



# **125 & 145-175 Lawson Road, Badgerys Creek**

## **Vegetation Management Plan**

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Formus Property Pty Ltd

## Document Tracking

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## Acknowledgements

This document has been prepared by Eco Logical Australia Pty Ltd with support from Formus Property Pty Ltd.

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## Abbreviations

Abbreviation	Description
AABR	Australian Association of Bush Regenerators
Biosecurity Act 2015	NSW <i>Biosecurity Act 2015</i>
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
CEEC	Critically Endangered Ecological Community
DCP	Development Control Plan
DPE	Department of Planning and Environment (now NSW DCCEEW)
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
ELA	Eco Logical Australia Pty Ltd
EPBC	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
LCC	Liverpool City Council
LGA	Local Government Area
LLS	Local Land Services
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
VMP	Vegetation Management Plan
WM Act	NSW Water Management Act 2000
WoNS	Weeds of National Significance

# 1. Introduction

## 1.1. Purpose of this report

Eco Logical Australia Pty Ltd (ELA) was engaged by Formus Property Pty Ltd to prepare a Vegetation Management Plan to support the proposed State Significant Development Application (SSDA) for the 'Cross Link Industrial Estate' at 125 & 145-175 Lawson Road, Badgerys Creek NSW (SSD-81662708).

## 1.2. Background and context

The study area forms part of the Badgerys Creek Precinct within the Western Sydney Aerotropolis (WSA) and is zoned ENT (Enterprise) and ENZ (Environment and Recreation) under the State Environmental Planning Policy (Precincts – Western Parkland City) 2021. The approximate area of the project Site is 83 hectares (ha) and comprises the following Lots:

- 1/-/DP226912
- 3/-/DP226912
- 4/-/DP226912
- 5/-/DP226912
- 6/-/DP226912

ELA has completed previous works associated with the proposed development 125 & 145-175 Lawson Road, Badgerys Creek (hereafter referred to as the 'project'). These works include biodiversity, riparian, and wildlife hazard assessment (ELA 2026a-d). This VMP is a component of the proposed development and will be implemented with other management plans prepared for the project. A Biodiversity Management Plan (BMP) (ELA 2026a) has been prepared to guide the management of various biodiversity aspects include weeds, flora and fauna, and dam dewatering. Finally, a Weed Eradication Management Plan (WEMP) has been prepared to manage weed control within the development footprint (ELA 2026d).

The study area contains an extent of the 4<sup>th</sup> order watercourse, Badgerys Creek, which runs along the western boundary of the study area. As such the study area is comprised of waterfront land and must adhere to the *Controlled Activities – Guidelines for Vegetation Management Plans on Waterfront Land* (DPE 2022). The required extent of the VMP area under these guidelines has been determined and detailed in the Riparian Assessment (ELA 2026b).

## 1.3. Scope and objectives

The overarching objectives of the VMP is to improve ecological health and integrity, maintain and enhance habitat values within the VMP area. This document will address all issues related to the protection of existing vegetation from impacts associated with the undertaking of earthworks and any edge effects as well as undertaking bush regeneration and management actions to improve its extent, condition, and resilience.

This VMP will outline the areas to be revegetated as part of the works and recommend fully structured vegetated areas, where possible, as per *Controlled Activities – Guidelines for Vegetation Management Plans on Waterfront Land* (DPE 2022). The VMP strategy is to maintain and enhance native species

cover and integrity in the riparian corridor by assisting natural regeneration through active restoration actions such as treating weed species and reintroducing native species (as plant or seed).

This VMP covers a five-year maintenance period plus the achievement of the performance criteria. This VMP may either be implemented all at once or staged by areas (e.g. to correspond with construction stages) as long as each stage follows the full VMP programme to meet the performance criteria. The objectives for the VMP area are summarised in Table 1.

**Table 1: VMP objectives**

<b>Objectives</b>	<b>Actions</b>
<b>Reinstate native vegetation and maintain ecological health (species composition and structure)</b>	<ul style="list-style-type: none"> <li>• Protect existing native vegetation from development pressures.</li> <li>• Rehabilitate and revegetate riparian corridor using appropriate native species.</li> <li>• Control weeds and prevent new outbreaks.</li> <li>• Assist in the natural regeneration of native species.</li> <li>• Addition of logs, rocks etc. removed from the development footprint for habitat improvement.</li> </ul>
<b>Improve ecological health and integrity.</b>	<ul style="list-style-type: none"> <li>• Continue to assist natural regenerative processes.</li> <li>• Maintain weed control</li> <li>• Prevent outbreaks of priority weeds</li> <li>• Revegetate using appropriate native species.</li> </ul>
<b>Maintain and enhance habitat values</b>	<ul style="list-style-type: none"> <li>• Protect existing native vegetation.</li> <li>• Control weeds and prevent new outbreaks.</li> <li>• Assist in the natural regeneration of species across the VMP areas.</li> </ul>
<b>Ensure stable bed and banks of creeks</b>	<ul style="list-style-type: none"> <li>• Where practical a 'soft engineering' approach to the maintenance and management of the creek bed and banks (e.g. hand installed erosion controls such as jute mesh, eco-logs, etc.) with a focus on planting locally indigenous native species, slowing flows before they reach the creek and attenuating peak and high frequency flows.</li> </ul>
<b>Control significant weeds, and prevent new infestations</b>	<ul style="list-style-type: none"> <li>• Primary weed control phase</li> <li>• Secondary / follow-up weed control phase</li> <li>• Maintenance</li> </ul>
<b>Protect existing natural areas from the proposed works</b>	<ul style="list-style-type: none"> <li>• Provision of exclusion zone from the works area to the areas to be managed as part of the VMP (e.g. provision of protection fencing and signage).</li> </ul>

#### **1.4. Preparation and implementation**

This VMP has been prepared and reviewed by Restoration Ecologist(s) with over five years' experience in environmental consulting and management, and a relevant Bachelor of Science degree. The role of the project restoration ecologist, where noted, should be undertaken by a similarly qualified and experienced restoration ecologist or bush regenerator.

## 2. Existing environment

### 2.1. Location context

The study area is located at 125 & 145-175 Lawson Road, Badgerys Creek NSW within the Liverpool City Council (LCC) Local Government Area (LGA). The study area is within the Cumberland IBRA subregion. Conservation areas within a 10 km radius of the study area includes the Burragorang State Conservation Area (southwest), Gulguer Nature Reserve (south), Kemps Creek Nature Reserve (east), and Mulgoa Nature Reserve (north).

### 2.2. Existing land use

The site has a historical land use for agricultural purposes. The study area is largely cleared of native vegetation, it consists of pasture-improved exotic grassland, scattered paddock trees, riparian vegetation, farm dams and built form.

### 2.3. Topography and hydrology

The site is comprised of an undulating landscape sloping from east to west. The study area contains an extent of the 4<sup>th</sup> order watercourse, Badgerys Creek, which runs along the western boundary of the study area.

### 2.4. Vegetation communities

Vegetation mapping provided within the Biodiversity Assessment Report (ELA 2026c) identified the following PCTs, and their broad condition states within the VMP area:

- PCT 3320 *Cumberland Shale Plains Woodland* (Moderate and DNG)
- PCT 4023 *Coastal Valleys Riparian Forest* (Moderate and Low)
- PCT 4025 *Cumberland Red Gum Riverflat Forest* (Moderate and Low)

PCT 3320 corresponds to a threatened ecological community (TEC) under the BC Act and EPBC Act. Under the BC Act, PCT 3320 is listed as critically endangered and named *Cumberland Plain Woodland in the Sydney Basin Bioregion*. Under the EPBC Act it can be listed as the critically endangered ecological community, *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*.

PCT 4023 can also correspond to a TEC under the BC Act and EPBC Act. Under the BC Act it is listed as endangered and named *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*. Under the EPBC Act it can also be listed as the endangered ecological community, listed *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*.

PCT 4025 corresponds to a TEC under the BC Act and EPBC Act. Under the BC Act, PCT 4025 is listed as Endangered and named *River-flat Eucalyptus Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*. Under the EPBC Act it can be listed as the critically endangered ecological community, *River-flat Eucalyptus Forest on coastal floodplains of the southern New South Wales and eastern Victoria*.

Exotic grassland was also identified within the VMP area which did not conform to a native PCT.

#### 2.4.1. PCT 3320: Cumberland Shale Plains Woodlands

PCT 3320 occurred in two conditions; moderate and DNG. Both vegetation zones occurred in the northwest corner of the study area. The Moderate condition zone was limited to two canopy species, *Eucalyptus moluccana* (grey box) and *Eucalyptus tereticornis* (forest red gum) in moderate cover, with a midstorey of scattered *Bursaria spinosa* subsp. *spinosa* (blackthorn). The groundlayer was dominated by native species including the grass *Microlaena stipoides* var. *stipoides* (weeping grass) and herbaceous species such as *Veronica plebeia* (trailing speedwell), *Commelina cyanea*, *Dichondra repens* (kidney weed) and *Plectranthus parviflorus* (cockspur flower). Exotic weed species were common on the groundlayer and included species such as *Tradescantia fluminensis* (trad), *Senecio madagascariensis* (fireweed), *Bidens pilosa* var. *pilosa* (cobblers pegs), *Ehrharta erecta* (panic veldtgrass) and *Cirsium vulgare* (spear thistle).

The DNG vegetation zone within the VMP area is a small patch attached to the east of the moderate condition zone. Derived native grasslands represent modified vegetation zones where the removal of trees and shrubs has occurred leaving an intact native groundlayer. Native species in this zone were dominant and cover was mostly limited to *Microlaena stipoides* var. *stipoides*, with native herbs also occurring including *Asperula conferta* (common woodruff) and *Oxalis perennans*. Exotic weeds also occurred in low cover including species such as *Paspalum dilatatum* (paspalum), *Verbena* spp., *Cirsium vulgare* and *Hypochaeris radicata* (catsear).

#### 2.4.2. PCT 4023: Coastal Valleys Riparian Forest

PCT 4023 occurred as moderate within the VMP area. This vegetation zone was restricted to the western boundary of the VMP area within and immediately adjacent to the creekline along most of the western boundary. The community is characterised by the dominance of young *Casuarina glauca* (swamp oak) groves sometimes with emergent eucalypts. *Casuarina glauca* was dominant in patches of PCT 4023 that graded into PCT 4025 within the study area. The midstorey was mostly limited to the exotic species *Cestrum parqui* (green cestrum), however scattered *Bursaria spinosa* subsp. *spinosa* also occurred infrequently. Native groundlayer species included *M. stipoides* var. *stipoides*, *Einadia trigonos* (fishweed) and *Plectranthus parviflorus*. A large patch of *Phragmites australis* (common reed) was also identified in the southwest corner of this vegetation zone, with scattered plants occurring elsewhere along the creekline.

#### 2.4.3. PCT 4025: Cumberland Red Gum Riverflat Forest

PCT 4025 was identified in a large patch on the western boundary of the VMP. This zone graded into PCT 3320 in the north and into PCT 4023 regularly along the length of Badgerys Creek. Canopy species included *Eucalyptus tereticornis* with high cover and scattered *Angophora floribunda* (apple). The midstorey included native species such as *Acacia parramattensis* (Parramatta wattle), *Melaleuca styphelioides* (prickly-leaved tea tree) and *Bursaria spinosa* subsp. *spinosa* less frequently. The exotic woody weed *Cestrum parqui* also occurred frequently in this zone. The native groundlayer was predominantly *Microlaena stipoides* var. *stipoides*, similarly to PCT 3320 – moderate. Other species in this stratum included the natives *D. repens*, *Einadia trigonos* and *Plectranthus parviflorus* and exotic species such as *Tradescantia fluminensis* and *Cenchrus clandestinus*.

A small patch of PCT 4025 disturbed occurred in the southwest corner of the VMP area. This was represented by a small grove of regrowth *Acacia parramattensis*, with an exotic understorey of *Cenchrus clandestinus*.

#### 2.4.4. PCT 4025: Exotic

Exotic patches occurred on the eastern boundary of the VMP area where it transitions out of the riparian corridor into the previous land use area. Grasses and common cosmopolitan weeds dominated this vegetation zone. Species included *Cenchrus clandestinus*, *Sida rhombifolia*, *Conyza* spp., *Paspalum dilatatum*, *Bidens pilosa* var. *pilosa*, *Verbena* spp., *Senecio madagascariensis*, *Solanum sisymbriifolium*, *Setaria parviflora*, *Echinochloa crus-galli*, *Malva parviflora*, *Cirsium vulgare*, *Hypochaeris radicata* and *Ehrharta erecta* among others.

## 2.5. Weeds

The *Biosecurity Act 2015* (Biosecurity Act) and regulations provide specific legal requirements for the state level priority weeds (Table 2). Under the Biosecurity Act 2015 all plants are regulated with a general biosecurity duty to prevent, eliminate, or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as reasonably practicable.

Specific legal requirements apply to State determine priorities under the *Greater Sydney Regional Strategic Weed Management Plan 2023-2030*, while regional priorities include outcomes to demonstrate compliance with the general biosecurity duty and strategic responses in the region to achieve relevant management objectives (Greater Sydney LLS 2023). Weeds listed as 'other weeds of regional concern' under the plan warrant resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, agriculture etc.

Weed species identified during the field survey for this VMP includes four of Weeds of National significance, and five weeds listed as Regional Level Priority. The weeds present, their priority listing under the Biosecurity Act 2015, the associated asset / value at risk and whether they are Weeds of National Significance (WoNS), are presented in Table 2. A list of weeds recorded during field survey is provided in Table 2, with the full list of weeds recorded in Appendix A.

**Table 2: A list of priority weeds and WoNS identified within the study area**

Scientific Name	Common Name	WoNS listed	Priority Weed Category
<i>Anredera cordifolia</i>	Madeira Vine	Yes	State priority - Containment and/or Asset Protection
<i>Asparagus asparagoides</i>	Bridal Creeper	Yes	State priority - Containment and/or Asset Protection
<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	-	Local region priority - Containment
<i>Rubus anglocandicans</i>	Blackberry	Yes	State priority - Containment and/or Asset Protection
<i>Senecio madagascariensis</i>	Fireweed	Yes	State priority - Containment and/or Asset Protection

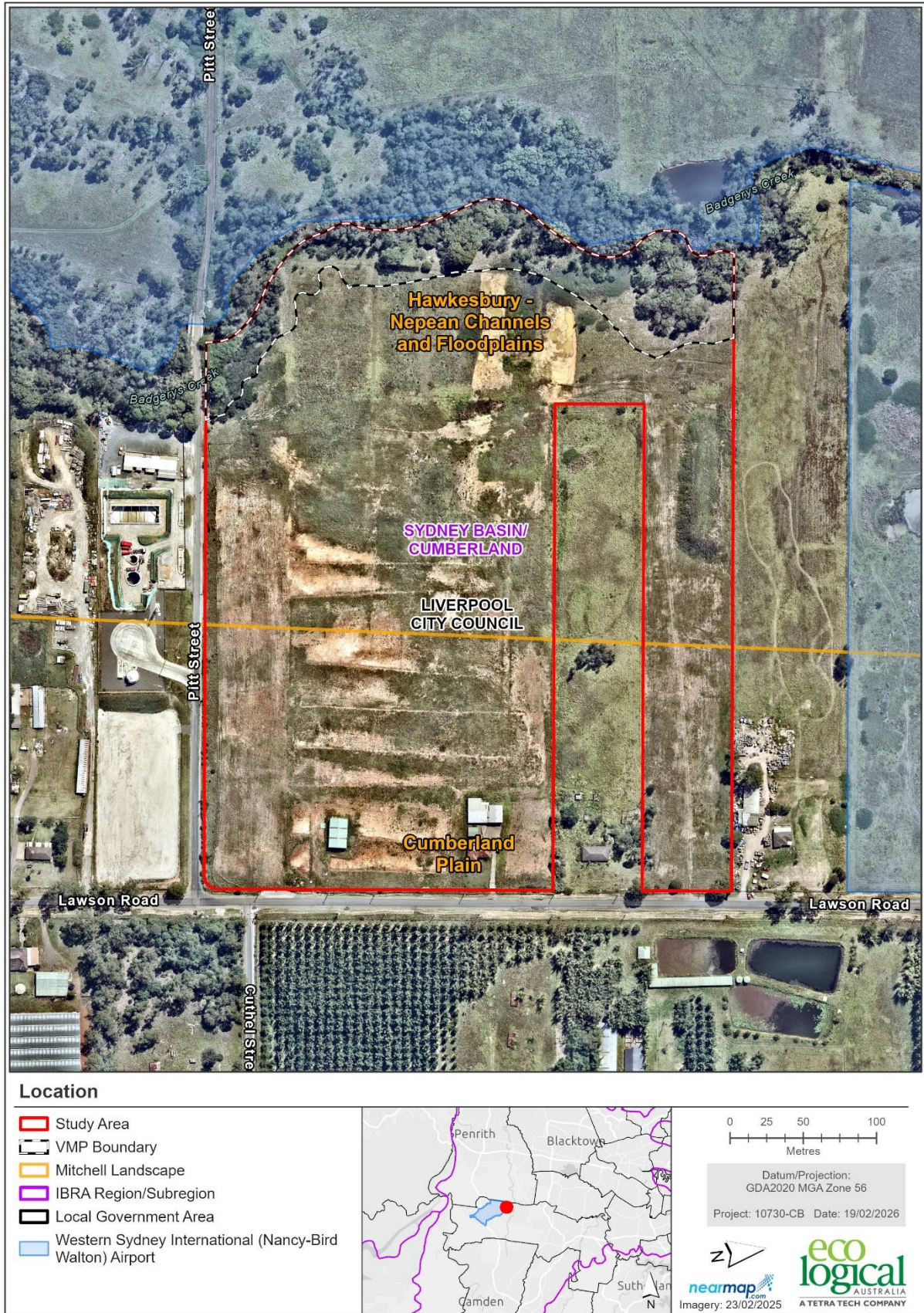


Figure 1: Location of the study area

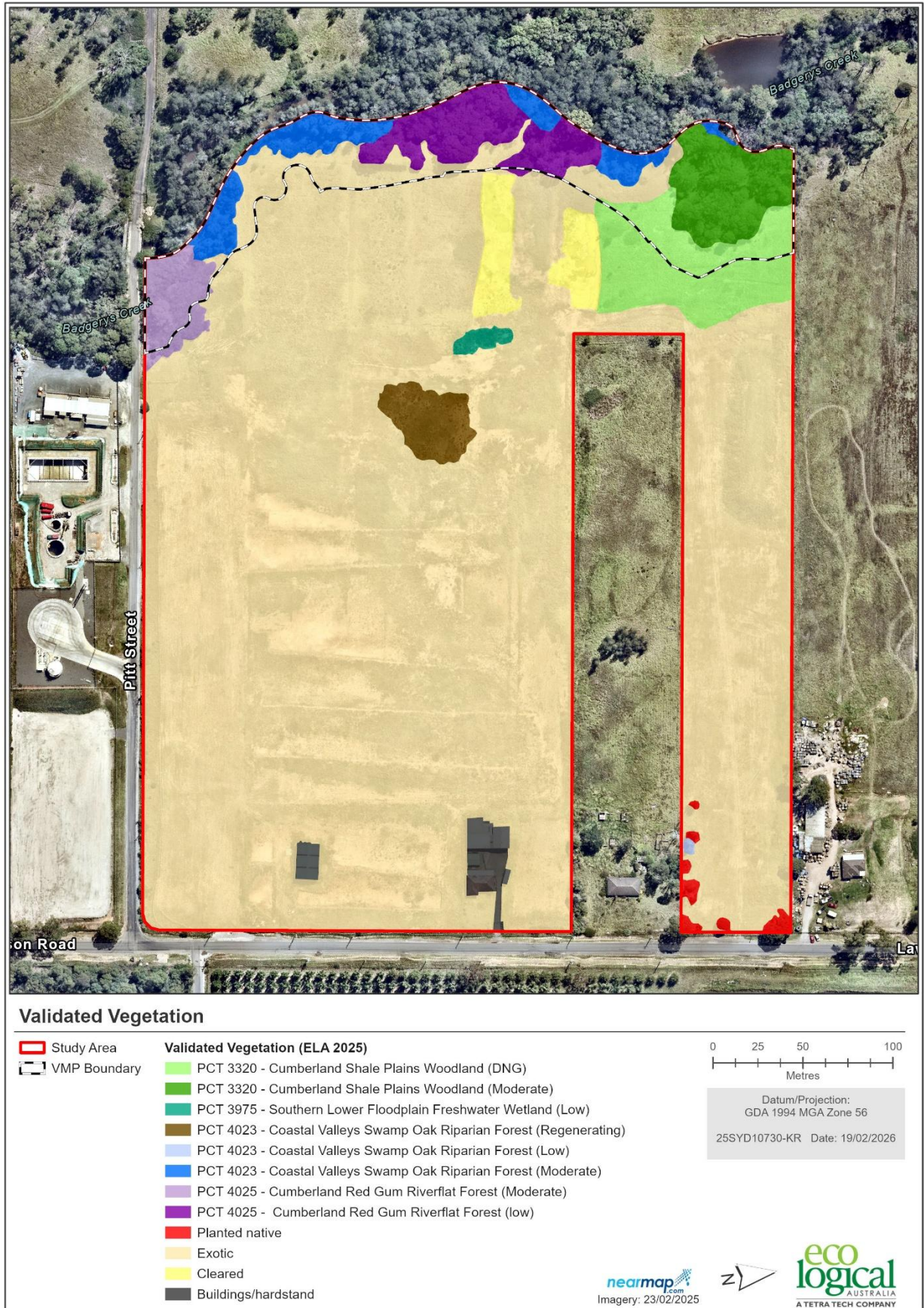


Figure 2: PCTs and other validated land types

### 3. Preliminary works

The following works will be required prior to vegetation management works being undertaken.

#### 3.1. Fencing and interpretation signage

##### 3.1.1. Temporary fencing

The edge of the VMP area where it borders the development footprint is to be fenced with temporary construction fencing to prevent civil construction machinery from entering the VMP area unless under supervision from a suitably qualified ecologist or bush regenerator.

Informational signage must be installed on the construction fencing that identifies that there is to be no entry into the VMP area without an ecologist or bush regenerator present.

Tree protection zones (TPZ) are required to be installed and implemented prior to construction works commencing within the VMP area. Tree protection zones must be implemented within the VMP area around key mature and recruiting native species in accordance with AS 4970-2009.

##### 3.1.2. Permanent fencing

The VMP area should be fenced permanently or similarly protected following completion of construction works to prevent any long-term impacts. Any fencing should incorporate suitable access for VMP and other works, including potential vehicle access where required.

##### 3.1.3. Signage and gates

Informational signage should be placed at minimum at each entry point into the VMP area.

Informational signage should state:

*The vegetation within bushland is protected. Activities such as firewood collection, bush rock removal, picking of native flowers and dumping of garden waste are prohibited.*

#### 3.2. Soil and water management

An Erosion and Sediment Control Plan, preferably as part of a Construction Environmental Management Plan, must be developed and implemented prior to the commencement of any on-ground works. This plan must outline mitigation measures (e.g., silt fencing, drainage swale, etc.) to protect the VMP area from increased nutrient loads and weed seed incursion from site runoff.

Prior to construction commencing, sediment fencing is to be installed at the base of the construction fencing to prevent sediment running into the VMP area and limit the spread of weed propagules in soil sediments during the construction period.

#### 3.3. Preclearance and earthworks supervision and habitat enhancement

Prior to vegetation removal a preclearance survey must be conducted to identify and mark all habitat features (i.e. Hollow bearing trees, stags, rocky outcrops etc.) within the development footprint. During construction activities, when clearing areas of existing vegetation, earthworks and tree removal should be undertaken with a fauna ecologist or wildlife carer present to capture and release any displaced fauna in suitable habitat adjacent to the development footprint, with assistance provided by wildlife carers to attend to and care for injured fauna as needed. The removal of all habitat features must take

place a minimum of 24 hrs following the removal of all other vegetation. Prior to the removal of habitat features, under the guidance of a suitably qualified ecologist the habitat feature must be tapped several times to observe for any signs of fauna. Following no observation of fauna the habitat feature can then be removed. Following removal, the qualified ecologist must inspect the habitat feature to ensure no fauna were harmed during the removal.

During works, all-natural timber (i.e., fallen logs and branches), hollow stems, sections of trees / large woody material (>10cm diameter) and suitable bush rock removed from within the development footprint/impact area must be used as habitat structures within the VMP area. This material provides microhabitat for fauna species, soil stability and nutrients cycling. Exotic vegetation is to be taken off-site and should not be used in habitat enhancement. The placement of all fauna habitat augmentation/relocation is to be carried out under the supervision of a qualified ecologist.

All viable seed and genetic material present at time of clearance will be collected for plant propagation uses.

### **3.4. Pest control**

It is the responsibility of the landholder to remove and protect the VMP area from all livestock within the area. Pest control is the responsibility of the land holder, if pest control is required installation is to be undertaken by relevant contractors in consultation with Local Land Services (LLS) and LCC.

### **3.5. Soil preparation prior to revegetation**

Considerable chemical change can occur between soil A and B horizons, with some B horizons highly sodic and prone to deflocculation, erosion and water logging – which could significantly reduce revegetation works success. For this reason, excavation, shaping and re-leveling activities within the VMP area, if required, should take particular care with the removal, stockpiling and replacement of soil horizons/strata to achieve final soil profiles that are appropriate for plant survival. Works should also have plans in place to minimise and remediate soil compaction where construction works are taking place in the VMP area. Furthermore, environmental hygiene is highly recommended to prevent the introduction or the transfer of pathogens or Noxious/WoNS seed. Safe Work Method Statements (SWMS) need to incorporate these measures for machinery and all pedestrians including work teams, reporters etc.

Soil preparation works are required in all areas of the VMP where construction impacts are present including haul roads and basin construction. In addition, areas of historical impact including previous construction/clearing may also require soil amelioration works.

After all construction works are complete and vehicle movements are excluded from the VMP area then all impacted surfaces should be treated with appropriate topsoils, compost, and ameliorants to finished levels, ripped (where necessary) and cultivated to a light friable consistency.

This approach is detailed in

Table 3 however the exact requirements should be finalised in consultation with a suitably qualified and experienced Restoration Ecologist. It is assumed that the Civil Contractor will undertake the soil preparation works with supervision, where relevant, from a suitably qualified and experienced Restoration Ecologist.

**Table 3: Soil preparation works required**

Task
Form and shape subgrade to 300mm below final levels
Install 225mm of suitable site topsoil consistent with the natural local soils
Install 75mm compost complying with AS4454-2012
Undertake soil testing and install suitable ameliorants depending on the results. An indicative example of what might be required includes: <ul style="list-style-type: none"> <li>• 100g/m<sup>2</sup> Gypsum</li> <li>• 20g/m<sup>2</sup> microbial soil conditioner (e.g., Bactivate granular or equivalent)</li> <li>• 20g/m<sup>2</sup> quick-release multi-source 5:2:8 NPK organic granular fertiliser (e.g., Terralift TX10 + MYCORRHIZA or equivalent)</li> <li>• 120g/m<sup>2</sup> slow-release microbial native 14:1:4 NPK granular fertiliser (e.g., Troforte M Native, or equivalent)</li> </ul>
Work in topsoil, compost, and ameliorants together at 25% volume (3 parts soil plus 1 part compost)
Install to a depth of 300mm over subgrade
Rip and cultivate until light and friable

## 4. Vegetation management works

### 4.1. VMP management zones

The following vegetation management zones are required to be implemented as part of this VMP. These three management zones have been designed to incorporate natural regeneration and rehabilitation of the site to provide a sustainable natural area.

- Zone 1: Cumberland Plain Woodland – Regeneration
- Zone 2: Swamp Oak and Cumberland River-flat Forest – Regeneration
- Zone 3: Cumberland Plain Woodland – Revegetation

#### 4.1.1. Management Zone 1: Cumberland Plain Woodland – Regeneration

Zone 1 (0.54 ha) encompasses areas of existing moderate and DNG condition Cumberland Shale Plain Woodland within the riparian corridor. Throughout this management zone it is assumed that management of exotic species will allow the existing native seed bank to regenerate. No revegetation has been allocated within this zone, however this should be reviewed during management works.

The key management priorities throughout Zone 1 are:

- Install and maintain VMP boundary fencing prior to construction of the riparian corridor
- Management of exotic species
- Facilitation of natural regeneration through opportunistic direct seeding and brush matting
- Enhance habitat features (e.g. logs, rocks, etc.)
- Monitor native vegetation and weed densities.

#### 4.1.2. Management Zone 2: Swamp Oak and Cumberland River-flat Forest – Regeneration

Zone 2 (0.79 ha) encompasses areas of existing moderate and disturbed condition and Swamp Oak Riparian Forest and Cumberland River-flat Forest within the riparian corridor. Throughout this management zone it is assumed that management of exotic species will allow the existing native seed bank to regenerate. No revegetation has been allocated within this zone, however this should be reviewed during management works.

The key management priorities throughout Zone 2 are:

- Install and maintain VMP boundary fencing prior to construction of the riparian corridor
- Management of exotic species
- Facilitation of natural regeneration through opportunistic direct seeding and brush matting
- Enhance habitat features (e.g. logs, rocks, etc.)
- Monitor native vegetation and weed densities.

#### 4.1.3. Management Zone 3: Cumberland Plain Woodland – Revegetation

Zone 3 (0.36 ha) encompasses areas of existing exotic pasture within the riparian corridor. This management zones aims to restore areas of CPW to support the regeneration of the riparian corridor. It

is assumed that this management zone will require 100% revegetation to achieve the performance criteria outlined in Table 7.

The key management goals throughout Zone 3 are:

- Install and maintain VMP boundary fencing following construction of the riparian corridor
- Management of exotic species
- Install mulch/jute matt as required
- Establish native tubestock species as outlined in Table 4 and Table 5
- Irrigate until established and as needed ongoing
- Enhance habitat features (e.g., rocks, logs etc.)
- Monitor native vegetation and weed densities.

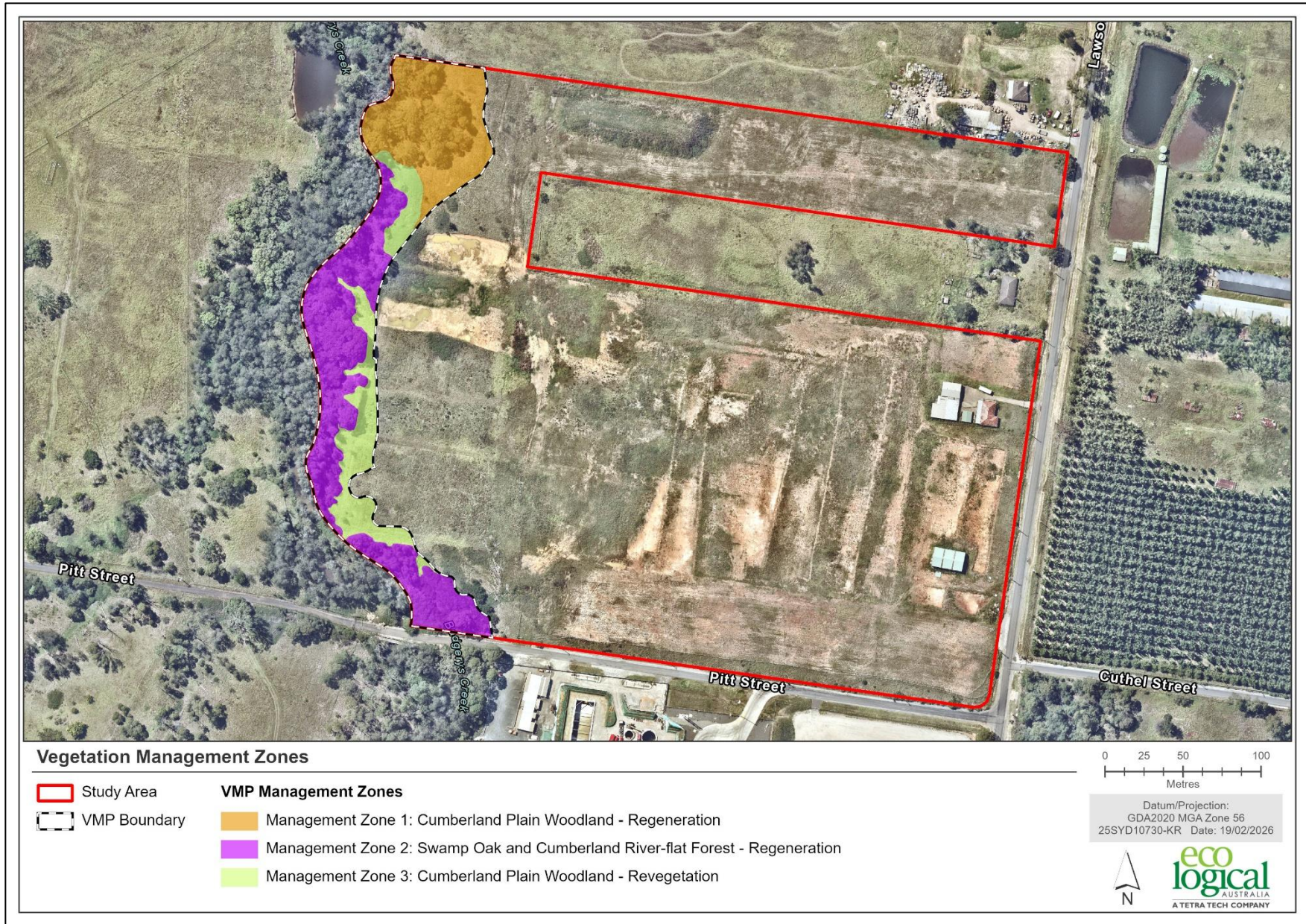


Figure 3: VMP management zones

## 4.2. Primary and secondary weed control

All weeds, including woody weeds will require treatment. Secondary and maintenance weed control will be required following revegetation. During these works, care must be taken to avoid any off-target damage to the natural regeneration of native species.

Primary weed control will include the removal of all woody and herbaceous exotic species outlined in Appendix A, specifically *Cestrum parqui* (Green Cestrum) Juvenile *C.parqui* plants can be hand-pulled, provided the whole root is removed. Large *C.parqui* plants can be treated using cut and paint method, removing the bulk of above ground biomass while retaining the root system to assist in erosion control. Chemical and mechanical control techniques will be required in follow up treatments. Follow up treatments of woody weeds including *C.parqui* to control seedling growth will be required. For more information on specific weed control techniques, see Appendix C.

## 4.3. Maintenance

Following the completion of primary and secondary weed control works, all areas throughout the VMP will require ongoing maintenance to control weed regrowth from the existing soil seed bank. Maintenance work is to be undertaken by a qualified bush regeneration contractor(s) as per specifications provided in Appendix C.

Maintenance will be undertaken on a regular basis in the peak growing seasons (i.e., spring and summer), with less frequent visits necessary during cooler periods (i.e., autumn and winter). Maintenance work will include actions to encourage native regeneration in areas of lower resilience where it is not occurring naturally. These actions include techniques such as soil disturbance, niche seedling and transplanting, where appropriate.

## 4.4. Revegetation

This VMP requires the revegetation of Management Zones 3 to be undertaken as part of the rehabilitation of the site. It is assumed that Management Zones 1 – 2 have sufficient native resilience to naturally regenerate, however this should be further assessed during the management period. Revegetation, where undertaken, will consist of the installation of native tubestock (hiko/viro cells).

Propagation material for planting stock should be sourced from pre-clearance collections, nearby locations, or from within the catchment region following current Florabank Guidelines (Harrison et al. 2021). Appropriate planning and timelines for sourcing propagation and planting material should be allowed for. Suggested species in Appendix B should be used as a general guide but other suitable species may be used if required.

Mulch is required to be installed throughout Management Zone 3, where required mulch will should be laid to a depth of 100mm. Mulching is required to aid in the suppression of exotic species germination and increase soil organic matter content. Where possible it is preferred to use site obtained mulch from the clearance of native vegetation, although if this is not possible mulch can be externally sourced adhering to Australian Standards (i.e., AS4454 (2012): Compost soils conditioners and mulches). In addition, mulch should be comprised of un-composted wood preferably wood waste, with a particle size of about 15mm to 40mm with no fines and good air-filled porosity. Mulch should not contain and weed seeds, nor be derived from diseased trees or from any part of the tree lower than 1m above the ground. It is assumed site access will permit the delivery of mulch within 30 m of the VMP area and spread via bobcat.

Jute matting should be used instead of mulch in any areas where water flow is likely or in areas of high erosional potential. Jute matting to be heavy weight, no less than 750 gsm/m<sup>2</sup>, keyed in at the top of slope and draped to the bottom. Strips will overlap 300 mm in the direction of water flow and be pinned every 250 mm.

Planting densities for each management zone are provided in Table 5. A recommended planting list is provided in Appendix B. Revegetation will be done with species consistent with vegetation communities that would naturally occur in Cumberland Shale Plains Woodland.

**Table 4: Planting assumptions**

Zone	Description	Area (sqm)	Reveg (%)	Reveg (sqm)	Jute Matt (%)	Jute Matt (m <sup>2</sup> )	Mulch (%)	Mulch (sqm)
1	Cumberland Plain Woodland – Regeneration	5,445	0	0	-	-	-	-
2	Swamp Oak and Cumberland River-flat Forest – Regeneration	7,916	0	0	-	-	-	-
3	Cumberland Plain Woodland – Revegetation	3,624	100%	3,624	-	-	100%	3,624
<b>Totals</b>		<b>16,985</b>	<b>-</b>	<b>3,624</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3,624</b>

**Table 5: Revegetation densities**

Zone	Description	Revegetation Area (sqm)	Revegetation densities (sqm)*				Totals
			Tree	Shrub	Herbs / Scramblers	Sedge / Grass	
1	Cumberland Plain Woodland – Regeneration	0	-	-	-	-	-
2	Swamp Oak and Cumberland River-flat Forest – Regeneration	0	-	-	-	-	-
3	Cumberland Plain Woodland – Revegetation	3,624	1/30	1/20	2	2	<b>14,799</b>
<b>Totals</b>		<b>3,624</b>	<b>121</b>	<b>181</b>	<b>7,248</b>	<b>7,248</b>	<b>14,799</b>

## 5. Implementation schedule

### 5.1. Implementation schedule

The VMP area will be managed with an establishment period expected to be 6-months and a five-year maintenance period. An indicative implementation schedule has been provided in Table 6 below.

Table 6: Responsibility of works

Task	Establishment	Year 1				Year 2				Year 3				Year 4				Year 5			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Preliminary works</b>																					
Site mark out/fencing																					
Earthworks (riparian construction)																					
<b>Revegetation</b>																					
Seed collection, cleaning, storage																					
Site preparation																					
Jute matting / mulch																					
Tubestock, supply and install																					
Replacement tubestock, supply and install																					
Irrigation																					
<b>Weed control</b>																					
Establishment																					
Maintenance Years 1-2																					
Maintenance Years 3-5																					
<b>Associated works</b>																					
Monitoring and reporting																					

<b>Key</b>	Civil construction activities
	Vegetation management works

## **5.2. Adaptive management**

As this is a long-term project that will be implemented over five years an adaptive management approach will be implemented that enables the successful contractor to learn from and respond to successful and unsuccessful techniques used on the site. In its simplest form, this may include the substitution of species identified in the planting table or for undertaking advanced direct seeding techniques in place of manual planting techniques for revegetation works.

The success of the works will be determined by meeting the performance criteria identified in Table 7. Contractors have the flexibility to implement different techniques to those specified here providing that performance criteria are met. Any major departures from the VMP or proposed changes to performance criteria must be undertaken after the opportunity for inspection with LCC and approved in writing by LCC.

## **5.3. VMP management after maintenance period (in perpetuity)**

The VMP is to be re-evaluated upon completion of all works described within this VMP and at least every five years after that to ensure the site meets the performance criteria. Surveys at these inspections is to include both priority and environmental weed populations. Areas that do not conform to the performance criteria at the completion of works area required to be rehabilitated using the methods outlined within this VMP and may result in the extension of the VMP management period for a further five years.

## **5.4. Training**

Construction staff will require training/inductions into the requirements of this VMP, including the location and requirements of tree/vegetation protection zones.

Implementation of the VMP is to be carried out by a suitably qualified and experienced Bush Regenerator (e.g. AABR membership or equivalent) holding a minimum qualification of TAFE Cert II in Conservation & Land Management. In addition, team leaders should have, as a minimum, a Certificate III in Conservation & Land Management or equivalent and an AQF 3 Chemical user's certificate. All herbicides should be used as per the Australian Pesticides and Veterinary Medicines Authority (APVMA) approved chemical label and at the associated dilution and application rates. The contractor will need to carry out best practice bush regeneration techniques as described by Buchanan (2009).

## 6. Monitoring and reporting

### 6.1. Photo monitoring

Photo monitoring points should be set-up using a permanent reference point to provide a visual reference of changes in the vegetation. Photo monitoring to include:

- Set up a minimum of eight (6) photo monitoring points within the VMP area with a minimum of two (2) per zone photo monitoring points in each zone.
- Mark the photo point with a six-foot star picket and map the location and bearing of each photo point.
- Take a digital photo of each photo point with the whole length of the star picket visible in the photo to act as a reference point; and
- Organise the digital photos logically with each image labelled with a unique reference number indicating the location of the photo point, the direction of the photo and the date the photo is taken.

Photo monitoring must be undertaken at the start of establishment period (baseline), the completion of the establishment period and then annually through the five year maintenance period.

### 6.2. Vegetation surveys

Quadrat data points will be set up within the VMP area to monitor changes in the vegetation through time. Quadrats will be undertaken at all photopoints installed in Section 6.1. The quadrat data forms the baseline for monitoring against the performance criteria for the duration of the VMP. Floristic plot data is to be collected including species richness, cover and abundance in a 10 x 10 m minimum sized quadrat.

Quadrats must be undertaken at the start of establishment period (baseline), the completion of the establishment period and then annually through the five year maintenance period.

### 6.3. Progress reports

Progress reports must be undertaken at the completion of the establishment period and then annually through the five year maintenance period.

This reporting includes the results of the monitoring actions specified in **Section 6.1** and **Section 6.2** and a description of the works that have been undertaken. These reports will be submitted to LCC. Reports will include at a minimum:

- The time period the report relates to,
- Qualifications and experience of contractors,
- Certification of seed and local provenance stock,
- A summary of works carried out within the period including:
  - Date and time of site visits,
  - Works completed on the site at each visit,
  - A table detailing total person hours for each task carried out on-site,
  - Methods of weeding undertaken and details of herbicide use,

- Numbers of tube stock planted if applicable,
- Methods implemented for Assisted Natural Regeneration,
- Photo monitoring and vegetation survey results to date,
- A description of any problems encountered in implementing the works outlined in this VMP and how they were overcome,
- Any observations made, including new plant species recorded (native and weed species), comments on rates of regeneration and any problems which impact on the implementation of the VMP,
- If applicable, the result of the implementation works in relation to the relevant performance criteria.

#### **6.4. Performance criteria**

The performance criteria are detailed in Table 7.

Failure to meet these performance criteria will mean that the maintenance period will be extended until they are achieved. Therefore, maintenance must continue until LCC agrees that the objectives and performance criteria have been met and the maintenance period has concluded. The author of this VMP, or an equally qualified and experienced person, must prepare a statement certifying the compliance of the performance criteria at the end of the VMP period.

If monitoring indicates that the VMP tasks are not resulting in achievement of the performance criteria, the task program will be revised. The land owner and the bush regeneration contractor, in consultation with LCC can adapt these criteria as required in response to the success of rehabilitation works.

The following performance criteria will need to be achieved in perpetuity:

- Across the VMP area, < 2% priority weeds cover and < 5% environmental weeds cover.
- No infiltration by exotic lawn species into the VMP area,
- No dumped garden waste within the VMP area,
- No patches of the VMP greater than 2m x 2m without any surviving natives or with significant erosion present.

Table 7: Performance Criteria

Zones	Establishment	Year 1	Year 2	Year 3	Year 4	Year 5
All Zones	<p>Commencement of all tasks outlined in the VMP or evidence of planning for their implementation.</p> <p><b>Civil construction works:</b></p> <ul style="list-style-type: none"> <li>All construction and sediment fencing installed</li> <li>Information signage installed</li> <li>Removal and disposal of all exotic and native vegetation throughout the VMP, completed under the supervision of a qualified ecologist</li> <li>All earthworks within the VMP area completed under the supervision of an ecologist or bush regenerator</li> <li>All rubbish and debris and debris are removed</li> <li>All soil preparation works completed to provide suitable conditions for revegetation</li> </ul> <p><b>Vegetation management works:</b></p> <ul style="list-style-type: none"> <li>Revegetation, where required, is to be undertaken with a minimum of 40% of the benchmark levels for species diversity provided in Table 8</li> <li>85% survival of revegetation or equivalent regeneration across each zone</li> <li>A minimum native ground cover density of 3.4 plants per m<sup>2</sup> in each management zone and no areas with more than 2 m x 2 m without surviving native plants</li> <li>Maintenance replanting is to replace plants by the same species or where that species is unavailable with the same growth form (e.g., tree for tree) and must not decrease species diversity. Any new species must be from the community being emulated and of local provenance.</li> <li>Treatment of any new weed infestations</li> <li>No woody weeds present capable of producing seed.</li> <li>No erosion or sedimentation beyond the boundary of the development lot</li> <li>Monitoring and reporting undertaken in accordance with Section 6</li> </ul>					
All Zones	Treat 100% of Priority Weeds and WoNS Treat 95% of all other weeds	No greater than 5% cover by priority weeds	No greater than 5% cover by priority weeds	No greater than 5% cover by priority weeds	No greater than 2% cover by priority weeds	No greater than 2% cover by priority weeds
Zones 1 and 2	Native groundcover no less than 50% of non-rock areas No greater than 40% groundcover by all weeds	Native groundcover no less than 55% of non-rock areas No greater than 35% groundcover by all weeds	Native groundcover no less than 60% of non-rock areas No greater than 30% groundcover by all weeds	Native groundcover no less than 70% of non-rock areas No greater than 25% groundcover by all weeds	Native groundcover no less than 80% of non-rock areas No greater than 15% groundcover by all weeds	Native groundcover no less than 90% of non-rock areas No greater than 10% groundcover by all weeds
Zone 3	Undertake all revegetation as per VMP	No greater than 40% groundcover by all weeds Native groundcover no less than 40% of non-rock areas	No greater than 30% groundcover by all weeds Native groundcover no less than 50% of non-rock areas	No greater than 20% groundcover by all weeds Native groundcover no less than 60% of non-rock areas	No greater than 10% groundcover by all weeds Native groundcover no less than 70% of non-rock areas	No greater than 5% groundcover by all weeds Native groundcover no less than 80% of non-rock areas

Table 8: PCT benchmark conditions

PCT ID	PCT Common name (community) (BioNet 2022)	Species richness			Cover (%)		
		Canopy	Shrub	Groundcover	Canopy	Shrub	Groundcover
3320	Cumberland Shale Plain Woodland	5	8	32	52	15	73

## 7. Costs

The cost of implementation for the five-year maintenance period is approximately **\$312,806** (Table 9) exclusive of GST and CPI. An indicative annual costing timeline is provided in Table 9. Costs should be reassessed at the end of Year 2 based on the results of the management undertaken to that point. Rates and costs are based on typical commercial rates. Assumptions that have been made regarding the estimation of costs have been outlined below.

### 7.1. Preliminary works

#### 7.1.1. Vegetation clearing and soil preparation

It is assumed that vegetation clearing as part of construction works and soil preparation works as per Section 3.5 will be undertaken by the civil contractor under the supervision of a qualified Ecologist or Bush Regenerator. No costs have been provided in this VMP for the soil preparation, vegetation clearing or supervision by a suitably qualified and experienced restoration ecologist.

#### 7.1.2. Seed collection

Budget for the collection of seed has been included as a separate task. This is an indicative figure and does not consider seasonal and annual climatic variation which may increase or decrease the efficiency of seed collection and potentially require longer collection times or areas. If further seed collection works are required, this may be an addition cost.

### 7.2. Vegetation management works

#### 7.2.1. Site preparation

Prior to mulching and revegetation, all exotic vegetation must be treated and controlled to an acceptable standard. It is assumed that all zones will require soil preparation and installation of mulch, which has been included in the VMP costs provided.

#### 7.2.2. Weed control techniques

Bush regeneration contractors will implement the weed control treatments identified in this VMP. These works have been estimated to cost \$2,850 for a team of four bush regenerators, including a supervisor, per day. The cost of bush regeneration works includes the costs of herbicide, vehicles and equipment which are required to implement the VMP.

Specific weed control techniques are provided in Appendix C.

#### 7.2.3. Revegetation treatments

Bush regeneration contractors will implement the revegetation treatments identified in this VMP. Tube stock costs have been budgeted at an estimated \$5.50 per tree and shrub including planting and \$2.50 per herb, grass, sedge, and groundcover including planting.

A total of approximately 20,000 plants are assumed to be required to achieve the densities identified in the VMP, plus a 20% rate for replacement plantings to be installed throughout the remainder of the VMP period after initial revegetation works.

#### **7.2.4. Monitoring and reporting**

Monitoring and reporting can be undertaken either by the bush regeneration contractor or by the project ecologist.

This includes:

- The initial set up of the photo points and conducting the baseline surveys at the beginning of the establishment period
- Preparing monitoring reports, including photo points and vegetation surveying at the end of the establishment period and annually until the end of Year 5

#### **7.3. Pest Control**

Costs for pest control works over the length of the maintenance period are difficult to predict and as such have not been included in the costings. The need and level of pest control works will be assessed in the monitoring reports and an approach will be determined in consultation with LCC and LLS.

Table 9: Indicative costings

Treatment	Establishment	Year 1	Year 2	Year 3	Year 4	Year 5	Total
<b>Revegetation</b>							
Seed collection, cleaning, storage	\$ 2,220	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,220
Site Preparation	\$ 3,624	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,624
Jute Matting / Mulch	\$ 30,806	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,806
Tubestock	\$ 37,903	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 37,903
Replacement tubestock	\$ -	\$ 3,790	\$ 3,790	\$ -	\$ -	\$ -	\$ 7,581
Irrigation	\$ 6,524	\$ 362	\$ 362	\$ -	\$ -	\$ -	\$ 7,248
<b>Weed control</b>							
Establishment	\$ 45,519	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 45,519
Maintenance – Years 1-2	\$ -	\$ 38,536	\$ 29,972	\$ -	\$ -	\$ -	\$ 68,508
Maintenance - Years 3-5	\$ -	\$ -	\$ -	\$ 22,311	\$ 19,401	\$ 16,491	\$ 58,204
<b>Associated costs</b>							
Disbursements	\$ 4,552	\$ 3,854	\$ 2,997	\$ 2,231	\$ 1,940	\$ 1,649	\$ 17,223
Monitoring & Reporting	\$ 7,279	\$ 5,338	\$ 5,338	\$ 5,338	\$ 5,338	\$ 5,338	\$ 33,970
<b>Totals</b>	<b>\$ 138,427</b>	<b>\$ 51,880</b>	<b>\$ 42,461</b>	<b>\$ 29,881</b>	<b>\$ 26,680</b>	<b>\$ 23,478</b>	<b>\$ 312,806</b>

## 8. References

Buchanan, R.A. 2009. *Bush regeneration: recovering Australian landscapes*. 2nd ed., TAFE NSW, Sydney.

Eco Logical Australia 2026a, *125 & 145-175 Lawson Road – Biodiversity Assessment*, Prepared for Formus Property Pty Ltd.

Eco Logical Australia 2026b, *125 & 145 - 175 Lawson Road, Badgerys Creek: Riparian Assessment*, Prepared for Formus Property Pty Ltd.

Eco Logical Australia 2026c, *125 & 145-175 Lawson Road – Biodiversity Management Plan*, Prepared for Formus Property Pty Ltd.

Eco Logical Australia 2026d, *125 & 145-175 Lawson Road, Badgerys Creek – Weed Eradication Management Plan*, Prepared for Formus Property Pty Ltd.

Eco Logical Australia 2026e, *125 & 145-175 Lawson Road, Badgerys Creek – Wildlife Hazard Assessment*, Prepared for Formus Property Pty Ltd.

Department of Planning and Environment – Water (DPE) 2022. *Guidelines for controlled activities on waterfront land – Riparian corridors*. Accessed June 2025 from [https://water.dpie.nsw.gov.au/\\_data/assets/pdf\\_file/0008/386207/licensing\\_approvals\\_controlled\\_activities\\_riparian\\_corridors.pdf](https://water.dpie.nsw.gov.au/_data/assets/pdf_file/0008/386207/licensing_approvals_controlled_activities_riparian_corridors.pdf).

Local Land Services (LLS) 2023. *Greater Sydney Regional Strategic Management Plan 2023-2030*.

## Appendix A Recorded Exotic Vegetation

Botanical Name	Common Name
<i>Anredera cordifolia</i>	Madeira Vine
<i>Araujia sericifera</i>	Moth Vine
<i>Asparagus asparagoides</i>	Bridal Creeper
<i>Avena fatua</i>	Wild Oats
<i>Canna indica</i>	Tous-les-mois Arrowroot
<i>Cenchrus clandestinus</i>	Kikuyu Grass
<i>Cestrum parqui</i>	Green Cestrum
<i>Chloris gayana</i>	Rhodes Grass
<i>Cirsium vulgare</i>	Spear Thistle
<i>Conyza bonariensis</i>	Flaxleaf Fleabane
<i>Cyperus eragrostis</i>	Umbrella Sedge
<i>Digitaria sanguinalis</i>	Crab Grass
<i>Ehrharta erecta</i>	Panic Veldtgrass
<i>Hypochaeris radicata</i>	Catsear
<i>Ipomoea</i> spp.	
<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive
<i>Paspalum dilatatum</i>	Paspalum
<i>Phalaris aquatica</i>	Phalaris
<i>Rubus anglocandicans</i>	Blackberry
<i>Senecio madagascariensis</i>	Fireweed
<i>Setaria parviflora</i>	
<i>Sida rhombifolia</i>	Paddy's Lucerne
<i>Solanum mauritianum</i>	Wild Tobacco Bush
<i>Solanum sisymbriifolium</i>	
<i>Tradescantia fluminensis</i>	Wandering Jew
<i>Trifolium repens</i>	White Clover
<i>Verbena bonariensis</i>	Purpletop

## Appendix B Recommended Revegetation Species

Strata	Botanical Name	Common Name
Tree	<i>Acacia decurrens</i>	Black wattle
	<i>Acacia parramattensis</i>	Parramatta wattle
	<i>Angophora floribunda</i>	Rough-barked apple
	<i>Angophora subvelutina</i>	Broad-leaved apple
	<i>Corymbia maculata</i>	Spotted Gum
	<i>Eucalyptus crebra</i>	Narrow-leaved ironbark
	<i>Eucalyptus eugenioides</i>	Thin-leaved stringybark
	<i>Eucalyptus fibrosa</i>	Red Ironbark
	<i>Eucalyptus moluccana</i>	Gum-topped box
	<i>Eucalyptus tereticornis</i>	Forest red gum
Shrub	<i>Acacia falcata</i>	Sickle wattle
	<i>Acacia implexa</i>	Hickory wattle
	<i>Breynia oblongifolia</i>	Coffee bush
	<i>Bursaria spinosa</i>	Sweet Bursaria
	<i>Daviesia ulicifolia</i>	Gorse bitter-pea
	<i>Dillwynia sieberi</i>	Prickly parrot-pea
	<i>Dodonaea viscosa</i>	Sticky hop bush
	<i>Indigofera australis</i>	Austral indigo
	<i>Melaleuca decora</i>	White feather honeymyrtle
	<i>Ozothamnus diosmifolius</i>	Sago bush
Grasses and sedges	<i>Aristida ramosa</i>	Purple wiregrass
	<i>Aristida vagans</i>	Threeawn speargrass
	<i>Bothriochloa macra</i>	Red grass
	<i>Chloris ventricosa</i>	Blue Star Grass
	<i>Cymbopogon refractus</i>	Barbed wire grass
	<i>Dichelachne micrantha</i>	Shorthair plumegrass
	<i>Echinopogon ovatus</i>	Common Hedgehog grass

Strata	Botanical Name	Common Name
	<i>Entolasia marginata</i>	Bordered Panic
	<i>Entolasia stricta</i>	Wiry Panic
	<i>Eragrostis brownii</i>	Browns lovegrass
	<i>Eragrostis leptostachya</i>	Paddock Lovegrass
	<i>Juncus usitatus</i>	Common rush
	<i>Lepidosperma laterale</i>	Variable Sword sedge
	<i>Lomandra filiformis</i>	Wattle Mat Rush
	<i>Lomandra longifolia</i>	Spiny head mat rush
	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many flowered mat rush
	<i>Microlaena stipoides</i>	Weeping Grass
	<i>Oplismenus aemulus</i>	Australian Basket Grass
	<i>Panicum effusum</i>	Hairy panic
	<i>Panicum simile</i>	Two colour panic
	<i>Paspalidium distans</i>	Shotgrass
	<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common Tussock-grass
	<i>Rytidosperma racemosum</i>	Clustered wallaby-grass
	<i>Rytidosperma tenuius</i>	Purplish wallaby grass
	<i>Sporobolus creber</i>	Slender Rat's-Tail Grass
	<i>Sporobolus elongatus</i>	Slender Rat's-Tail Grass
	<i>Themeda triandra</i>	Kangaroo grass
	<i>Arthropodium milleflorum</i>	Pale Vanilla Lily
	<i>Brunoniella australis</i>	Blue trumpet
	<i>Centella asiatica</i>	Asiatic pennywort
	<i>Dianella longifolia</i>	Greater Blueberry Lily
	<i>Dianella revoluta</i>	Blueberry lily
<b>Forbs</b>	<i>Dichondra repens</i>	Kidney Weed
	<i>Einadia hastata</i>	Berry Saltbush
	<i>Lobelia purpurascens</i>	White root
	<i>Phyllanthus virgatus</i>	Jointweed

Strata	Botanical Name	Common Name
	<i>Solanum prinophyllum</i>	Forest Nightshade
	<i>Veronica plebeia</i>	Creeping speedwell
	<i>Wahlenbergia gracilis</i>	Australian bluebell
	<i>Clematis aristata</i>	Old Man's Beard
	<i>Clematis glycinoides</i>	Headache Vine
	<i>Convolvulus erubescens</i>	Australian bindweed
	<i>Desmodium varians</i>	Slender tick trefoil
	<i>Glycine clandestina</i>	Twining glycine
	<i>Glycine microphylla</i>	Small-leaf glycine
	<i>Glycine tabacina</i>	variable glycine
	<i>Hardenbergia violacea</i>	Purple coral-pea
	<i>Polymeria calycina</i>	Slender bindweed

## Appendix C Techniques and specifications

### C1: Weed Control

Weed control involves a combination of mechanical, physical, and chemical techniques to remove the weeds and prevent regrowth. Weed control will be undertaken across the entire zone. A selection of the best suited weed control method within the site depends on a number of factors, including:

- The species or combination of weeds being targeted,
- The density of weeds present,
- Resources available (time, labour, equipment, and finances),
- weather condition on the day.

### C2: Weed control techniques

Details of specific weed control techniques to be used such as cut-and-paint, scrape-and-paint, herbicide-spraying, and hand weeding are provided in Brodie (1999). The principles of bush regeneration and techniques to trigger natural regeneration are to be in accordance with the Bradley Method and other techniques described in Buchanan (2009). Management techniques for different types of weeds are provided below.

#### *Annual grasses*

Annual grasses should be hand removed or spot sprayed where isolated or in low concentrations. Larger patches of annual grasses may be slashed/brush cut in late spring to early summer, after flowering, but prior to seed set. For most species, slashing/brush cutting prior to late spring through to early summer will promote vigorous growth and should not occur. However, some annual grasses can grow and produce seed at any time of the year dependent on climatic conditions such as high rainfall and warm temperatures. Monitoring of annual species should be undertaken and if new growth occurs, the same treatment will be applied to the new growth to prevent seed production. Individual plants should be hand removed, bagged, and disposed of appropriately offsite.

#### *Perennial grasses*

Perennial grasses will be hand removed where isolated or in low concentrations. Larger patches may be slashed prior to seed production in spring or summer (depending on the growth cycle of the species) and the regrowth spot-sprayed 2-3 weeks later when it is actively growing and approximately 10 cm in length. Monitoring of these species will occur and if new seed production occurs, the same treatment will be applied again as required. However, slashing will not reduce the presence of exotic grasses on its own and must always be combined with targeted removal to reduce densities and allow for native regeneration. Individual plants should be hand removed, bagged, and disposed of at a registered green waste facility.

#### *Woody weeds*

Primary control of trees such as *Olea europaea subs. cuspidata* following vegetation removal, should be implemented by using the cut and paint or drill and fill method using a non-selective herbicide. The most appropriate method to be used depends on the size of the individual to be removed and will be determined by the bush regeneration contractor. Primary weed control should use techniques that will not encourage flushes of secondary weed growth. All seedlings of woody weeds will be hand pulled or spot-sprayed with a non-selective herbicide.

Follow up treatment of woody weeds, including *O.europaea subs. cuspidata* will be controlled by the cut and paint or drill and fill method using a non-selective herbicide.

The most appropriate method to be used depends on the size of the individual to be removed and will be determined by the bush regeneration contractor. Primary weed control should use techniques that will not encourage flushes of secondary weed growth. All seedlings of woody weeds will be hand pulled or spot-sprayed with a non-selective herbicide.

### ***Creepers and climbers***

The control of exotic vines should be managed by skirting at chest height then spraying the target once it is on the ground. This should be done with a dicot specific herbicide such as Grazon®. Follow up treatments will be necessary and should be done as the germinating vines are still saplings.

The control of creepers varies depending on the species. For the most part, seedlings will be hand pulled, while mature plants can be controlled by the stem-scrape method or spot spraying using a non-selective herbicide. The precise method to be used will be determined by the bush regeneration contractor depending on the species, size, and reproductive status of the individual. All vegetative material removed should be bagged, removed from site, and disposed of appropriately.

### ***Herbaceous weeds***

Herbaceous weeds will be hand pulled prior to flowering. Where large swaths of these species occur, they will be sprayed using a non-selective herbicide. If high densities of mature stands occur, weeds may be slashed first using a brush cutter and any subsequent regrowth sprayed. Regular monitoring of these species will be required to prevent seed production. All vegetative material that is pulled out and has the potential to regrow if deposited on ground will be bagged and removed from site.

### ***Management of weed waste***

All weed propagules, especially priority weeds, will be bagged and disposed of as directed by legislation at facility licensed to receive green waste. All weed waste without propagules will be composted onsite in small unobtrusive piles.

### ***Herbicide use***

The use of herbicide to control weeds should be carefully considered. Herbicide must only be used for the purpose described on the product label, as per the NSW *Pesticides Act 1999*. Herbicide use should assess potential long-term impacts of the technique, including whether the proposed works address the source of the weed infestation. However, herbicide application forms an important and useful component of an integrated weed management approach and can be the most appropriate method for the control and eventual eradications of some weed species.

Herbicide use should occur during the active growing season for plants to encourage the chemical uptake into the plant. The selection of herbicides should also consider the type of weed and the location. Where non-selective herbicides are required for use, glyphosate is the most suitable. A glyphosate-based herbicide, formulated for use near waterways, will be used if works require herbicide application near waterways, a (e.g., Roundup Biactive®).

Broad-leaf selective herbicide may be used as per the NSW Weed Control Handbook (DPI 2018). However, this type of herbicide is extremely toxic to aquatic life and must not be used in, or adjacent to, waterways.

Registration and records must be kept in accordance with the NSW *Pesticides Regulation 2017*.

### **C3: Revegetation works**

Revegetation has the dual aim of both re-establishing the original native vegetation community at the site and reducing erosion along the length of the riparian corridor, which will carry greatly increased peak flows due to the increased run-off from the hard surfaces created by the associated residential development. Any plantings should consist of local provenance stock. Planting of Hiko for trees and shrub species and Hiko or Viro cells for grasses and other groundcover species is the preferred method. Planting should be done via a low impact method such as hand digging or hand auger. The holes dug for each plant should be at least 1.5x the width and 2x the depth of the root ball. Fertiliser should be added to each hole dug as per the label specifications. Water crystals or wetting agents should be added to each plant hole. This will increase the water holding capacity of the soil and reduce watering schedules. Initial irrigation of the plantings is essential to ensure that the soil forms around the root ball and air pockets are removed. This will be required unless sufficient rainfall (approx. 10mm) occurs on the day of planting.

Tree guards should be installed on each tree or shrub to protect seedlings from extreme weather (frosts and heat), herbivorous grazing and herbicide drift during maintenance works. Bio-degradable tree guards are recommended to protect the seedlings. Following the revegetation works, irrigation needs to be undertaken for at least 8 weeks following planting to ensure the establishment of the plants. The level of irrigation will be determined by rainfall and temperature experienced at the planting site.

A temporary irrigation system should be installed to assist in the establishment of vegetation. Timing of the planting of these areas will need to take into consideration surrounding civil works and erosion/sediment control requirements, these areas will not be planted until earthworks have been completed. A minimum rate of attrition of 10% is to be expected and should be allowed for.

Mulch can be derived from vegetation removed from the development area, if available. Alternately, mulch should be comprised of un-composted wood (preferably wood waste), with a particle size of 15 mm to 40 mm, with no fines, and good air-filled porosity. Mulch should not contain any weed seeds, nor be derived from diseased trees or from any part of the tree lower than 1 m above the ground. Mulch, where required, should be installed to a depth of 100 mm.

Jute matting, where required, must be comprised of 100% biodegradable jute fibres with a minimum weight of 680g/m<sup>2</sup> (~6 mm thickness). Jute must be pegged with at least 3 x 150 mm pins per m<sup>2</sup>, and each roll overlapped by 100 mm.

#### ***Seed collection***

For the growth of the plants used in the revegetation works, seed must be collected from local provenance species. Groundcovers, shrubs and trees should be collected as within close proximity (i.e., <20km) to the site. However, soil type, climate and aspect of the collection site(s) should also be considered. Native grasses typically have much larger dispersal mechanisms and are to be collected from within the Sydney basin.

Where species identified in this VMP cannot be sourced, they may be substituted for other species as identified by Tozer (2003). Species must be substituted with species of a similar form, e.g., trees for tree, grasses for grasses, etc. Only wild native species are to be used. Plants are not to be substituted with horticultural varieties under any circumstances.

Record keeping of seed collection and planting locations are to follow the Florabank guidelines (Mortlock, 2000). A Section 132C licence under the NSW *National Parks and Wildlife Act 1974* will be required to undertake seed collection works.

#### **C4: Bush regeneration contractors**

The rehabilitation and revegetation requirements detailed in this VMP must be implemented under the supervision of the supervising Ecologist or Bush Regenerator.

The supervising Bush Regenerator should be a member of AABR or should possess the required qualifications and experience for membership. In addition to this, they should have, as a minimum, a Certificate III in Conservation & Land Management or equivalent. The contractor will need to conduct best practice bush regeneration techniques as described by Buchanan (2009).

A flexible approach to this site is recommended since techniques may need to be changed or modified to suit site conditions. This approach is consistent with adaptive management and allows the contractor to develop and build on site knowledge whilst implementing this VMP. Monitoring will assist in the development of the VMP actions in subsequent years.

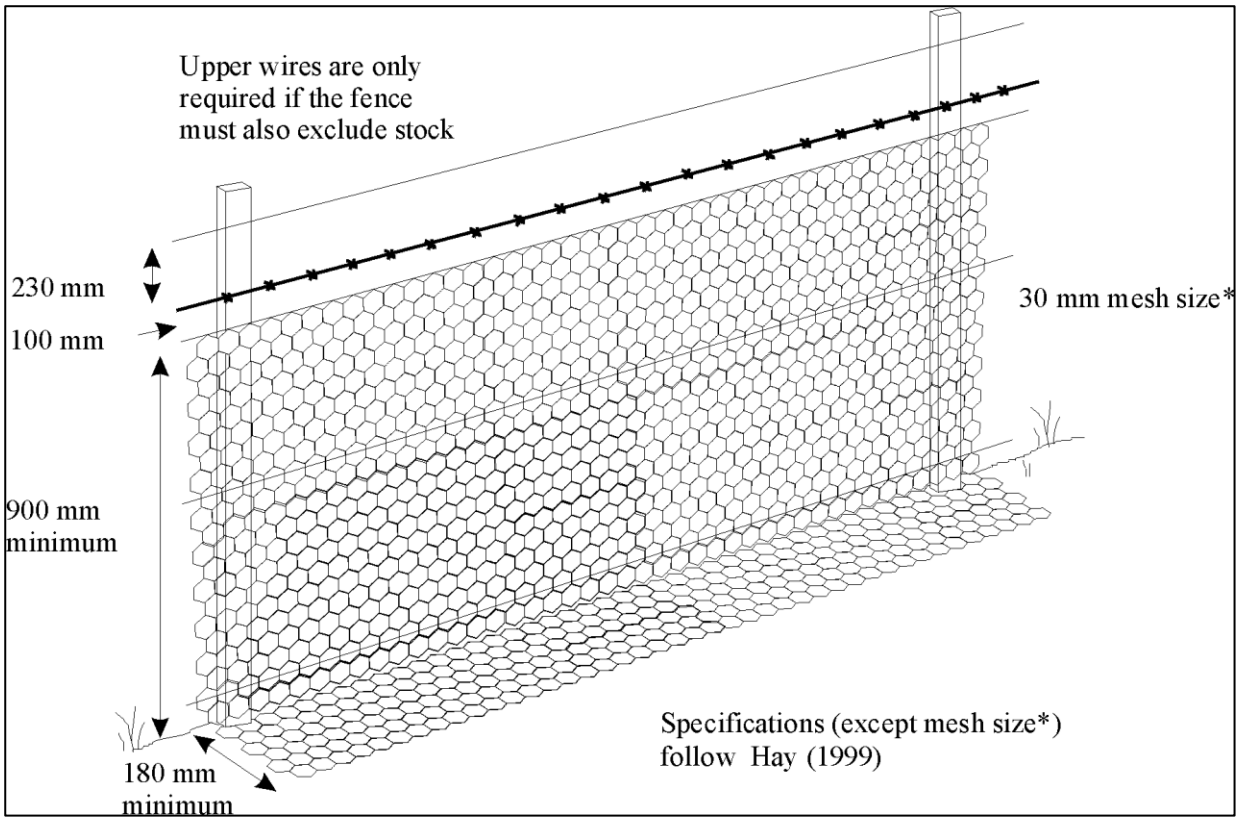
#### **C5: Hygiene protocols**

To avoid introducing soil pathogens / diseases, in particular *Phytophthora cinnamomi* (Root rot disease), onto site a hygiene protocol should be undertaken as per the guidelines developed by the Royal Botanic Gardens in 'Best Practice Management Guidelines for *Phytophthora cinnamomi* with the Sydney Metropolitan Catchment Management Authority.' Management actions should be outlined within the Biodiversity management plan (ELA 2024).

For Bush Regenerators all tools and boots should be washed down and thoroughly cleaned of soil / mud using a solution of water and disinfectants prior to undertaking works onsite. All machinery should be thoroughly cleaned of all soil / mud / debris prior to working within the VMP area.

#### **C6: Rabbit exclusion fencing**

Rabbit proof fencing may be required to be installed to the guidelines in the Commonwealth Department of the Environment Catalogue of fence designs. The fencing will need to be a minimum of 90mm high, with a 180 mm skirt as per the figure below.



Recommended fencing for rabbit exclusion (DoEE 2004)

