parallel field traverses in combination with a random meander in accordance with the NSW Guide to Surveying Threatened Plants (NSW Government 2020b). Targeted threatened flora surveys using parallel traverses were undertaken on the 20-23 August 2024. Where threatened flora species were observed, the location was recorded with a handheld GPS.

Details of the threatened flora species targeted during surveys undertaken in the VMP Area are provided in the BDAR report prepared for the project (Cumberland Ecology 2024a).

3. Existing Biodiversity Values

3.1. Vegetation Communities

The native vegetation within the study area and VMP Area has been mapped as containing:

- PCT 3320 Cumberland Shale Plains Woodland in the following condition states:
 - PCT 3320 Cumberland Shale Plains Woodland – Intact;
 - PCT 3320 Cumberland Shale Plains Woodland – Mown;
 - PCT 3320 Cumberland Shale Plains Woodland – Canopy;
 - PCT 3320 Cumberland Shale Plains Woodland – Exotic Ground.
- PCT 4025 Cumberland Red Gum Riverflat Forest; and
- Planted Native Vegetation.

All four vegetation condition states of Cumberland Plain Woodland in the Sydney Basin Bioregion conform to the Threatened Ecological Community (TEC) listing under the BC Act, however only the intact, mown and exotic ground conditions of Cumberland Plain Woodland in the Sydney Basin Bioregion conform to the TEC listing under the EPBC Act (see **Table 1**). These condition states occur in the VMP Area, but the canopy condition is scattered throughout the study area and exists as small patches of remnant trees over a totally exotic and manicured garden understorey.

The small patch (~0.06 ha) of PCT 4025 conforms to the TEC listing for Riverflat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions under the BC Act, but does not conform to the TEC listing under the EPBC Act due to its small size and lack of native understorey.

In addition, the following non-native communities/areas have been recorded from the study area:

- Exotic Dominated Grassland;
- Exotic Woody Vegetation; and
- Cleared (comprising bare earth where tracks currently occur).

The area of the vegetation communities within the study area and VMP Area are shown in **Table 1** and depicted in **Figure 3**.

Table 1 Extent of vegetation communities within the study area and VMP Area

Vegetation Community				PCT	EPBC Act Status	BC Act Status	Study Area (ha)	VMP Area (ha)
Cumberland Shale Plains Woodland (Intact)				3320	CEEC	CEEC	1.39	1.35
Cumberland Shale Plains Woodland (Mown)				3320	CEEC	CEEC	0.15	0.12

Vegetation Community				PCT	EPBC Act Status	BC Act Status	Study Area (ha)	VMP Area (ha)
Cumberland Shale Plains Woodland (Exotic Ground)				3320	CEEC	CEEC	0.87	0.69
Cumberland Shale Plains Woodland (Canopy)				3320	CEEC	-	0.60	0.00
Cumberland Red Gum Riverflat Forest				4025	EEC	-	0.06	0.00
Planted Native Vegetation				-			1.93	
Exotic Woody Vegetation				-			2.06	
Exotic Dominated Grassland				-			6.55	
Cleared Land				-			6.38	
Total:							19.99	2.16

3.1.1. PCT 3320 - Cumberland Shale Plains Woodland

Vegetation Formation: Grassy Woodlands

Vegetation Class: Coastal Valley Grassy Woodlands

Percent Cleared Value: 93.03

3.1.1.1. General Description

This community is a tall sclerophyll open forest to woodland with a sparse mid-stratum of soft-leaved shrubs and small trees with a grassy ground cover on the undulating shale plains of western Sydney (EHG 2024b). The canopy very frequently includes *Eucalyptus tereticornis* and *Eucalyptus moluccana*, with ironbarks (*Eucalyptus crebra* and *Eucalyptus fibrosa*) occasionally present, however prominent in localised areas, and the stringybark species *Eucalyptus eugenioides* commonly occurs. The sparse shrub to small tree layer very frequently includes *Bursaria spinosa* and one or more species of *Acacia*, of which *Acacia parramattensis*, *Acacia decurrens* and *Acacia falcata* are the most frequent and abundant.

The mid-dense ground layer typically includes grasses, forbs, twiners and a hardy fern. *Microlaena stipoides* is almost always present and *Themeda triandra*, *Dichondra repens*, *Brunoniella australis*, *Cheilanthes sieberi subsp. sieberi*, *Desmodium varians*, *Aristida vagans* and *Glycine tabacina* are very frequent. This is the most widespread PCT on the Cumberland Plain, occupying much of the plain between Bankstown and the Hawkesbury and Nepean rivers. It typically occurs in a warm, moist climate below 120 metres asl however can occur up to 200 metres asl on the undulating terrain between Douglas Park and Campbelltown to the east of the Nepean River. While widespread, this PCT primarily occurs in small, often disturbed patches within a rural or urban matrix.

Within the VMP Area, PCT 3320 occurs as three condition states (also referred to as vegetation zones); intact, mown and exotic ground. These are explained in more detail in the section below.

3.1.1.2. Vegetation Zones within the VMP Area

i. PCT 3320_Intact

This vegetation zone occurs within the north-east of the VMP Area and represents the most intact occurrences of PCT 3320 present, in which native species are dominant in all strata. This is likely due to bushland regeneration efforts, as other areas within the VMP Area have large abundances of exotic species. The canopy is dominated *Eucalyptus moluccana* (Grey Box), and *Eucalyptus tereticornis* (Forest Red Gum), and *Eucalyptus crebra* (Narrow-leaved Ironbark) also occurs. A sub-canopy is present and includes younger individuals of the canopy species along with *Melaleuca nodosa* and *Exocarpos cupressiformis* in some areas.

The shrub layer is moderately dense and includes *Bursaria spinosa* (Blackthorn), *Daviesia ulicifolia* (Bitter Gorse Pea), and *Leucopogon juniperinus* (Prickly Beard Heath). Exotic species are rare in the layer, but there are sporadic occurrences of some such as *Ochna serrulata* (Mickey Mouse Plant).

The ground layer is dominated by *Microlaena stipoides* var. *stipoides* (Weeping Grass), with other species present including the grasses *Themeda triandra* (Kangaroo Grass), *Aristida vagans* (Threeawn Grass), and *Paspalidium distans*, the forbs *Brunoniella australis*, *Brunoniella australis* (Blue Trumpet), and *Solanum prinophyllum* (Forest Nightshade), and the sedge *Gahnia aspera*.

There are scattered occurrences of exotic species which include the grass *Setaria parviflora* (Pigeon Grass), and the forbs *Asparagus aethiopicus* (Ground Asparagus), and *Bidens pilosa* (Cobbler's Pegs).

An example of PCT 3320 (intact) in the VMP Area is shown in **Photograph 1**.

Photograph 1 Example of PCT 3320 (intact) within the VMP Area



ii. PCT 3320_Exotic_Ground

This vegetation condition has a native dominated canopy of *Eucalyptus moluccana* and *Eucalyptus tereticornis*, and to a lesser extent *Eucalyptus crebra*. *Allocasuarina littoralis* (Black Oak), *Exocarpos cupressiformis*, and *Acacia decurrens* (Black Wattle) are present in the sub-canopy along with younger individuals of the canopy species. The shrub layer is dominated by native species, and includes *Ozothamnus diosmifolius*, *Olearia viscidula*, and *Bursaria spinosa*, and the vulnerable *Acacia pubescens* (Downy Wattle). The presence of scattered individuals of native species which do not match well with shales in Western Sydney, such as *Zieria smithii*, have probably been planted in the patch, potentially by bushland regenerators. Exotic species are relatively common and include *Olea europaea* subsp. *cuspidata* (African Olive) and *Ochna serrulata*.

The ground layer in this vegetation zone is highly dominated by exotic species in most areas, often with sub-dominant occurrences of the grasses such as *Entolasia marginata* (Bordered Panic), and *Microlaena stipoides* var. *stipoides*. Native forbs are present, though not as commonly as in the intact condition state and include *Dianella longifolia* and *Dichondra repens* (Kidney Weed).

Dominant exotic grass species include *Ehrharta erecta* (Panic Veldtgrass), *Ehrharta longiflora* (Annual Veldtgrass), and *Megathyrsus maximus* (Guinea Grass). Common exotic forbs include *Bidens pilosa* and *Asparagus aethiopicus*.

An example of PCT 3320 (exotic ground) in the VMP Area is shown in **Photograph 2**.

Photograph 2 PCT 3320 (exotic ground) within the VMP Area



iii. PCT 3320_Mown

This vegetation zone comprises remnant Cumberland Plain Woodland trees with some native species remaining in the ground layer, however with an absent shrub layer, and closely cropped ground layer due to mowing. Canopy species include *Eucalyptus moluccana* and *Eucalyptus tereticornis*.

Native species persisting in the ground layer include *Microlaena stipoides* var. *stipoides*, *Eragrostis leptostachya* (Paddock Lovegrass), *Bothriochloa decipiens* var. *decipiens* (Pitted Bluegrass), and *Rytidosperma racemosa*. Native forbs include *Cotula australis* (Common Cotula), *Oxalis perennans*, and *Veronica plebeia* (Trailing Speedwell).

Exotic grass species are dominant in the ground layer and include *Poa annua* (Winter Grass), *Paspalum dilatatum*, *Ehrharta erecta*, and *Briza minor* (Little Quaking Grass).

An example of PCT 3320 (mown) in the VMP Area is shown in **Photograph 3**.

Photograph 3 PCT 3320 (mown) within the VMP Area



3.2. Threatened Flora Species

3.2.1. *Acacia pubescens* (Downy Wattle)

A few patches of *Acacia pubescens* (Downy Wattle) are located within PCT 3320 (exotic ground) occurring within the VMP Area – see **Figure 3**.

Acacia pubescens (Downy Wattle) is listed as vulnerable under the BC Act and the EPBC Act.

Acacia pubescens (Downy Wattle) is a spreading shrub, 1 - 5 m high with brilliant yellow flowers, bipinnate leaves (divided twice pinnately) and conspicuously hairy branchlets. It flowers from August to October with pollination of the flowers usually by insects and birds. The pods mature in October to December. Recruitment is more commonly from vegetative reproduction than from seedlings. The percentage of pod production and seed fall for this species appears to be low (OEH Species profile: <https://threatenedspecies.bionet.nsw.gov.au/profile?id=10023>).

Acacia species generally have high seed dormancy and long-lived persistent soil seedbanks. It is thought that the species needs a minimum fire free period of 5 - 7 years to allow an adequate seedbank to develop.

An example of *Acacia pubescens* in the VMP Area is shown in **Photograph 4**.

Photograph 4 Flowering *Acacia pubescens* (Downy Wattle) located in the VMP Area



Photograph 5 Flowering *Acacia pubescens* (Downy Wattle) located in the VMP Area



3.3. Fauna Habitat

The study area contains native vegetation that provides connectivity to the VMP Area from the southern section of the study area, in a south-north direction. It also provides limited connectivity between urban backyard trees with other retained native vegetation in the surrounding properties in the east. Native fauna species are unlikely to use the VMP Area as 'stepping stone' habitat outside of the study area, such as to reach the Killara, Horsely Park and Kelso Park Reserves in the south, as they are separated from the VMP Area by the M5 South Western Motorway. The VMP Area consists of the majority of woody vegetation within the study area, and habitat connectivity will be conserved and improved as a result of implementing this VMP.

The native vegetation present within the VMP Area provides a range of fauna habitats including potential foraging, shelter, and breeding opportunities for fauna.

Key habitat features recorded within the VMP Area include:

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

No mapped watercourses occur within the study area or VMP Area.

4. Vegetation Management Zones

Under this VMP, the VMP Area will be managed by the landowner and will require weed management, restoration and revegetation with native, endemic plant species and monitoring.

The VMP Area will be managed as two Management Zones as follows (**Figure 4**):

- Management Zone 1 – Native Vegetation Maintenance; and
- Management Zone 2 – Revegetation of Native Vegetation.

It is expected that initial management under this VMP would be undertaken over a five-year period, with native trees being protected and/or replaced in the VMP Area in perpetuity. Refer to **Chapter 8** of this VMP for specific timing and responsibilities of Management Zone works.

4.1. Management Zone 1 – Native Vegetation Maintenance

Management Zone 1 is comprised of all areas mapped as PCT 3320 Cumberland Shale Plains Woodland in the intact and mown condition. The overall aim of Management Zone 1 is to regenerate the existing native vegetation in this zone through weed management (see **Chapter 5**).

4.1.1. Objectives

Objectives for this management zone are:

- Control exotic weed species as per **Chapter 5**; and
- Maintain native regeneration areas as per **Section 5.7.4**, and **Section 6.7 and Chapter 7**.

4.1.2. Actions

Initial actions within Management Zone 1 of the VMP Area will be the removal of exotic vegetation by a Bushland Regenerator Contractor (BRC). In particular, the removal of weeds listed under the Biosecurity Act (see **Table 2**) is a high priority as these weeds, specifically the state priority weeds, are considered to pose the greatest threat to the natural regeneration of native species present.

All existing native species will be retained. Natural regeneration will be encouraged where needed in currently wooded areas, with planting of native canopy, understory and ground layer species undertaken if natural regeneration does not occur in months following weed removal for the purposes of increasing species diversity in these strata.

4.1.3. Asset Protection Zone Requirements

The mown vegetation zone of Cumberland Plain Woodland is currently maintained as an Asset Protection Zone (APZ) under the previous DA (DA-752/2011). The study area is not mapped as 'Bushfire Prone Land', however due to the proximity of the VMP Area to the childcare centre, the APZ is to be maintained as part of the current DA, and so no revegetation will occur within the mown area.

4.2. Management Zone 2 - Revegetation of Native Vegetation

Management Zone 2 is comprised of all areas of the VMP Area mapped PCT 3320 Cumberland Shale Plains Woodland in the 'exotic ground' condition state. These areas contain a diverse native canopy layer, but some areas lack an understorey due to weed infestations, and therefore, the overall aim of Management Zone 2 is to revegetate the areas of existing native canopy with native understorey species characteristic of Cumberland Plain Woodland.

4.2.1. Objectives

Objectives for Management Zone 2 are:

- Control exotic weed species as per **Chapter 5**;
- Revegetation of an array of native understorey and ground layer species characteristic of Cumberland Plain Woodland to improve ecological biodiversity as per **Chapter 6**;
- Ensure protection of the vulnerable *Acacia pubescens* (Downy Wattle); and
- Maintain revegetated areas as per **Section 5.7.4**, and **Section 6.7** and **Chapter 7**.

4.2.2. Actions

Initial actions within Management Zone 2 of the VMP Area will be to propagate native shrubs and ground layer species using local provenance seeds. Native shrubs will need to be grown by a nursery that specialises in native plants. Where possible seed should be propagated from areas of Cumberland Plain Woodland within the study area. It is understood that Mirvac is currently propagating trees from within the VMP Area to be used as part of this VMP and for landscaping.

The removal of exotic vegetation will commence concurrently with revegetation works. In particular, the removal of weeds listed under the Biosecurity Act (see **Table 2**). These weeds, specifically the state priority weeds, are considered to pose the greatest threat to the natural regeneration of native species present. Extra care should be taken with the removal of exotic vegetation around the patches of *Acacia pubescens* (Downy Wattle).

Any existing native shrub and understorey species will be retained. After the clearance of all, or most, of the exotic vegetation has taken place, the reconstruction of native vegetation to Cumberland Plain Woodland will commence where necessary. Shrub species will be revegetated using Hiko tubestock, and native groundcover species will be revegetated using hydro mulching (if considered suitable). Note that hydro mulching will not occur during periods of high rainfall. **Appendix C** contains species planting lists for Cumberland Plain Woodland, separated by growth form group.

5. Weed Management Plan

5.1. Introduction

This Weed Management Plan applies to the entirety of the VMP Area. It provides an overview of legislation relevant to weed control, identifies the weed species present and then identifies appropriate weed control methods and the stages of weed control to be implemented.

5.2. Relevant Legislation

5.2.1. Biosecurity Act 2015

Under the Biosecurity Act all weeds are required to be controlled by all persons under a “General Biosecurity Duty”. The General Biosecurity Duty means that all public and private land owners or managers and all other people who deal with weed species (biosecurity matters) must use the most appropriate approach to prevent, eliminate, or minimise the negative impact (biosecurity risk) of those weeds (DPI 2017). The power for enforcement of penalties relating to compliance with the legislation is given to Local Control Authorities (i.e. Local Governments).

State-wide management of weeds under the Biosecurity Act is directed by the NSW Invasive Species Plan (LLS: Greater Sydney 2022). Weed responses are assigned to four categories:

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

Under the Biosecurity Act some weed species have been prioritised for management by specific regulations and controls under the Act. The state has been divided into 11 regions with weed management in each directed by a regional weed committee. Each committee has prepared a Regional Strategic Weed Management Plan.

Under the Biosecurity Act there are weeds which have legislated management requirements under controls and regulations of the act. These are known as State Priority Weeds. All 32 Weeds of National Significance (WoNS) are also listed as State Priority Weeds. WoNS are species that have been identified by Australian governments based on their invasiveness, potential for spread, and environmental, social, and economic impacts and are priorities for control.

The study area is located within the Greater Sydney Management Region and as such weeds are required to be managed as directed by the Greater Sydney Regional Strategic Weed Management Plan 2023-2027 (LLS: Greater Sydney 2022);

5.2.2. Pesticides Act 1999

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

5.3. Weed Species in the VMP Area

Weeds identified within the VMP Area make up the weed species list used for the basis of this VMP. A full list of native and introduced species within the study area is provided in **Appendix A** and the control methods for the weed species identified are provided in **Appendix B**. The priority weed species, as listed under the Greater Sydney Regional Strategic Weed Management Plan 2023-2027, and WoNS identified within the VMP Area are listed in **Table 2** below.

Table 2 Priority weeds and WoNS identified within the VMP Area

Scientific Name	Common Name	Priority Status	WoNS
<i>Anredera cordifolia</i>	Madeira Vine	State Priority – Asset Protection	Yes
<i>Asparagus aethiopicus</i>	Ground Asparagus	State Priority	No
<i>Asparagus asparagoides</i>	Bridal Creeper	State Priority	No
<i>Senecio madagascariensis</i>	Fireweed	State Priority – Asset Protection	Yes

5.4. Weed Control Objectives

The objective of weed management is to reduce the threat of introduced weed species within all management zones, to reduce competition and promote natural regeneration. Specifically, the weed control target is to reduce weed levels to a maximum of 5% cover for the ground layer and <1% cover for the shrub and tree layers within five years of VMP commencement. The removal of introduced species in the ground layer of all management zones prior to planting will be a priority.

5.5. Best Management Practice

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

- The main principles of the Bradley Method of bush regeneration, such as not over clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter;
- Removal of fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;
- Minimise chemical use in all zones;
- Use of chemicals and sprays only when hand-removal cannot be used, and only during suitable weather conditions (such as not during wet or windy conditions), and only during appropriate seasons;
- All equipment should be thoroughly cleaned prior to entering the site to minimise contamination; and
- Presence of native fauna or nesting/breeding sites.

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 or requirements of Council to prevent the spread of propagules to adjacent areas of native vegetation within adjacent reserves.

Machinery and tools involved in weed management will also be washed down prior to entry to the site and following activities on site to prevent new weed infestations on site and on-site weeds from spreading to offsite areas.

5.6. Weed Control Methods

Weed control is to be implemented throughout the VMP Area using the strategies outlined below.

5.6.1. 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) where practical. All weeds removed by hand will be handled according to best practice bush regeneration techniques to prevent subsequent seed set from the removed weeds.

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

Larger woody weed species will need other methods of removal besides spraying with herbicide, such as by cutting and painting cut stems with herbicide. Areas of occurrence of these weeds should be controlled prior to the spraying of the groundcover species. Introduced vine species that are climbing into native vegetation to be retained should also be removed by hand to prevent damage to native vegetation by herbicides.

5.6.2. Woody Weed Removal

Recommended removal techniques for large woody weed species such as *Ligustrum* spp. include:

- The selective spraying of woody weed regrowth, 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 Picloram; and
- Target drilling and injecting certain large tree weeds with herbicides such as Glyphosate and a Garlon/diesel mix.

5.6.3. Use of Herbicides

All herbicides should be used according to recommendations on the herbicide label. Some herbaceous weeds reach heights that make control with herbicide impractical as spraying at these heights can be dangerous and will result in a higher instance of herbicide drift which can harm non-target native shrubs and trees. In these instances, mechanical means such as use of a brush cutter can be used, followed by spraying with herbicide when plant remnants at the ground level re-sprout leaves.

To minimise instances of vegetation damage through herbicide drift during spraying, the VMP Area should be searched thoroughly prior to herbicide use for native plants in the understorey/ground layer. Native species in the ground layer that occur in the VMP Area should have plastic tree guards installed around them to prevent the native plants from being harmed by herbicide drift. Some species may be too large for installation of tree guards. In these cases, individuals should be flagged with flagging tape and care taken to spray around these with a hand operated backpack sprayer on a non-windy day.

In areas near water courses, an appropriate form of the herbicide should be used to minimise impact to aquatic life and amphibians. Herbicide use should be avoided within 2 m 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 should be avoided prior to or directly after rains.

Appropriate Personal Protective Equipment (PPE) should be worn, and consideration given to time of day, likelihood of rainfall, wind direction and speed and likely impact on native species as per guidelines on the label. Use of Glyphosate will be appropriate for most species. As runoff is a likely way for herbicide residue to enter watercourses, chemical treatment should be avoided prior to or directly after rains.

It is important to note that there can be legal restrictions and permit requirements for use of specific herbicides for specific plants, and chemical labels and permit requirements always need to be researched prior to herbicide application. While the recommended methods for weed treatment detailed in **Appendix B** are effective, some will require a permit to be undertaken. The relevant permit number is PER9907, and PER11916. Herbicide permits need to be obtained from the Federal Government body, the Australian Pesticides and Veterinary Management Authority. Manual removal will be an appropriate form of control for some species, and all chemical treatment should be carried out according to best practice guidelines. Planting should not occur within 10 days of herbicide application.

5.7. Stages of Weed Control

5.7.1. Site Preparation

5.7.1.1. Sediment Fencing

There is potential for the runoff of surface soil after initial weed management works in the study area. Temporary silt sediment fencing should be installed around the VMP Area if required to prevent soil runoff, especially after heavy rainfall events into the ephemeral drainage line.

Temporary fencing should remain in place for the duration of construction, and should be replaced with permanent fencing once construction to protect the VMP Area. Additionally, prior to residential dwellings being occupied, educational signage will be installed along the perimeter of the VMP Area to inform that there is no public access into the VMP Area, and to improve local knowledge of the Cumberland Plain Woodland present and the fauna species that utilise it. This signage will also notify the public that wood collection and rubbish dumping within the VMP Area are prohibited.

5.7.1.2. Installation of Tree Guards around Native Plants

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

5.7.1.3. Laying of Weed Suppression Materials

Several days after the second application of herbicide, weed suppression materials can be installed, if required. This is most likely to be useful in Management Zone 2, where the native seedbank is likely to be low, and large areas are proposed to be reconstructed with native plantings. 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 species 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, but it will also inhibit regrowth of native species from seed. For this reason, weed suppression matting should only be used initially to establish a revegetation site while intensive weed control is needed, and be allowed to biodegrade over time without being reapplied, unless required during the establishment period.

5.7.1.4. Removal of Priority Weeds

The priority for weed treatment in the VMP Area will be targeting mature individuals of the priority weed species and other environmental weeds. 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 priority woody exotic shrubs/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 (where appropriate to use). 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 B**. Knapsack sprayers with a spray cone to direct the spray towards the ground should be used to prevent herbicide drift into adjacent vegetated areas.

5.7.1.5. Primary Weeding

Following control of mature individuals of state priority and regional concern weed species, primary weeding will be undertaken throughout the VMP Area. 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 VMP Area will be to eliminate all the larger weed infestations to allow planting to take place and fill gaps in the understorey and canopy without competition from weed species.

Primary weeding is the first stage of bushland regeneration and 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 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.

During site visits for primary weeding, the bushland maintenance team should start from one end of the VMP Area and work towards the other end to achieve the aims listed above through the entirety of the 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 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 their foliage.

5.7.1.6. Rubbish Removal

Before construction begins, the client must ensure that all rubbish has been removed from the VMP Area. As there may be native fauna utilising the rubbish as habitat (such as native reptiles or ground-dwelling mammals), it is recommended that an ecologist is present for this removal to ensure that these fauna are not injured during the removal process, and that any fauna using the rubbish can be captured and released into other sections of the VMP Area.

5.7.2. Ongoing Weed Maintenance

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 weed control on site is found in **Appendix B**.

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 revegetation and natural regeneration areas should occur for a five-year period by the contracted bushland regeneration company, and it is recommended that 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 site will not be made.

Tree guards should remain around native remnant plants, and native flora that has been planted, for at least six months to protect them from herbivory. Rabbits and other fauna species 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 flora by herbicide drift.

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

1. Initially the bushland regeneration team visiting the site should sweep from one end to the other. During this sweep, weeds occurring within each tree guard alongside native plants and any weed occurring within a patch of dominant native flora (such as a patch of grasses) should be removed by hand. During the 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/native remnants 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 are prolific seeders, and many exotic species can have seed that remain viable in the soil for long periods of time. 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 and WoNS (**Table 2**) should be prioritised for control. Individuals 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 that plants have established enough to prevent soil surface runoff.

Follow-up weeding should be implemented under this VMP for a minimum of five years, after primary weeding, 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 with Council to determine on-going site maintenance requirements and an updated VMP for the ongoing and in perpetuity management should be developed.

6. Revegetation Plan

6.1. Introduction

This chapter outlines the measures to undertake revegetation within the VMP Area in areas of retained vegetation in Management Zone 2.

6.2. Objectives

The aim of restoration and regeneration actions within the vegetation in the VMP Area is to achieve the following performance-based outcomes:

- Control threats affecting the health of regenerating native vegetation and inhibiting the future regeneration potential of Cumberland Plain Woodland;
- Improve the resistance of native vegetation within the VMP Area to future weed colonisation and establishment and related threats, by initiating the above aim; and
- Use measurable indicators to monitor regeneration responses and to assist in prioritising regeneration works during the proposed works program.

6.3. Site Preparation

The replanting of individuals from seed or tube stock will require the treatment of soils, the installation of protective plant fencing, and ongoing maintenance treatments such as watering and weeding.

Recommended reconstruction strategies include:

- Initial and ongoing control of weeds and competing grasses using bushland regeneration techniques and conventional best practice chemical and physical strategies;
- Specifically collecting local plant seed and subsequent propagation as tubestock;
- Stabilising soils within areas (if required) using square jute fibre mats, or a similar sturdy biodegradable material, in areas following initial weed control;
- Protecting individual tree and shrub plantings with a tree guard from feral animal grazing, frost and maintenance herbicide spraying overspray. Wooden stakes and plastic tree guards are suitable for this purpose; 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.

6.4. Plant Sourcing

Any tube stock will be propagated from local native seed and grown by a nursery specialising in native plants purchased of local provenance native plants preferably cultivated using seed or cuttings sourced from within a 10 km radius of the study area. 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.

A qualified and experienced bushland regenerator is to be engaged for any native plant propagation works. Appropriate permissions for any collections undertaken and appropriate licensing under the BC Act will need to be obtained for any seed collected from offsite areas, this will be the responsibility of the bushland regenerator engaged to undertake the works.

Appendix C lists a planting list of species from Cumberland Plain Woodland, which are to be used for the planting. Substitution of alternate species from those listed in **Appendix C** is not advised as the final revegetated area must represent the species composition of this community. In the event that substitution of plant species is required due to supply shortages of species listed in **Appendix C**, 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 be utilised for planting without prior approval from Council.

6.5. Planting Densities

6.5.1. Management Zone 2

Management Zone 2 should be revegetated where required with Cumberland Plain Woodland species from the planting list in **Appendix C** at the recommended densities below. It is noted that given the diverse canopy layer, the requirement for replanting of canopy trees is considered unlikely.

The recommended planting specifications for Cumberland Plain Woodland are as follows:

- Canopy Trees @ 1 unit / 16 m²
- Shrubs @ 1 unit / 10 m²
- Groundcovers @ 1-3 unit / 1 m².

In order to ensure that weed maintenance is able to be carried out safely with a backpack sprayer on the site, multiple ground covers can be planted within one hole within a metre square and surrounded within a single tree guard. This will allow the bushland maintenance team to move around the site easily and ensure that the ground cover plantings are protected from predation and herbicide drift until established.

The goal of planting is to recreate a naturally functioning ecological community that contains all vegetation strata – canopy, shrubs and groundcovers. It should be noted that planting will not be required in both management zones, and areas that already contain substantial native vegetation (e.g. Management Zone 1) will be allowed to regenerate naturally, and plantings in these areas will be restricted to bare patches and where some strata are lacking. Planting of understorey and ground layer species will also be undertaken to restore areas where dense weed infestations have been removed and for the purposes of increasing species diversity in these strata. In Management Zone 2, shrub and groundcover strata will be planted following weed control, along with canopy trees if needed.

6.6. Characteristic Planting Units

Where required, native 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 restoration areas. Trees and shrubs should be planted unevenly in patches to mimic natural distribution. Differential cover of shrubs will also provide a greater diversity of fauna habitat, particularly for some small, woodland birds which forage in grassy areas and shelter in shrub thickets.

6.7. Management of Existing Native Vegetation

Where a retained tree in the VMP Area is removed for safety reasons or lost through natural causes, it is to be replaced with another native canopy tree of the same species to ensure no net loss of current retained trees. Any replacement trees should have a mature height of at least two metres. The replacement trees should be protected until maturity.

Planted trees are to be maintained, to ensure they are not lost, for the 5-year maintenance period of the VMP. This will include watering during dry periods in the first year, and hand-removal of weeds around the base of trees (no use of herbicides or brush cutters).

6.8. Maintenance of Plantings

Plantings must be maintained in accordance with the measures outlined in this section to ensure the long-term success of the revegetation.

Initially, tree and shrub plantings will be protected from feral and domestic animal grazing, frost and maintenance herbicide spraying overspray by the installation of a tree guard and stakes.

After planting works have been completed, treated areas should be maintained weed free by appropriately qualified personnel, selectively spot spraying and hand weeding around native plants, watering plants and replacing dead plants as needed.

Provision should be made to irrigate newly reconstructed areas, as required, in the first 3 months after installation, (on at least 4-5 occasions, depending on rainfall conditions, more watering if required). Irrigation water may be sourced by pumping from the river and local dams. A permit from the NSW Office of Water may be sought to use water for watering-in newly installed plants.

Re-growing environmental weeds such as vines, woody trees and shrubs, broadleaf annuals and naturalised grasses should be closely monitored and controlled using ecologically sensitive bushland regeneration hand weeding and spot-spraying methods, to ensure adequate weed control and native plant establishment.

Weeding inside each planting bag by hand or selective herbicides will be required, as well as in an approximate 50 cm radius around the outside of each plant and tree guard.

Plants that have died due to drought or pest and disease damage should be replaced as required. Plants that are observed to have died should be replaced by the bushland maintenance team with a planting of the same form. At the end of the annual maintenance period the density of living planted plants should be as outlined in **Section 7.4** and described within the annual report.

7. Monitoring and Reporting

7.1. Responsibilities

It is recommended that a project manager/supervisor with the Bushland Regeneration Contractor (BRC) be assigned to coordinate, supervise, and manage all works and correspondence with respect to the management of the VMP Area. The consultant will be responsible for ensuring the measures outlined in this VMP are implemented and that plant stock is replaced, as needed. The project manager will become familiar with the VMP Area and surrounds, and progress of all aspects of works undertaken.

The project manager will be responsible for allocation of maintenance tasks to personnel in response to ongoing monitoring results as well as reporting. Regular monitoring and feedback from personnel will assist in the allocation of labour relative to available funds.

7.2. Monitoring

A monitoring program will be implemented to ensure that Cumberland Plain Woodland is retained without loss of native tree species for the duration of the management period of this VMP (5 years), and to measure success of weed control and revegetation. A qualified BRC or an independent ecological consultant will carry out a program of regular monitoring of the implementation of the VMP.

The monitoring will ensure that key performance measures are achieved for the VMP Area for the five-year management period. These include:

- No loss of native trees from the VMP Area as a result of works associated with the development;
- No decline in tree health within the VMP Area as a result of works associated with the development; and
- Less than 10% cover of exotic species, with no WoNS present.

The following activities are to be conducted annually by a licensed BRC or ecologist as part of the monitoring program:

- Establish a series of fixed monitoring points within the VMP Area;
- Take photographs annually from each monitoring point. Compare photographs to previous years to visually measure the success of management actions;
 - Photographs should be taken once a month by the BRC for the first year of the VMP, and then every six months for the duration.
- Use the photograph point to form a corner of a 20 x 20 m quadrat at each monitoring point. Note any weeds occurring in the quadrat and state relative abundance of weed species (using Braun-Blanquet scale), as well as projective foliage cover of native species in each stratum. Record numbers of failed plantings in each quadrat;
- Note any other weed outbreaks in the regeneration and restoration areas. This can be done while walking between monitoring plots;
- Note areas where erosion is present, and control is required; and

- Note the condition of the retained and planted species and identify where replacement planting is required.
- Notes on plant health including signs of die-back or Myrtle rust infection; and
- Recommendations for corrective measures and/or vegetation management.

The monitoring program will be carried out for the duration of the VMP, where monitoring will be conducted before weed control measures are implemented, and annually for the remainder of the five-year management period of the VMP. The BRC will do basic monitoring each month and will take notes on the need for replacement planting and locations of weed regrowth. During annual monitoring, if maintenance weeding is conducted, each patch of land where weed control has occurred should be checked approximately a month afterwards, or after rain, to determine whether more weeding is required.

The co-ordinates for the locations of the fixed monitoring points should be recorded at establishment of the monitoring sites and documented in the annual report. It is recommended that there should be a minimum of two monitoring points per management zone.

7.3. Reporting

A brief and concise monitoring report will be prepared annually based on the findings of the two monitoring visits in the first year and annual monitoring visits subsequently in further years. The report will be prepared by the project manager and kept as a record of works that have been undertaken within the VMP Area.

Each annual report will:

- Describe the regeneration works undertaken;
- State the findings of the monitoring surveys;
- An evaluation against key performance targets;
- Discuss any problems encountered in implementing the VMP; and
- Recommend any adaptations or additions to the VMP.

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

Where performance measures have not been achieved, the report must prescribe rectification measures for vegetation management.

7.4. Review of this VMP

If the objectives of this VMP are not met within five years, the monitoring and maintenance works phases are to be extended until they are achieved. Alternate adapted management actions for implementation are to be identified and implemented where relevant to the success of this VMP, in consultation with Council.

8. Timing and Responsibilities

The VMP works will be broken down into phases, although some phases may overlap. Phase 2 to 4 will take place over a five-year period. Some maintenance, monitoring, and reporting (if targets are not met) will be required in perpetuity after this five-year period. The phases are:

- Phase 1 – Site Preparation;
- Phase 2 – Revegetation and weeding;
- Phase 3 – Maintenance;
- Phase 4 – Monitoring and reporting.

Timing and responsibilities at each phase of management within the VMP Area are shown within **Table 3**. This table assigns each activity within each phase to those responsible.

Table 3 Timing and responsibilities

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Phase 1 Site Preparation					
Seed Collection	Bush Regeneration Contractor (BRC)	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.	Increase seed collection or source additional seed from local nursery if seed is not available on-site.	Immediately
Establish fixed monitoring points	BRC 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.
Installation of fencing and sediment control	Property Owner or Subcontractor	Installation of fencing and sediment control around the VMP Area to prevent grazing and spread of chemicals.	Fencing has been installed around the entire VMP Area, and photographs taken for documentation.	Install fencing and sediment control.	Prior to commencement of reconstruction and weeding works.
Phase 2 - Restoration Works Commence					
Fixed Monitoring Point	BRC	Photographs of fixed monitoring sites before initial weeding.	Photograph have been taken.	Take photographs.	Prior to commencement of restoration works.

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Carry out initial weeding	BRC	Main weed infestations, priority weeds and WoNS removed - Reproductively mature plants absent from site.	Primary weeding completed and documented.	Undertake targeted weeding.	First month of restoration works.
Characteristic species are planted according to species list in Appendix A.	BRC	Native plants have been planted (species from Appendix C) as required in Management Zone 2	Revegetation has occurred and been documented.	Undertake revegetation works.	Immediately upon establishment of reconstruction areas.
Carry out maintenance weeding	BRC	Weed regrowth following primary weeding removed. Work has commenced on control of annual weed species.	Weeding of regrowth following primary weeding completed and documented.	Undertake targeted weeding.	Following primary weeding, site visits monthly for the first year.
Phase 3 – Maintenance					
Carry out maintenance weeding throughout the site	BRC	Priority weed cover is reduced annually, ranging from less than 2-10% cover over the 5-year period Non-priority weed cover is reduced annually, ranging from less than 4-15% cover over the 5-year period. No new weed species or 'large scale / dense' weed infestations from species extant on site, and prevention of, the encroachment of weeds or exotic	Monitoring point 20 x 20 m quadrat data results.	Undertake maintenance weeding.	Monthly for the first year, then every six months for the duration of the 5-year maintenance period under VMP.

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		lawn/vegetation into area of bush land regeneration as far as feasibly possible. Large scale/dense infestation = an area >2 m ² without successfully established native plantings. New weed infestations = areas with infestation not previously recorded on the site in quarterly / annual monitoring reports.			
Maintenance plantings	of BRC	Survival rate of plantings is 90-95% in earlier years. or stratum density is similar to that specified in the VMP via natural recruitment. Species diversity and density equal to or greater than baseline data.	Monitoring point 20 x 20 m quadrat data results.	Any dead plantings replaced, especially if natural recruitment does not occur. Additional plantings where required due to observed gaps in any strata.	Annually for the duration of the 5-year maintenance period under VMP.
		Plants watered when drought stressed.	Plants are watered during times of drought and documented.	Water plants in times of drought.	In times of drought.
Phase 4 - Monitoring and reporting					
Annual inspection of site completed as outlined in Chapter 7	BRC or Ecologist	Survival rate of plantings is 90-95% in earlier years. or stratum density is	Monitoring point 20 x 20 m quadrat data results.	Undertake replanting, especially if natural recruitment does not occur.	Every year for the 5-year maintenance period of VMP.

Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
		similar to that specified in the VMP via natural recruitment.			
		Priority weeds cover is reduced annually, ranging from less than 2-10% cover over the 5-year period.		Targeted weeding.	
		Non-priority weed cover is reduced annually, ranging from less than 10-20% cover over the 5-year period.			
		Species diversity and density equal to or greater than previous inspection.		Undertake replanting and/or plant additional species.	
		No encroachment of exotic vegetation into area of bush land regeneration.		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.	BRC Ecologist or	Annual Report prepared on progress of restoration works including all data collected in annual 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.	BRC Ecologist or	Survival rate of plantings is 90-95% or stratum density is similar to that specified in the VMP via natural recruitment.	Monitoring point 20 x 20 m quadrat data results.	Extended 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. Non-priority weeds to be less than 10% cover. Species diversity and density equal to or greater than previous inspection. No encroachment of exotic lawn/vegetation into area of bush land regeneration.			
Final Report	BRC Ecologist or	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.	Extended life of VMP until performance criteria is met.	After 5 years of maintenance under VMP.

9. References

- Botanic Gardens Trust. 2021. PlantNET. National Herbarium of NSW, Royal Botanic Gardens, Sydney.
- Canterbury-Bankstown LGA. 2023a. Canterbury-Bankstown Development Control Plan 2023.
- Canterbury-Bankstown LGA. 2023b. Canterbury-Bankstown Local Environmental Plan 2023
- Clennell, A. June 17, 2014. M9 Outer-western Sydney Orbital motorway part of big ticket \$5.5b roads package unveiled in today's NSW Budget. The Daily Telegraph. News Limited, Sydney.
- Cumberland Ecology. 2024a. Biodiversity Development Assessment Report for the Western Sydney University Milperra Campus: Stage 2.
- Cumberland Ecology. 2024b. Biodiversity Development Assessment Report for the Western Sydney University Milperra Campus, Commercial Area.
- Cumberland Ecology. 2024c. Flora and Fauna Assessment for the Western Sydney University Milperra Campus: Stage 1.
- DAWE. 2020. Commonwealth Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria DAWE, Canberra, ACT.
- DCCEEW. 2024. Species Profile and Threats Database.
- DEWHA. 2010. Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. Page pg. 11 in W. Department for Environment, Heritage and the Arts,, editor., Canberra.
- DPE. 2024. NSW State Vegetation Type Map.
- DPI. 2017. Fact Sheet: Weed Management Legislation is Changing.
- EHG. 2024a. Bionet Atlas.
- EHG. 2024b. BioNet Vegetation Classification. Environment and Heritage Group.
- EHG. 2024c. Threatened Biodiversity Database Collection.
- LLS: Greater Sydney, editor. 2022. Greater Sydney Regional Strategic Weed Management Plan 2023-2027. Local Land Services.
- NSW Government. 2020a. Biodiversity Assessment Method. Department of Planning, Industry and Environment, Parramatta.
- NSW Government. 2020b. Surveying threatened plants and their habitats. NSW survey guide for the Biodiversity Assessment Method. Environment, Energy and Science. Department of Planning, Industry and and Environment, Parramatta.
- NSW Government. 2024. SEED The Central Resource for Sharing and Enabling Environmental Data in NSW.
- NSW Scientific Committee. 2011. River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing.
- OEH. 2011. Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing.
- Temporal Tree Management. 2024. Western Sydney University Milperra Campus Arboricultural Impact Assessment Report
- Threatened Species Scientific Committee. 2008. Commonwealth Conservation Advice on Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest. Department of Environment, Water, Heritage and the Arts, Canberra, ACT.
- Threatened Species Scientific Committee. 2009. Commonwealth Listing Advice on Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. Department of the Environment, Water, Heritage and the Arts, Canberra.

APPENDIX A :

Flora Species List

Table 4 Flora species list for the study area

Scientific Name	Common Name	Exotic?	Growth Form
<i>Acacia decurrens</i>	Black Wattle		Tree (TG)
<i>Acacia implexa</i>	Hickory Wattle		Shrub (SG)
<i>Allocasuarina littoralis</i>	Black She-Oak		Tree (TG)
<i>Anredera cordifolia</i>	Madeira Vine	YES	
<i>Araujia sericifera</i>	Moth Vine	YES	
<i>Arctotheca calendula</i>	Capeweed	YES	
<i>Aristida vagans</i>	Threeawn Speargrass		Grass & grasslike (GG)
<i>Arthropodium</i> sp. South-east Highlands			Forb (FG)
<i>Asparagus aethiopicus</i>	Asparagus Fern	YES	
<i>Asparagus asparagoides</i>	Bridal Creeper	YES	
<i>Bidens pilosa</i>	Cobbler's Pegs	YES	
<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	Pitted Bluegrass		Grass & grasslike (GG)
<i>Brassica fruticulosa</i>	Twiggy Turnip	YES	
<i>Briza maxima</i>	Quaking Grass	YES	
<i>Briza minor</i>	Shivery Grass	YES	
<i>Briza subaristata</i>		YES	
<i>Bromus catharticus</i>	Praire Grass	YES	
<i>Brunoniella australis</i>	Blue Trumpet		Forb (FG)
<i>Bursaria spinosa</i>	Native Blackthorn		Shrub (SG)
<i>Caesia parviflora</i> var. <i>parviflora</i>			Forb (FG)
<i>Capsella bursa-pastoris</i>	Shepherd's Purse	YES	
<i>Cardamine hirsuta</i>	Common Bittercress	YES	
<i>Cenchrus clandestinus</i>	Kikuyu Grass	YES	
<i>Cerastium glomeratum</i>	Mouse-ear Chickweed	YES	
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Rock Fern		Fern (EG)
<i>Cirsium vulgare</i>	Spear Thistle	YES	
<i>Clematis glycinoides</i>	Headache Vine		Other (OG)
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	YES	
<i>Conyza sumatrensis</i>	Tall fleabane	YES	
<i>Cotula australis</i>	Common Cotula		Forb (FG)
<i>Crassula sieberiana</i>	Australian Stonecrop		Forb (FG)

Scientific Name	Common Name	Exotic?	Growth Form
<i>Cynodon dactylon</i> var. <i>dactylon</i>	Common Couch		Grass & grasslike (GG)
<i>Cyperus eragrostis</i>	Umbrella Sedge	YES	
<i>Cyperus gracilis</i>	Slender Flat-sedge		Grass & grasslike (GG)
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum		Tree (TG)
<i>Daviesia ulicifolia</i>	Gorse Bitter Pea		Shrub (SG)
<i>Dianella caerulea</i> var. <i>caerulea</i>			Forb (FG)
<i>Dianella caerulea</i> var. <i>producta</i>			Forb (FG)
<i>Dianella longifolia</i>	Blueberry Lily		Forb (FG)
<i>Dichondra repens</i>	Kidney Weed		Forb (FG)
<i>Digitaria parviflora</i>	Small-flowered Finger Grass		Grass & grasslike (GG)
<i>Ehrharta erecta</i>	Panic Veldtgrass	YES	
<i>Ehrharta longiflora</i>	Annual Veldtgrass	YES	
<i>Einadia trigonos</i>	Fishweed		Forb (FG)
<i>Entolasia marginata</i>	Bordered Panic		Grass & grasslike (GG)
<i>Eragrostis curvula</i>	African Lovegrass	YES	
<i>Eragrostis leptostachya</i>	Paddock Lovegrass		Grass & grasslike (GG)
<i>Eucalyptus amplifolia</i> subsp. <i>amplifolia</i>			Tree (TG)
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark		Tree (TG)
<i>Eucalyptus moluccana</i>	Grey Box		Tree (TG)
<i>Eucalyptus tereticornis</i>	Forest Red Gum		Tree (TG)
<i>Exocarpos cupressiformis</i>	Cherry Ballart		Shrub (SG)
<i>Fumaria muralis</i>	Wall Fumitory	YES	
<i>Gahnia aspera</i>	Rough Saw-sedge		Grass & grasslike (GG)
<i>Gamochaeta americana</i>	Purple Cudweed	YES	
<i>Glycine clandestina</i>	Twining glycine		Other (OG)
<i>Glycine microphylla</i>	Small-leaf Glycine		Other (OG)
<i>Glycine tabacina</i>	Variable Glycine		Other (OG)
<i>Gomphrena celosioides</i>	Gomphrena Weed	YES	
<i>Hardenbergia violacea</i>	False Sarsaparilla		Other (OG)
<i>Hibbertia aspera</i>	Rough Guinea Flower		Shrub (SG)
<i>Hypochaeris radicata</i>	Catsear	YES	
<i>Indigofera australis</i>	Australian Indigo		Shrub (SG)

Scientific Name	Common Name	Exotic?	Growth Form
<i>Lactuca serriola</i>	Prickly Lettuce	YES	
<i>Lepidosperma laterale</i>	Variable Sword-sedge		Grass & grasslike (GG)
<i>Leucopogon juniperinus</i>	Prickly Beard-heath		Shrub (SG)
<i>Lobelia purpurascens</i>	whiteroot		Forb (FG)
<i>Lolium perenne</i>	Perennial Ryegrass	YES	
<i>Lomandra filiformis subsp. coriacea</i>	Wattle Matt-rush		Grass & grasslike (GG)
<i>Lomandra filiformis subsp. filiformis</i>			Grass & grasslike (GG)
<i>Lomandra multiflora subsp. multiflora</i>	Many-flowered Mat-rush		Grass & grasslike (GG)
<i>Lotus uliginosus</i>	Birds-foot Trefoil	YES	
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	YES	
<i>Malva parviflora</i>	Small-flowered Mallow	YES	
<i>Medicago minima</i>	Woolly Burr Medic	YES	
<i>Medicago polymorpha</i>	Burr Medic	YES	
<i>Megathyrsus maximus</i>		YES	
<i>Melaleuca nodosa</i>			Shrub (SG)
<i>Microlaena stipoides var. stipoides</i>	Weeping Grass		Grass & grasslike (GG)
<i>Modiola caroliniana</i>	Red-flowered Mallow	YES	
<i>Notelaea longifolia f. longifolia</i>			Tree (TG)
<i>Nothoscordum gracile</i>	Onion Weed	YES	
<i>Ochna serrulata</i>	Mickey Mouse Plant	YES	
<i>Olea europaea subsp. cuspidata</i>	African Olive	YES	
<i>Olearia viscidula</i>	Wallaby Weed		Shrub (SG)
<i>Oxalis perennans</i>			Forb (FG)
<i>Ozothamnus diosmifolius</i>	White Dogwood		Shrub (SG)
<i>Paronychia brasiliiana</i>	Chilean Whitlow Wort, Brazilian Whitlow	YES	
<i>Parsonsia straminea</i>	Common Silkpod		Other (OG)
<i>Paspalidium distans</i>			Grass & grasslike (GG)
<i>Paspalum dilatatum</i>	Paspalum	YES	
<i>Plantago lanceolata</i>	Lamb's Tongues	YES	

Scientific Name	Common Name	Exotic?	Growth Form
<i>Poa annua</i>	Winter Grass	YES	
<i>Poranthera microphylla</i>	Small Poranthera		Forb (FG)
<i>Ranunculus sceleratus</i>	Celery Buttercup	YES	
<i>Rytidosperma racemosum</i>	Wallaby Grass		Grass & grasslike (GG)
<i>Senecio madagascariensis</i>	Fireweed	YES	
<i>Setaria parviflora</i>		YES	
<i>Sida rhombifolia</i>	Paddy's Lucerne	YES	
<i>Solanum nigrum</i>	Black-berry Nightshade	YES	
<i>Solanum prinophyllum</i>	Forest Nightshade		Forb (FG)
<i>Solanum sisymbriifolium</i>		YES	
<i>Soliva sessilis</i>	Bindyi	YES	
<i>Sonchus asper</i>	Prickly Sowthistle	YES	
<i>Sonchus oleraceus</i>	Common Sowthistle	YES	
<i>Sporobolus africanus</i>	Parramatta Grass	YES	
<i>Stachys arvensis</i>	Stagger Weed	YES	
<i>Stellaria media</i>	Common Chickweed	YES	
<i>Taraxacum officinale</i>	Dandelion	YES	
<i>Themeda triandra</i>			Grass & grasslike (GG)
<i>Trifolium repens</i>	White Clover	YES	
<i>Verbena bonariensis</i>	Purpletop	YES	
<i>Vernonia cinerea</i> var. <i>cinerea</i>		YES	
<i>Veronica arvensis</i>	Wall Speedwell	YES	
<i>Veronica plebeia</i>	Trailing Speedwell		Forb (FG)
<i>Vulpia bromoides</i>	Squirrel Tail Fesque	YES	
<i>Wahlenbergia communis</i>	Tufted Bluebell		Forb (FG)
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell		Forb (FG)
<i>Zieria smithii</i>	Sandfly Zieria		Shrub (SG)

APPENDIX B :

Weed Control Measures

Table 5 Weed control methods

Scientific Name	Common Name	Priority Status	WoNS	Control Method
<i>Anredera cordifolia</i>	Madeira Vine	State Priority – Asset Protection	Yes	- Hand pull juvenile vines, or remove with hand tools taking care to remove roots and tubers - 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
<i>Araujia sericifera</i>	Moth Vine	Other Weed of Regional Concern	No	- 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
<i>Asparagus aethiopicus</i>	Ground Asparagus	State Priority	No	- 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

Scientific Name	Common Name	Priority Status	WoNS	Control Method
				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.- 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
<i>Asparagus asparagoides</i>	Bridal Creeper	State Priority	No	- 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
<i>Bidens pilosa</i>	Cobbler's Pegs	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Bromus catharticus</i>	Brome Grass	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Cerastium glomeratum</i>	Mouse-ear Chickweed	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Cirsium vulgare</i>	Spear Thistle	No Status	No	- Hand Weed using gloves - Spot Spray - Glyphosate 10mL/1L
<i>Conyza sumatrensis</i>	Tall Fleabane	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L - On-going grubbing (all year)

Scientific Name	Common Name	Priority Status	WoNS	Control Method
<i>Hypochaeris radicata</i>	Catsear	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Lactuca serriola</i>	Prickly Lettuce	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Lolium perenne</i>	Perennial Ryegrass	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L - On-going grubbing (all year)
<i>Lotus uliginosus</i>	Greater Bird's Foot Trefoil	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Medicago polymorpha</i>	Burr Medic	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Paspalum dilutatum</i>	Dallis Grass	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Plantago lanceolata</i>	Lamb's Tongues	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Senecio madagascariensis</i>	Fireweed	State Priority – Asset	Yes	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Sida rhombifolia</i>	Paddy's Lucerne	No Status	No	- Hand weed - Spot Spray - Glyphosate 10mL/1L - Cut large, firmly rooted individuals at the base with secateurs and paint with undiluted glyphosate

Scientific Name	Common Name	Priority Status	WoNS	Control Method
<i>Solanum sisymbriifolium</i>	Sticky Nightshade	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Sonchus asper</i>	Sow Thistle	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Stachys arvensis</i>	Stagger Weed	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Trifolium repens</i>	White Clover	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
<i>Verbena bonariensis</i>	Purple Top	No Status	No	- Hand Weed - Spot Spray - Glyphosate 10mL/1L

APPENDIX C :

Species Planting List



Table 6 Species Planting List - Cumberland Plain Woodland

Form	Family	Scientific Name	Common Name
Trees	Fabaceae (Mimosoideae)	<i>Acacia parramattensis</i>	Parramatta Wattle
	Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
	Myrtaceae	<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
	Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box
	Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Shrubs	Asteraceae	<i>Ozothamnus diosmifolius</i>	Dogwood
	Fabaceae (Faboideae)	<i>Bossiaea prostrata</i>	Creeping Bossiaea
	Fabaceae (Faboideae)	<i>Chorizema parviflorum</i>	Eastern Flame Pea
	Fabaceae (Faboideae)	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea
	Fabaceae (Faboideae)	<i>Dillwynia sieberi</i>	
	Fabaceae (Faboideae)	<i>Indigofera australis</i>	Australian Indigo
	Fabaceae (Faboideae)	<i>Pultenaea microphylla</i>	
	Fabaceae (Mimosoideae)	<i>Acacia implexa</i>	Hickory Wattle
	Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush
	Pittosporaceae	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Blackthorn
	Rosaceae	<i>Rubus parvifolius</i>	Native Raspberry
	Sapindaceae	<i>Dodonaea viscosa</i>	Sticky Hop Bush
	Scrophulariaceae	<i>Eremophila debilis</i>	Winter Apple
	Fabaceae (Faboideae)	<i>Desmodium brachypodum</i>	Large Tick-trefoil
	Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil
Vines and Twiners	Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining Glycine
	Fabaceae (Faboideae)	<i>Glycine microphylla</i>	Small-leaf Glycine
	Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Twining Glycine
	Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	Purple Coral Pea
	Ranunculaceae	<i>Clematis glycinoides</i>	Headache Vine
Groundcovers	Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet
	Anthericaceae	<i>Arthropodium milleflorum</i>	Pale Vanilla Lily
	Anthericaceae	<i>Dichopogon fimbriatus</i>	Chocolate Lily
	Anthericaceae	<i>Dichopogon strictus</i>	Nodding Chocolate Lily
	Anthericaceae	<i>Tricoryne elatior</i>	Yellow Autumn Lily
	Apiaceae	<i>Centella asiatica</i>	Indian Pennywort
	Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot

Form	Family	Scientific Name	Common Name
	Asteraceae	<i>Chrysocephalum apiculatum</i>	Yellow Buttons
	Asteraceae	<i>Cymbonotus lawsonianus</i>	Bear's Ears
	Asteraceae	<i>Euchiton sphaericus</i>	
	Asteraceae	<i>Glossocardia bidens</i>	Cobbler's Tack
	Asteraceae	<i>Vernonia cinerea</i>	
	Campanulaceae	<i>Wahlenbergia gracilis</i>	Small Bluebell
	Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush
	Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush
	Chenopodiaceae	<i>Einadia polygonoides</i>	
	Chenopodiaceae	<i>Einadia trigonos</i>	Fishweed
	Clusiaceae	<i>Hypericum gramineum</i>	Small St Johns Wort
	Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew
	Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
	Crassulaceae	<i>Crassula sieberiana</i>	Australian Stonecrop
	Cyperaceae	<i>Carex inversa</i>	
	Cyperaceae	<i>Cyperus gracilis</i>	
	Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
	Cyperaceae	<i>Scleria mackaviensis</i>	
	Fabaceae	<i>Desmodium varians</i>	Slender Tick-trefoil
	Fabaceae	<i>Zornia dyctiocarpa</i>	Zornia
	Geraniaceae	<i>Geranium homeanum</i>	
	Geraniaceae	<i>Geranium solanderi</i>	Native Geranium
	Goodeniaceae	<i>Goodenia hederacea</i>	Forest Goodenia
	Hypoxidaceae	<i>Hypoxis hygrometrica</i>	Golden Weather-grass
	Lamiaceae	<i>Ajuga australis</i>	Austral Bugle
	Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flower
	Lamiaceae	<i>Scutellaria humilis</i>	Dwarf Skullcap
	Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot
	Lomandraceae	<i>Lomandra filiformis</i>	Wattle Mat-rush
	Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush
	Malvaceae	<i>Sida corrugata</i>	Corrugated Sida
	Oxalidaceae	<i>Oxalis perennans</i>	Native oxalis
	Phormiaceae	<i>Dianella longifolia</i>	Blueberry Lily
	Phyllanthaceae	<i>Phyllanthus virgatus</i>	

Form	Family	Scientific Name	Common Name
	Phyllanthaceae	<i>Poranthera microphylla</i>	Small-leaved Poranthera
	Plantaginaceae	<i>Plantago debilis</i>	
	Plantaginaceae	<i>Plantago gaudichaudii</i>	Narrow Plantain
	Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell
	Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass
	Poaceae	<i>Aristida vagans</i>	Three awned Speargrass
	Poaceae	<i>Bothriochloa decipiens</i>	Pitted Bluegrass
	Poaceae	<i>Bothriochloa macra</i>	Red-leg Grass
	Poaceae	<i>Chloris truncata</i>	
	Poaceae	<i>Chloris ventricosa</i>	Plump Windmill Grass
	Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass
	Poaceae	<i>Dichanthium sericeum</i>	Queensland Bluegrass
	Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plume Grass
	Poaceae	<i>Dichelachne parva</i>	Plume Grass
	Poaceae	<i>Digitaria diffusa</i>	Open Summer-grass
	Poaceae	<i>Echinopogon caespitosus</i>	Tufted Hedgehog Grass
	Poaceae	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
	Poaceae	<i>Elymus scaber</i>	Common Wheatgrass
	Poaceae	<i>Eragrostis leptostachya</i>	Paddock lovegrass
	Poaceae	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass
	Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
	Poaceae	<i>Panicum effusum</i>	Hairy Panic
	Poaceae	<i>Paspalidium distans</i>	
	Poaceae	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass
	Poaceae	<i>Rytidosperma racemosa</i>	Wallaby Grass
	Poaceae	<i>Rytidosperma tenuius</i>	Wallaby Grass
	Poaceae	<i>Sorghum leiocladum</i>	Wild Sorghum
	Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
	Poaceae	<i>Themeda triandra</i>	Kangaroo Grass
	Pteridaceae	<i>Cheilanthes distans</i>	Bristly Cloak Fern
	Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern
	Rubiaceae	<i>Asperula conferta</i>	Common Woodruff
	Rubiaceae	<i>Opercularia diphylla</i>	
	Solanaceae	<i>Solanum cinereum</i>	

Form	Family	Scientific Name	Common Name
	Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade
	Stackhousiaceae	<i>Stackhousia viminea</i>	Slender Stackhousia

FIGURES



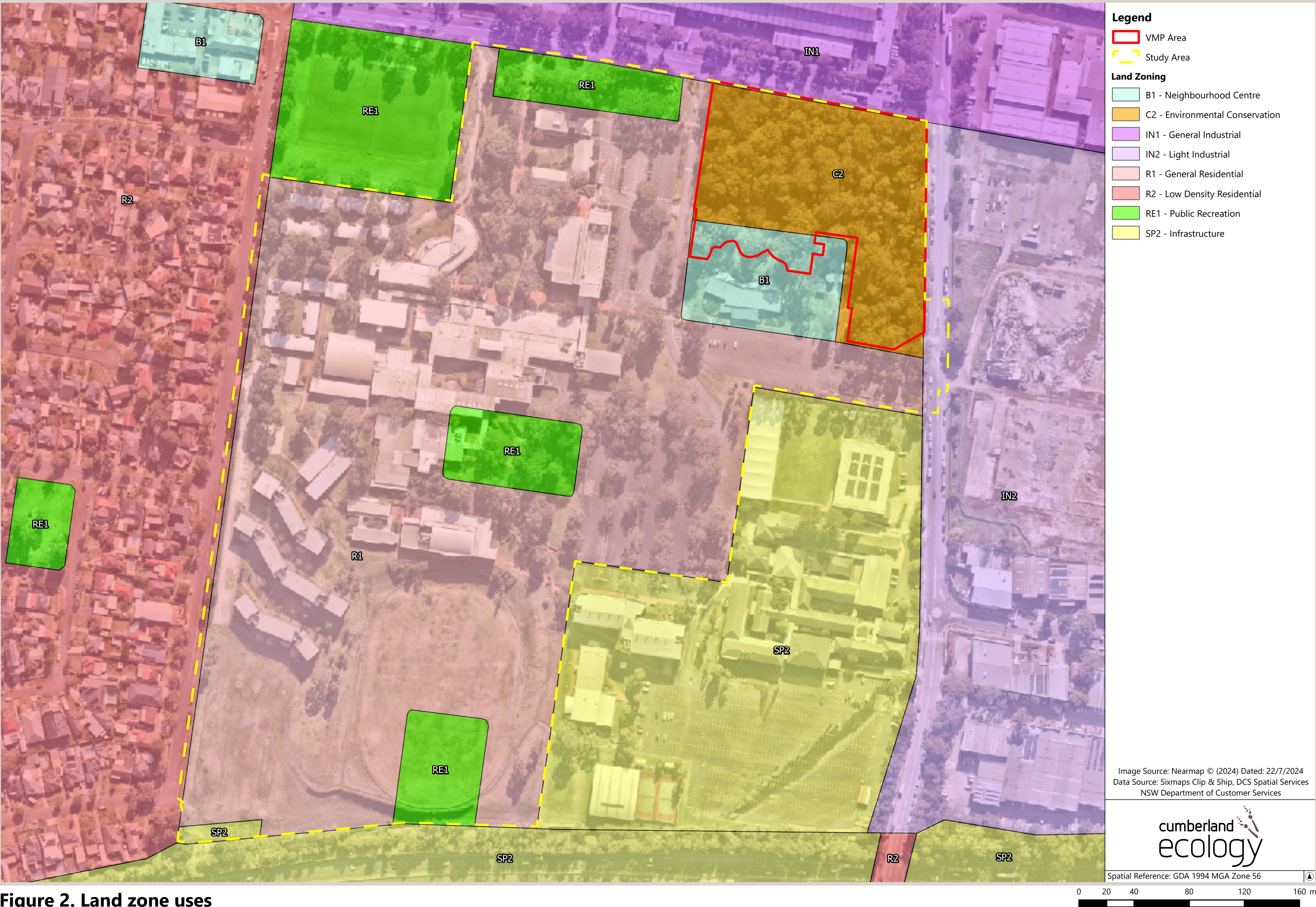


Figure 2. Land zone uses



Figure 3. Plant community types and threatened flora within the study area

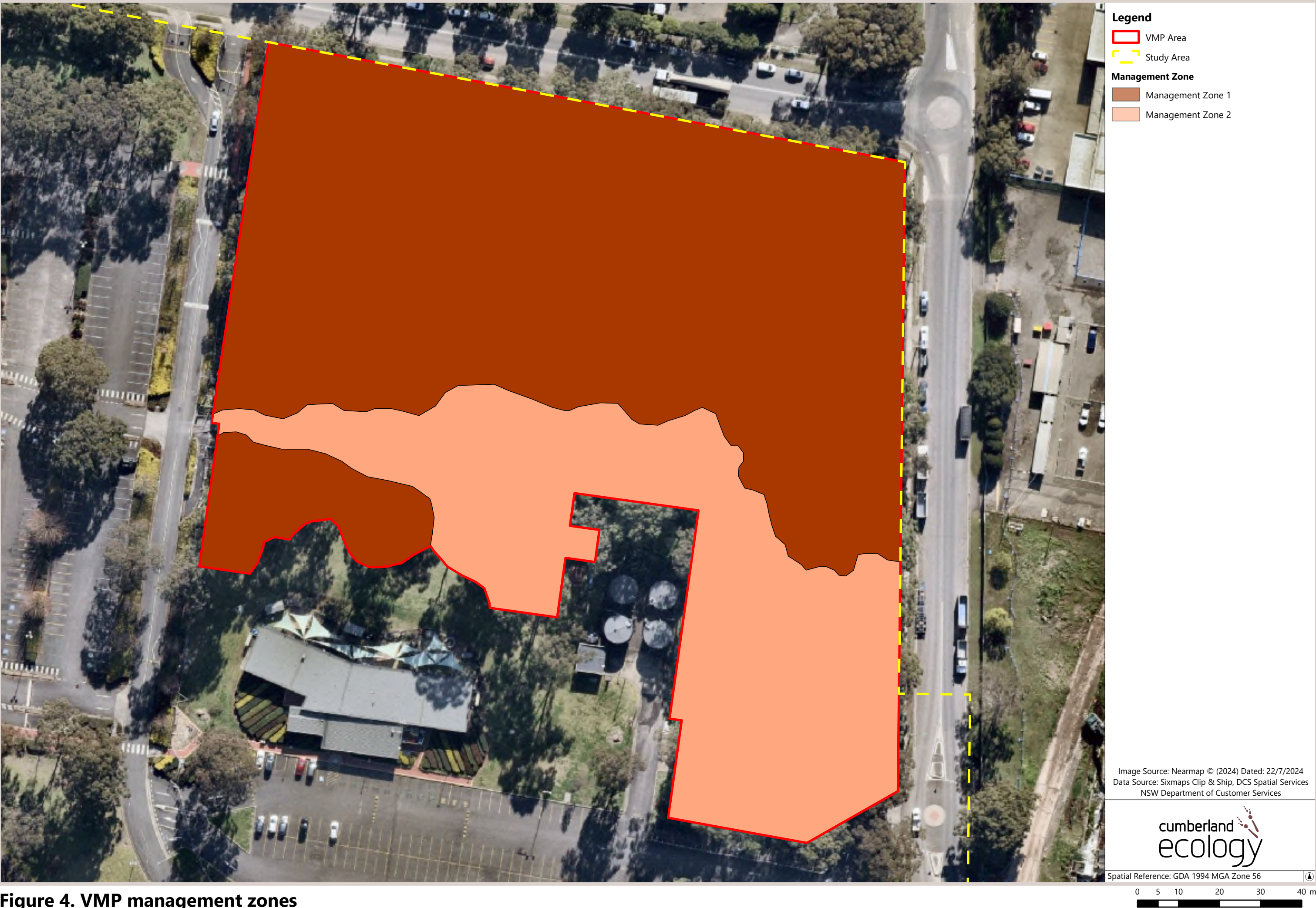


Figure 4. VMP management zones