# Galston Aquatic Centre Vegetation Management Plan

## Architects of Arcadia Pty Ltd

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Template 2.8.1

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# Abbreviations

| Abbreviation | Description |
|---|---|
| APZ | Asset Protection Zone |
| BAL | Bushfire Attack Level |
| BC Act | *NSW Biodiversity Conservation Act 2016* |
| CEEC | Critically Endangered Ecological Community |
| ELA | Eco Logical Australia Pty Ltd |
| EPBC Act | *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* |
| FFA | Flora and Fauna Assessment |
| HSC | Hornsby Shire Council |
| IPA | Inner Protection Area |
| LGA | Local Government Area |
| MZ | Management Zone |
| STIF | Sydney Turpentine-Ironbark Forest |
| SSGF | Sydney Sandstone Gully Forest |
| VMP | Vegetation Management Plan |
| WoNS | Weeds of National Significance |

# 1. Introduction

This vegetation management plan (VMP) has been prepared by Eco Logical Australia Pty Ltd (ELA) on behalf of Architects of Arcadia to support the Development Application (DA/1041/2019) for addition and alterations at the Galston Aquatic and Leisure Centre. This site is located within the Hornsby Shire Council local government area (LGA).

## 1.1 Background

The Galston Aquatic and Leisure Centre is located at Hayes Park, 412 Galston Road, Galston (Lot 181 DP 752048.) (the study area) (Figure 1). The Aquatic Centre is bound by Galston Road to the east, a private property to the north and Galston Recreation Reserve to the south and west. The study area is located within the Hornsby Shire Council LGA.

## 1.2 Proposed works

The proposed works include the re-roofing of the Aquatic Centre.

*The highest Bushfire Attack Level to the subject building and proposed works was determined to be 'Flame Zone' and construction requirements within NSW are therefore outside the scope of AS 3959 – 2009 as 'BAL FZ' has not been adopted as a set of deemed to satisfy provisions. The proposed works will be constructed to BAL FZ under AS3959 – 2009 and amendments as detailed in the National Construction Code. In accordance with section 3.5 of AS 3959 - 2009 all new works facing northeast and southeast have been downgraded to BAL 40 due to shielding provided by the building itself (Building Code & Bushfire Hazard Solutions Pty Limited, 2019).*

These works to the southeast of the building require an Asset Protection Zone (APZ) to achieve a maximum Bushfire Attack Level (BAL) of BAL 40 in accordance with Australian Standard AS 3959-2009 Construction of Buildings in Bushfire Prone Areas. As such, vegetation removal of tree or shrub species and modification, such as the trimming or removal of branches, will be required to comply with the maintenance of the APZ.

A Green Offset Policy will be applied at a 5:1 ratio in accordance with Council's Green Offsets Code through the implementation of a Vegetation Management Plan to enhance the retained native vegetation within the study area. This area should exclude the APZ and include the surrounding bushland within the reserve.

## 1.3 Objectives of the Vegetation Management Plan

Under Hornsby Shire Council's Guidelines for the preparation of Vegetation Management Plans 2008 there are specific situations where a VMP may be required. Situation 1 applies to the proposed works within the study area and is described below:

> *Situation 1*
>
> *Applies to residential subdivisions or developments on lands that support remnant native vegetation or scattered remnant trees with native understorey species classified as an*

*Endangered Ecological Community or threatened species habitat as listed under the Threatened Species Conservation Act 1995* (Repealed by the Biodiversity Conservation Act 2016 (BC Act)).

***Council's aim of net improvement of native vegetation (HSC 2006) requires:***

- *Retention and protection of existing native trees and vegetation during the land disturbance phase and following completion of the development or restoration project.*
- *Active management or appropriate enhancement plantings to ensure long term conservation of remnant native vegetation and habitat.*

The overall objectives of the VMP are to protect and enhance the native species cover by assisting in the natural regeneration of the VMP area.

The establishment period will run for one (1) year and the maintenance period will run for a further (4) four years or until the objectives of the VMP are met. The objectives for the VMP are summarised in Table 1**.**

**Table 1: VMP Objectives**

| Objectives | Approach |
|---|---|
| Maintain and enhance habitat values | • Protect existing native vegetation<br>• Establishment of clearly defined areas, such as the works area and any 'no-go' areas within/adjacent to work site boundaries that are not to be in any way disturbed or damaged by the works<br>• Control weeds and prevent new outbreaks<br>• Assist in the natural regeneration of species across the VMP area.<br>• Incorporate pest management actions. |
| Threatened species and threatened species habitat | • Ensure vegetation is managed for long term conservation outcomes, including restoration, monitoring and protection of *Epacris purpurascens* var. *purpurascens* habitat. |
| Enhance native fauna habitat | • Where possible retain all hollow-bearing trees within the APZ<br>• If hollow-bearing trees cannot be retained, replace the hollows with installation of nest-boxes to mitigate loss of hollow-bearing trees at a 1:1 ratio<br>• Increase native flora species diversity to provide native fauna habitat<br>• Install woody debris for native fauna habitat |
| Promote community education regarding the VMP area | • Installation of signage at key locations along the VMP boundary<br>• Promote community involvement in weed control and prevention activities |

## 1.4 Preparation and implementation of this plan

A suitably qualified and experienced bush regeneration contractor is required to implement this VMP. They should be a member of the Australian Association of Bush Regenerators (AABR) or should possess the required qualifications and experience for membership. In addition to this, team leaders should have, as a minimum, a Certificate III in Conservation & Land Management or equivalent. The contractor will need to carry out best practice bush regeneration techniques as described by Buchanan (2009).

## 1.5 Key terms

For the purpose of this VMP, the following terminology has been adopted:

- Study Area: the study area includes everything within Lot 181 DP 752048 (Figure 1)
- VMP area: The proportion of the site to be conserved and managed by this VMP, specifically the 1.95 ha comprised of largely remnant vegetation to the west of Galston Aquatic Centre and smaller portion of vegetation to the south-east of the study area. The VMP area also includes the Asset Protection Zone (Figure 3).


**Figure 1: Location of study area**

# 2. Description of the environment

## 2.1 Location

The Galston Aquatic and Leisure Centre is located at Hayes Park, 412 Galston Road, Galston (Lot 181 DP 752048.) (the study area) (Figure 1). The Aquatic Centre is bound by Galston Road to the east, a private property to the north and Galston Recreation Reserve to the south and west. The study area is located within the Hornby Shire Council Local Government Area (LGA).

Much of the study area to the west of the walking track and basketball court (Figure 2) is relatively undisturbed native vegetation. The existing vegetation around the Aquatic Centre, playground area and oval consist of landscaped areas with both native and exotic species. Colah Creek is located approximately 275 m downslope to the west of the Aquatic Centre.

## 2.2 Vegetation communities

A map of validated vegetation within both the study area and study area is shown in Figure 2.

A description of the validated vegetation communities is described below, and a summary shown in Table 2, including Plant Community Types (PCTs) in accordance with the BioNet Vegetation Classification. A description of the vegetation within the study area is provided in the sections below.

**Table 2: Vegetation communities and their condition listing under the BC and EPBC Act criteria within the study area**

| PCT ID | PCT Name | PCT Common Name | BC Act | EPBC Act |
|---|---|---|---|---|
| 1181 | *Smooth-barked Apple – Red Bloodwood – Sydney sandstone open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion* | Sydney Sandstone Gully Forest | Not listed | Not listed |
| 1281 | *Turpentine – grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion.* | Sydney Turpentine-Ironbark Forest | CEEC[1] | Not listed |
| - | - | Planted Native / Exotics | N/A | N/A |

[1] Critically Endangered Ecological Community

### SYDNEY TURPENTINE-IRONBARK FOREST (STIF) – POOR CONDITION

Sydney Turpentine-Ironbark Forest (STIF) occurs in the south-east portion of the study area. STIF is listed under the NSW BC Act as a critically endangered ecological community. The STIF on site occurs along the southern boundary in a poor to moderate condition.

There is a native canopy which includes *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine), *Angophora costata* (Sydney Red Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark), *Lophostemon confertus* (Brush Box), *Eucalyptus punctata* (Grey Gum) and *Eucalyptus microcorys* (Tallowwood). A native mid-storey is lacking in this community with only a few, likely planted *Acacia* spp. The understorey at the base of trees contains some native and exotic species. Species in the groundcover included *Dianella* sp., *Clematis aristata* (Old Man's Beard), *Microlaena stipoides* var. *stipoides, Dichondra repens* (Kidney Weed), *Eragrostis brownii* (Brown's Love Grass), *Hardenbergia violacea* (False Sarsaparilla), *Ehrharta erecta*, (Panic Veldtgrass), *Trifolium repens* (White Clover), *Paspalum dilatatum*, *Plantago lanceolata* (Lamb's Tongues), and *Cenchrus clandestinus* (Kikuyu Grass).

Surrounding the base of the tree trunks, the groundcover becomes grassy and is mowed with some bare patches of soil. A park bench and a cement walking path run through a portion of the STIF to the east and the entrance to the parking lot also intersects some of the STIF along the southern boundary.

### SYDNEY SANDSTONE GULLY FOREST (SSGF) – POOR – MODERATE CONDTION

Sydney Sandstone Gully Forest occurs on the higher slopes and on the ridge within the site. The majority of this community within the subject site had been previously cleared and exists in an under-scrubbed form, or as open areas of exotic grassland with scattered canopy species.

The canopy was dominated by *Eucalyptus pilularis* (Blackbutt), *Angophora costata,* (Sydney Red Gum), *Syncarpia glomulifera* (Turpentine) and *Eucalyptus resinifera* (Red Mahogany), and occurring less frequently Eucalyptus *piperita,* Sydney Peppermint and *Eucalyptus punctata* (Grey Gum). The mid-storey contained little diversity, with the dominant species of native *Pittosporum undulatum* and exotic *Privet* spp. The ground layer was dominated by exotic grasses and some woody weeds, but also contained a variety of native forbs and grasses including *Oplismenus aemulus, Pratia purpurascens (White Root), Lomandra* spp. (Matrush), *Paspalum dilatatum, Dianella revoluta* (Blue-flax Lily). *Araujia sericifera* (Moth Vine), *Asparagus asparagoides* (Bridal Creeper) and *Sida rhombifolia.* An intact form of this vegetation community exists in the western portion of the study area.

This community also occurs in a landscaped condition to the north of the site with a similar assemblage of species and also included *Imperata cylindrica* var*. major* (Blady Grass)*, Banksia spinulosa* (Hairpin Banksia), *Allocasuarina littoralis* (Black Sheoak), *Entolasia marginata* (Bordered panic) and some planted *Eucalyptus scoparia (*Wallangarra White Gum), which is listed as a threatened species under the BC Act.

## 2.2.1 Threatened ecological communities

One threatened ecological community, Sydney Turpentine-Ironbark Forest (STIF) (PCT 1281) was present within the study area and was mapped in two conditions (poor to moderate) and (planted). The majority of vegetation within the study area is managed vegetation, largely consisting of cleared and disturbed vegetation with some native groundcovers and opportunistic weeds.

STIF is also listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) as a critically endangered ecological community. The Turpentine-Ironbark Forest of

the Sydney Basin Bioregion ecological community is limited to remnants that are relatively intact in condition, as outlined below.

- *The vegetation contains some characteristic components from all structural layers (tree canopy, small tree/shrub midstorey, and understorey).*
- *Tree canopy cover is greater than 10% and remnant size is greater than one hectare. These areas have the greatest conservation value and their high quality and size makes them most resilient to disturbance.*
- *However, remnants with tree canopy cover less than 10% are also included in the ecological community, if the fragments are greater than one hectare in size and occur in areas of native vegetation in excess of 5 hectares in area. These areas enhance the potential for connectivity and viability of the ecological community. They support native flora and fauna species by facilitating gene flow among remnants and buffering against disturbance.*

Under the above conditions the STIF identified within the study area does not meet the condition criteria for listing under the EPBC Act for the following reasons:

- The patch of STIF on-site is less than one hectare in size.

### 2.2.2 Flora species

The field survey identified 63 flora species, comprising 37 native species and 26 exotic species. A full list of flora species recorded within the study area is available in Appendix B.

### 2.2.3 Threatened flora species

One threatened species, *Epacris purpurascens* var. *purpurascens*, listed as a vulnerable species under the BC Act has been identified within the VMP area. Fourteen (14) *Epacris purpurascens* var. *purpurascens* individuals were recorded during a field survey undertaken on 10 October 2019 by ELA ecologists Stacey Wilson and Mike Lawrie.

Habitat for this species is present throughout the VMP area and caution should be taken whilst working in areas of suitable habitat for this species. It is recommended that all contractors undergo a 'Toolbox Talk' which addresses the requirements of this VMP and any associated plans. This includes the '*Epacris purpurascens* var. *purpurascens* Species Profile' provided in Appendix E.

## 2.3 Priority Weeds

The *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds. Under the Act 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 is reasonably practicable.

Specific legal requirements apply to State determined priorities under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022. 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.

Of the weeds identified during the field survey, four have been listed as state level priority weeds, one listed as a regional priority and seven listed as other weeds of regional concern. The weeds present, their priority listing under the Act, the associated asset / value at risk and whether they are Weeds of National Significance (WoNS), are presented in Table 3 below.

A full list of weeds recorded during the field survey is provided in Appendix B.

**Table 3: Priority weed species recorded in the study area**

| Scientific Name | Common Name | WoNS | Priority Weed Objective or Asset at Risk* |
|---|---|---|---|
| **State Priority Weeds** | | | |
| *Lantana camara* | Lantana | Yes | Asset protection[2] |
| *Asparagus asparagoides* | Bridal Creeper | Yes | Asset protection |
| **Weeds of Regional Concern** | | | |
| *Olea europaea* subsp. *cuspidata* | African Olive | No | Eradication |
| **Other Weeds of Regional Concern** | | | |
| *Araujia sericifera* | Moth Vine | No | Environment[3] |
| *Cinnamomum camphora* | *Camphor Laurel* | No | Environment, Agriculture, Human Health[3] |
| *Cenchrus clandestinus* | Kikuyu | No | Environment |
| *Eragrostis curvula* | African Lovegrass | No | Environment |
| *Ligustrum lucidum* | Broad-leaf Privet | No | Environment, Human Health |
| *Ligustrum sinense* | Small-leaf Privet | No | Environment, Human Health |
| *Phoenix canariensis* | Canary Island Date Palm | No | Environment |
| *Tradescantia fluminensis* | Trad | No | Environment |

*Refer to *Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022* for specific species legal requirements

[2]Mandatory measure (Whole of NSW)

[3] Regional Strategic Response


**Figure 2: Validated Plant Community Types and location of the APZ within the study area**

# 3. Fencing

The civil construction company shall be responsible for the following works.

### 3.1.1 Permanent fencing

Permanent fencing will be installed around the STIF within the south-east of the study area, between the skate park and the carpark. This will stop any slashing from occurring in this area and encourage the natural regeneration of STIF and protection of the supplemental plantings in this area. If permanent fencing cannot be installed, potentially re-using any logs from trees removed from the impact area could be used as a barrier to discourage movement through this area.

# 4. Vegetation management works

## 4.1 Management zones

The total VMP area is 3.88 ha and encompasses the Sydney Turpentine-Ironbark Forest within the south east of the study area, the Sandstone Gully Forest to the west of the study area and the APZ.

There are four VMP management zones:

- Zone 1: Assisted Regeneration – Sydney Sandstone Gully Forest
- Zone 2: Assisted Regeneration – Sydney Turpentine-Ironbark Forest
- Zone 3: Revegetation – Sydney Turpentine-Ironbark Forest
- Zone 4: Asset Protection Zone (APZ)

Further descriptions are provided below.

### 4.1.1 Management Zone 1 (MZ1): Assisted Regeneration – Sydney Sandstone Gully Forest

Zone 1 encompasses 1.7 ha of SSGF within the western portion of the study area (Figure 3). The vegetation throughout this zone is in moderate to good condition with an intact canopy. The mid-storey is dominated with a dense stand of *Ligustrum* spp. (Privet). The understorey throughout the zone is comprised of mixed exotic and native groundcovers and grasses. Weed management works in this zone are to focus on the treatment of *Ligustrum* spp. in a mosaic pattern to prevent erosion, and allow natural regeneration of native canopy, shrubs and groundcovers. No revegetation works are expected within this management zone.

### 4.1.2 Management Zone 2 (MZ2): Assisted regeneration - Sydney Turpentine-Ironbark Forest

Zone 2 encompasses 0.09 ha of STIF in low to moderate condition. This includes the area of STIF between the parking lot and the skate park (Figure 3). This patch contains a native canopy and mix of native groundcovers however lacks a native mid storey. The works in this area should focus on the removal of weeds, and, if required, some plantings in mid storey and groundcover strata only. All plantings should be no taller than 800 mm in order to maintain sight lines. Any seedlings that become taller than this specified height will be removed and / or transplanted to another zone within the VMP area.

MZ2 also includes the edges of the small drainage channel which intersects the STIF within MZ2 (Figure 3). The edges of the drainage channel should be revegetated with riparian species along the drainage channel and will reduce erosion potential further downslope to Colah Creek. Revegetation requirements are provided in Section 4.2.3.

Following revegetation works large logs should be installed to delineate this zone as a 'no mow' area.

### 4.1.3 Management Zone 3 (MZ3): Revegetation - Sydney Turpentine-Ironbark Forest

Zone 4 encompasses 0.02 ha of between Galston road and the pedestrian path. The area has been cleared of all native vegetation with only managed exotic grasses within this area. This zone will require revegetation in mid storey and groundcover strata only. All plantings should be no taller than 800 mm in order to maintain sight lines. Any seedlings that become taller than this specified height will be removed and / or transplanted to another zone within the VMP area. Revegetation requirements are provided in Section 4.2.3.

Exotic grasses on the edges of this zone should be slashed and sprayed using a non-selective herbicide (e.g. Roundup Bioactive®) in preparation for revegetation works. This will reduce competition on native plantings. Care must be taken to prevent off-target spraying of native groundcovers.

### 4.1.4 Following revegetation works large logs should be installed to delineate this zone as a 'no mow' area. Management Zone 4 (MZ4): Asset Protection Zone

Management Zone 4 encompasses the 0.14 ha that has been designated to the Asset Protection Zone (Figure 3).

A Bushfire Report has been provided by Building Code & Bushfire Hazard Solutions dated 6 November 2019. The report identifies the requirement that an Asset Protection Zone (APZ) be maintained around the pool and recreational building to achieve a BAL of 40.

Actions undertaken within MZ5 should follow the requirements of the Bushfire Report as specified below:

*'All Asset Protection Zones within the subject site will be maintained in accordance with an Inner Protection Area as detailed in the NSW Rural Fire Service publication 'Standards for Asset Protection Zones' and be subject to a Fuel Management Plan'*

*That the grounds shown on Image 05 of this report within the subject site are required to be maintained as an Asset Protection Zone (Inner Protection Area) and in accordance with Appendix 5 'Landscape and Property Maintenance' of PBP. This will allow for gardens (including native trees and shrubs) in the APZ managed as clumps or islands, covering no more than 20% of the area.*

Additionally, section A4.1 of the Bushfire Report lists the following requirements for Inner Protection Areas (IPA's)

*When establishing and maintaining an IPA the following requirements apply:*

*Trees*

- *tree canopy cover should be less than 15% at maturity;*

- *trees at maturity should not touch or overhang the building;*
- *lower limbs should be removed up to a height of 2m above the ground;*
- *tree canopies should be separated by 2 to 5m; and*
- preference should be given to smooth barked and evergreen trees.

*Shrubs*

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

*Grass*

- *grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and*
- *leaves and vegetation debris should be removed.*

## 4.2 Weed Control

### 4.2.1 Primary and secondary weed control

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

Primary and secondary weed control will include woody weed and vine control, specifically the control of *Ligustrum* spp. (Privet). Juvenile *Ligustrum* spp. plants can be hand-pulled, provided the whole root is removed. Large *Ligustrum* spp. plants can be treated using cut and paint method. Chemical and mechanical control techniques will be required in follow up treatments. Follow up treatments of woody weeds including *Ligustrum* spp. seedling growth will be required. For more information on specific weed control techniques, see **Appendix C**.

### 4.2.2 Maintenance

Following secondary weed removal and revegetation, all areas will require ongoing maintenance to control weed regrowth from the 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 (spring and summer), with less frequent visits in cooler periods (autumn and winter). Maintenance programs will also comment on other site issues such as rabbit activity. Maintenance work will include actions to encourage native regeneration where it is not occurring naturally. These actions include techniques such as soil disturbance, niche seeding and transplanting. Maintenance actions within MZ2 and MZ3 will also require the monitoring of seedlings to ensure they do not grow above a height of 800 mm in order to maintain sight lines. Seedlings that reach above that height will be removed / transplanted to other zones within the VMP area where appropriate.

### 4.2.3 Revegetation

Revegetation works are required within MZ2 and MZ3.

Revegetation works will include planting of groundcover, grass / sedge, shrub and canopy species using species consistent with Sydney Sandstone Gully Forest. Planting of Hiko / Viro cells is the preferred revegetation method for ground cover species and grasses. Mulch will not be applied within STIF revegetation works as per the Sydney Turpentine Ironbark Forest Best Practice Guidelines state:

*'mulch within Sydney Turpentine–Ironbark Forest prevents the native seed bank from germinating and can potentially introduce foreign fungus species that were not previously present on the site.'* (DECC 2008).

Planting densities for the management zones are listed below (Table 5). Specifications for revegetation activities, including seed collection is provided in **Appendix C**. A recommended planting list of are provided in **Appendix D**.

**Table 4: Planting assumptions and mulch requirements**

| Zone | Description | Total area (m²) | Revegetation Area (%) | Revegetation area (m²) |
|---|---|---|---|---|
| MZ2 | Assisted Regeneration – Sydney Turpentine-Ironbark Forest | 900 | 10 | 90 |
| MZ3 | Revegetation – Sydney Turpentine-Ironbark Forest | 200 | 100 | 200 |

**Table 5 Revegetation densities**

| Zone | Description | Revegetation area (m²) | Planting densities (per m²) | | | |
|---|---|---|---|---|---|---|
| | | | Trees | Shrubs | Herbs /Scramblers | Sedges / Grasses |
| MZ3 | Assisted Regeneration – Sydney Turpentine-Ironbark Forest | 90 | - | 1/20 | 1.00 | 3.00 |
| MZ3 | Revegetation – Sydney Turpentine-Ironbark Forest | 200 | 1/50 | 1/20 | 1.00 | 3.00 |

**Table 6: Plant number requirements**

| Zone | Description | Revegetation area (m²) | Total plant number requirements | | | | |
|---|---|---|---|---|---|---|---|
| | | | Trees | Shrubs | Herbs / scramblers | Sedges / Grasses | Total |
| MZ2 | Assisted Regeneration – Sydney Turpentine-Ironbark Forest | 90 | 0 | 5 | 90 | 270 | 365 |
| MZ3 | Revegetation – Sydney Turpentine-Ironbark Forest | 200 | 0 | 10 | 200 | 600 | 812 |
| **Totals** | | **290** | **0** | **15** | **290** | **870** | **1,177** |


**Figure 3: Vegetation Management Zones**

# 5. Implementation schedule

## 5.1 Implementation schedule

The VMP will have an implementation period of five (5) years or until the required objectives for the VMP area as identified are met, whichever is longer.

An indicative implementation schedule has been provided in Table 8.

Responsibilities have been identified as below:

| | | |
|---|---|---|
| Key | Civil construction activities (i.e. Fencing) | |
| | Vegetation management works | |

## 5.2 Adaptive management

As this is a long-term project that will be implemented over a number of 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.

The success of the works will be determined by meeting the performance criteria identified in **Table 9**. 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 approved in writing by Hornsby Shire Council.

After the completion of all works described within this VMP, on-going inspection of the vegetation within the community lot is to be carried out at least every three years to ensure the site meets the performance criteria. Areas that do not conform to the performance criteria are required to be rehabilitated using the methods outlined within this VMP. Survey at these inspections is to include both priority and environmental weed populations.

The following performance criteria will need to be achieved annually in-perpetuity by the landowner:

- across the VMP area, <2% priority weeds cover and <4% environmental weeds cover
- no infiltration by exotic lawn species into the VMP area
- no bare areas >5m$^2$ or erosion from exposed surfaces
- nest boxes maintained in a working condition free from degradation and non-target species
- species richness and cover goals after the initial 5-year implementation period based on BioNet benchmark conditions for vegetation communities present on site (excluding the APZ) and as a reference for the riparian vegetation (**Table 7**).

**Table 7: Benchmark conditions for vegetation communities within the VMP area**

| PCT | PCT Common Name | Species richness[4] | | | Cover (%)[4] | | |
|---|---|---|---|---|---|---|---|
| | | Canopy | Shrub | Grass & Grass Like | Canopy | Shrub | Grass & Grass Like |
| 1250 | Sydney Sandstone Gully Forest | 7 | 27 | 9 | 51 | 70 | 33 |
| 1281 | Sydney Turpentine-Ironbark Forest | 7 | 13 | 9 | 63 | 30 | 39 |

[4] Based on monthly average following average rainfall year. Note: groundcovers include grasses and forbs but does not include ferns or other vegetation types within the groundstorey strata

**Table 8: Implementation schedule**

| Treatment | 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 |
| **Fencing** | | | | | | | | | | | | | | | | | | | | |
| Install permanent fencing | | | | | | | | | | | | | | | | | | | | |
| Install informational signage (if required) | | | | | | | | | | | | | | | | | | | | |
| **Revegetation** | | | | | | | | | | | | | | | | | | | | |
| Seed collection, cleaning, storage | | | | | | | | | | | | | | | | | | | | |
| Site Preparation | | | | | | | | | | | | | | | | | | | | |
| Install mulch | | | | | | | | | | | | | | | | | | | | |
| Tubestock, supply and install | | | | | | | | | | | | | | | | | | | | |
| Replacement tubestock, supply and install | | | | | | | | | | | | | | | | | | | | |
| Irrigation | | | | | | | | | | | | | | | | | | | | |
| Installation of logs around MZ 2 & MZ3 | | | | | | | | | | | | | | | | | | | | |
| **Weed control** | | | | | | | | | | | | | | | | | | | | |
| Primary | | | | | | | | | | | | | | | | | | | | |
| Secondary | | | | | | | | | | | | | | | | | | | | |
| Maintenance | | | | | | | | | | | | | | | | | | | | |
| **Other works** | | | | | | | | | | | | | | | | | | | | |
| Monitoring and reporting | | | | | | | | | | | | | | | | | | | | |
| Pest control (if required) | | | | | | | | | | | | | | | | | | | | |

# 6. Monitoring and reporting

The bush regeneration contractor and the land manager will monitor the vegetation for changes over time. Information gained through the monitoring and reporting process will identify works that have and have not been successful, and the reasons for their success or failure.

The aim of monitoring is to measure the effectiveness of the management actions being undertaken to achieve the desired outcome. It will identify non-conformance and provide the land manager with the ability to implement corrective actions. Information derived from the results of monitoring will also be used in adaptive management (i.e. learning from past experience to inform future priorities and work plans). For example, as annual grass weeds are removed, herbaceous and perennial weeds may establish.

Finally, monitoring and reporting will help determine and quantify the costs related to weed management and revegetation and the cost effectiveness of the VMP.

## 6.1 Monitoring

Monitoring will be undertaken by vegetation surveys and photo monitoring. Monitoring will need to be implemented prior to works commencing to establish a benchmark for performance, and to occur on an annual basis until the completion of the project. Monitoring results will be included in the progress report.

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 seven photo monitoring points within the VMP area
- place two six-foot star pickets 10 m apart
- record the location (eastings and northings) of the first star picket with a GPS as well as the bearing to the second star picket
- take a digital photo from the first star picket looking towards the second star picket, the entire length of the star picket visible in the photo to act as a reference point
- label each digital image with a unique reference number that indicates where the photo was taken (i.e. the photo monitoring point) and the date it was taken (e.g. 01_190330 for a photo taken at the first photo monitoring point on the 30th March 2019).

Monitoring results will be included in progress reports as per **Section 6.3**

## 6.2 Quadrat data points

Quadrat data points will be within the VMP area to monitor changes in the vegetation through time. The quadrat data forms the baseline for monitoring against the performance criteria for the first 5 years of the duration of the VMP. Floristic plot data is to be collected including species richness, cover and abundance in a 5x5 m quadrat.

## 6.3 Progress reports

Progress reports are to be provided on an annual basis until the completion of the project. This reporting includes the implementation of the monitoring actions specified in **Section 6.1** and a description of the works that have been undertaken. These reports will be submitted to Hornsby Shire Council. 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 man hours for each task carried out on site
  - methods of weeding undertaken and details of herbicide use
  - numbers of tubestock planted if applicable
  - methods implemented for Assisted Natural Regeneration
- photo and quadrat monitoring results to date
- a description of any problems encountered in implementing the works recommended in the 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 results of the implementation works in relation to the relevant performance criteria.

## 6.4 Performance criteria

The performance criteria are detailed in **Table 9**.

Failure to meet these performance criteria will mean that the maintenance period will be extended until they are achieved. Therefore, maintenance must continue until Hornsby Shire Council agrees that the objectives and performance criteria have been met and the maintenance period has concluded. The author of this VMP or equally qualified and experienced person must prepare a statement certifying the compliance of the performance criteria at the end of the 5-year period.

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

**Table 9: Performance criteria**

| Management Zone | Year 1 (Establishment) | Year 2 | Year 3-4 | Year 5 |
|---|---|---|---|---|
| All Zones | • Commencement of all tasks outlined in the VMP or evidence of planning for their implementation<br>• All fencing installed<br>• Pest control management plan in consultation with LLS, with rabbit fencing installed (if required)<br>• All rubbish and debris removed<br>*Vegetation management works:*<br>• Revegetation is to be undertaken with a minimum of 60% of the benchmark levels for species diversity provided in Table 5<br>• A minimum of 85% survival rate of all vegetation strata planted in each revegetation zone (e.g. tree, shrub and groundcover)<br>• No area greater than 2m x 2m without surviving revegetation<br>• Maintenance replanting is to replace plants by the same species, or where that species is not available, with the same growth form (i.e. tree for tree, etc.) and must not decrease species diversity. Any new species must be from the community being emulated and of local provenance<br>• Treatment of any new weed breakouts<br>• Priority weed cover less than 2% cover by Year 5<br>• Monitoring of rabbit activity across the VMP area<br>• Monitoring and reporting undertaken in accordance with **Section 6**. | | | |
| MZ1 | • Treat 100% of priority weeds<br>• Treat 95% of other weeds<br>• Treatment of new weed breakouts | • No greater than 10% cover by both priority weeds<br>• No greater than 25% cover by other weeds | • No greater than 5% cover by priority weeds<br>• No greater than 10% cover by other weeds | • No greater than 2% cover by priority weeds<br>• No greater than 4% cover by other weeds |
| MZ2 & MZ3 | • Treat 100% of priority weeds<br>• Treat 95% of other weeds<br>• Treatment of new weed breakouts<br>• All revegetation works undertaken<br>• Large logs on site installed around the boundary of MZ 2 and MZ 3 to delineate these zones as 'no mow' areas. | • No greater than 10% cover by priority weeds<br>• No greater than 25% cover by other weeds<br>• Suppression of all weeds during revegetation<br>• Groundcover cover no less than 40% of benchmark levels provided in Table 5<br>• 85% survival rate of plantings, replacement plantings where required | • No greater than 5% cover by priority weeds<br>• No greater than 10% cover by other weeds<br>• Groundcover cover no less than 50% of benchmark levels provided in Table 5<br>• All plantings should be no taller than 800 mm in order to maintain sight lines. Any seedlings that become taller than this specified height will | • No greater than 2% cover by priority weeds<br>• No greater than 4% cover by other weeds<br>• Groundcover cover no less than 60% of benchmark levels provided in Table 5<br>• All plantings should be no taller than 800 mm in order to maintain sight lines. Any seedlings that become taller than this specified height will |

| Management Zone | Year 1 (Establishment) | Year 2 | Year 3-4 | Year 5 |
|---|---|---|---|---|
| | | • All plantings should be no taller than 800 mm in order to maintain sight lines. Any seedlings that become taller than this specified height will be removed and / or transplanted to another zone within the VMP area. | be removed and / or transplanted to another zone within the VMP area. | be removed and / or transplanted to another zone within the VMP area. |
| MZ4 (APZ) | • Treat 100% of priority weeds<br>• Treat 95% of other weeds<br>• Treatment of new weed breakouts<br>• Tree canopy cover should be less than 15% at maturity;<br>• Trees at maturity should not touch or overhang the building;<br>• Lower limbs should be removed up to a height of 2m above the ground;<br>• Tree canopies should be separated by 2 to 5m<br>• Shrubs should not form more than 10% ground cover<br>• Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height);<br>• leaves and vegetation debris should be removed. | • No greater than 10% cover by priority weeds<br>• No greater than 25% cover by other weeds<br>• Tree canopy cover should be less than 15% at maturity;<br>• Trees at maturity should not touch or overhang the building;<br>• Lower limbs should be removed up to a height of 2m above the ground;<br>• Tree canopies should be separated by 2 to 5m<br>• Shrubs should not form more than 10% ground cover<br>• Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height);<br>• leaves and vegetation debris should be removed. | • No greater than 5% cover by priority weeds<br>• No greater than 10% cover by other weeds<br>• Tree canopy cover should be less than 15% at maturity;<br>• Trees at maturity should not touch or overhang the building;<br>• Lower limbs should be removed up to a height of 2m above the ground;<br>• Tree canopies should be separated by 2 to 5m<br>• Shrubs should not form more than 10% ground cover<br>• Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height);<br>• leaves and vegetation debris should be removed. | • No greater than 2% cover by priority weeds<br>• No greater than 4% cover by other weeds<br>• Tree canopy cover should be less than 15% at maturity;<br>• Trees at maturity should not touch or overhang the building;<br>• Lower limbs should be removed up to a height of 2m above the ground;<br>• Tree canopies should be separated by 2 to 5m<br>• Shrubs should not form more than 10% ground cover<br>• Grass should be kept mown (as a guide grass should be kept to no more than 100mm in height);<br>• leaves and vegetation debris should be removed. |

# 7. Cost

The cost of implementation for the five-year period is approximately **$56,242** exclusive of GST and CPI. An indicative annual costing timeline is provided in

Rates and costs are based on typical commercial rates. Assumptions that have been made in regard to estimating costs have been outlined below.

## 7.1 Fencing

Civil construction activities related to fencing are identified in Table 8 these have not been included in Table 10**.**

## 7.2 Vegetation management works

### 7.2.1 Weed control techniques

Bush regeneration contractors will implement the weed control treatments identified in this VMP. These works have been estimated to cost **$2,000** 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.

### 7.2.2 Revegetation treatments

Bush regeneration contractors will implement the revegetation treatments identified in this VMP. Tubestock costs have been budgeted at an estimated $5.50 per tree and shrub including tree guards, planting, water crystals, fertiliser and initial watering, and an estimated $2.50 per grass, sedge and groundcover including planting, water crystals and initial watering.

A total of approximately **1,177** plants will be required to achieve the densities identified in the VMP, including a 10% replacement rate. The total estimated cost of revegetation is approximately **$3,142** for tubestock installation, including a 10% replacement rate.

It has been assumed that mulch will be generated from site works, with costs provided for mulch spreading / installation only, this has been estimated at a cost of $2.50 / m². Note that if this is not the case, then this mulch will need to be brought in, increasing the expected cost.

### 7.2.3 Seed collection

Budget for the collection of seed has been included for the first year only. If further seed collection works are required, this may be an additional cost.

### 7.2.4 Monitoring and reporting

Bush regeneration contractors or ecologists will undertake the monitoring and reporting identified in this VMP. This includes:

- initial setup of the photo points and vegetation surveys, and conducting the baseline surveys
- preparing a yearly report, including photo points and vegetation surveys until the completion of the project

**Table 10: Indicative implementation costs over a 5-year period**

| Treatment | Establishment | Maintenance | | | |
|---|---|---|---|---|---|
| | Year 1 | Year 2 | Year 5 | Year 4 | Year 5 | Total |
| **Revegetation** | | | | | | |
| Seed collection, cleaning, storage | $170 | $0 | $0 | $0 | $0 | $170 |
| Site Preparation | $140 | $0 | $0 | $0 | $0 | $140 |
| Jute Matting / Mulch | $0 | $0 | $0 | $0 | $0 | $0 |
| Tubestock, supply and install | $2,856 | $0 | $0 | $0 | $0 | $2,856 |
| Replacement tubestock, supply and install | $0 | $286 | $0 | $0 | $0 | $286 |
| Irrigation | $280 | $0 | $0 | $0 | $0 | $280 |
| **Weed control** | | | | | | |
| Primary | $3,800 | $0 | $0 | $0 | $0 | $3,800 |
| Secondary | $4,225 | $12,675 | $0 | $0 | $0 | $16,900 |
| Maintenance | $0 | $0 | $7,467 | $7,467 | $7,467 | $22,400 |
| **Associated costs** | | | | | | |
| Disbursements | $803 | $1,268 | $747 | $747 | $747 | $4,310 |
| Monitoring & Reporting | $1,020 | $1,020 | $1,020 | $1,020 | $1,020 | $5,100 |
| **Totals** | **$13,294** | **$15,248** | **$9,233** | **$9,233** | **$9,233** | **$56,242** |

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# Appendix B : Species identified within the study area

**Table 11: Flora species recorded in the study area**

| Scientific Name | Common Name | Exotic (*) | Priority Weed (PW / WoNs) |
|---|---|---|---|
| *Acacia decurrens* | Black Wattle | | |
| *Acacia linifolia* | White Wattle | | |
| *Allocasuarina littoralis* | Black Sheoak | | |
| *Allocasuarina torulosa* | Forest Oak | | |
| *Angophora costata* | Smooth-barked Apple | | |
| *Araujia sericifera* | Moth Vine | * | PW |
| *Aristida ramosa* | Purple Wiregrass | | |
| *Asparagus asparagoides* | Bridal Creeper | * | PW, WONS |
| *Banksia spinulosa* | Hairpin Banksia | | |
| *Bidens pilosa* | Cobbler's Pegs | * | |
| *Bossiaea obcordata* | Spiny Bossiaea | | |
| *Bromus* sp. | | * | |
| *Casuarina glauca* | Swamp Oak | | |
| *Cenchrus clandestinus* | Kikuyu | * | |
| *Cinnamomum camphora* | Camphor Laurel | * | |
| *Clematis aristata* | Old Man's Beard | | |
| *Commelina cyanea* | Scurvy Weed | | |
| *Conyza bonariensis* | Flax-leaf Fleabane | * | |
| *Cyathochaeta diandra* | | | |
| *Cyperus eragrostis* | Umbrella Sedge | * | |
| *Dianella* sp. | | | |
| *Dichondra repens* | Kidney Weed | | |
| *Doryanthes excelsa* | Gymea Lily | | |
| *Ehrharta erecta* | Vasey Grass | * | |
| *Einadia* sp. | | | |
| *Entolasia marginata* | Bordered Panic | | |
| *Eragrostis brownii* | Brown's Love Grass | | |
| *Eragrostis curvula* | African Lovegrass | * | |
| *Epacris purpurascens var. purpurascens* | | | |
| *Eucalyptus fibrosa* | Broad-leaved Ironbark | | |
| *Eucalyptus microcorys* | Tallowwood | | |
| *Eucalyptus pilularis* | Blackbutt | | |
| *Eucalyptus piperita* | Sydney Peppermint | | |
| *Eucalyptus punctata* | Grey Gum | | |
| *Eucalyptus scoparia* | Wallangarra White Gum | | |
| *Goodenia hederaceae* | Forest Goodenia | | |
| *Hardenbergia violacea* | False Sarsaparilla | | |
| *Hydrocotyle bonariensis* | Large-leaf Pennywort | * | |
| *Hypochaeris radicata* | Flatweed | * | |
| *Imperata cylindrica* var. *major* | Blady Grass | | |
| *Kunzea ambigua* | Tick Bush | | |
| *Lantana camara* | Lantana | * | PW, WONS |

| Scientific Name | Common Name | Exotic (*) | Priority Weed (PW / WoNs) |
|---|---|---|---|
| *Ligustrum lucidum* | Broad-leaf Privet | * | |
| *Ligustrum sinense* | Small-leaf Privet | * | |
| *Lomandra longifolia* | Spiny-headed Mat-rush | | |
| *Lomandra obliqua* | Fish Bones | | |
| *Lophostemon confertus* | Brush Box | | |
| *Medicago sativa* | Lucerne | * | |
| *Microlaena stipoides* | Weeping Meadow Grass | | |
| *Olea europaea* subsp. *cuspidata* | African Olive | * | PW |
| *Oplismenus aemulus* | Australian Basket Grass | | |
| *Paspalum dilatatum* | | * | |
| *Phoenix canariensis* | Canary Island Date Palm | * | |
| *Pinus* sp. | | * | |
| *Pittosporum undulatum* | Sweet Pittosporum | | |
| *Plantago lanceolata* | Plantain | * | |
| *Pratia purpurascens* | White Root | | |
| *Pteridium esculentum* | Bracken Fern | | |
| *Sida rhombifolia* | Paddy's Lucerne | * | |
| *Sonchus oleraceus* | Common Sowthistle | * | |
| *Syncarpia glomulifera* | Turpentine | | |
| *Tradescantia fluminensis* | Trad | * | |
| *Trifolium repens* | White Clover | * | |
| *Verbena bonariensis* | Purple Tops | * | |

# Appendix C : Techniques and specifications

## 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 the weeds
- resources available (time, labour, equipment and finances)
- weather conditions of the day

## WEED CONTROL TECHNIQUES

Detail of specific weed control techniques to be used such as cut and paint, scrape and paint, herbicide spraying, and hand weeding are given 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 (2000). 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, such as *Cynodon dactylon* (Common Couch), *Paspalum dilatatum* (Paspalum), *and Pennisetum clandestinum* (Kikuyu Grass) 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 appropriately offsite.

## WOODY WEEDS

Follow up treatment of woody weeds, including *Sida rhombifolia* (Sida) and *Lantana camara* (Lantana) 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 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

Where individual plants of herbaceous weeds (e.g. *Senecio madagascariensis* (Fireweed), *Solanum* sp. and *Bidens pilosa* (Cobbler's Peg)) are found, they 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. *Cirsium vulgare* (Spear Thistle) will not be hand-pulled due to its thorns and instead will be treated using cut and paint methods or spot sprayed for larger infestations using a non-selective herbicide. 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.

### WEED CATEGORISATION

Weeds within the Hornsby Shire Council LGA, which are deemed to have a strong negative impact on the environment, agriculture, economy or human health, are categorised under the Hawkesbury River County Council's (HRCC) Biosecurity Priority Weeds Local Plan 2017 (WLP). The WLP was developed under the direction of the NSW *Biosecurity Act 2015* and Greater Sydney Regional Weeds Plan 2017. The weed species listed in the WLP are included in the HRCC Priority Weeds list as 'Schedule 1 (State Priority Weeds)'. The weeds listed in the Greater Sydney Regional Strategic Weed Management Plan are included in the HRCC Priority Weeds list as 'Schedule 2 (Regional Priority Weeds)'. In addition to the State and Regional guidance, the Biosecurity Act allows for the flexibility to respond to the protection of local assets such as Western Sydney biodiversity and our valuable production landscapes. As such, these weeds have been verified using the same system as the broader jurisdictions but performed at a local scale. They have been listed as 'Schedule 3 (Local Priority Weeds)'.

### ACTION ON PRIORITY WEEDS

HRCC notes in the WLP that it will ensure compliance with the *Biosecurity Act 2015* for each of it's member Councils in the following ways:

- prevent, eliminate, minimise and manage priority weeds by direct control on Council owned land

- achieve compliance with priority weeds on private property by a process of routine, equitable and strategic inspections
- develop, coordinate and measure weed programs by creating and maintaining policy, processes, operational plans and regular reporting
- maintain records on its control, education and inspection functions and make these available to NSW Department of Primary Industries and the community as required.

### ACTION ON WIDESPREAD LOW RISK WEEDS

The WLP notes that HRCC will not enforce the Act and/or control widespread low risk weeds unless, in the opinion of an Authorised Officer, one or more of the following conditions are met (HRCC 2017):

- The weeds have a proven health impact on a person directly adjoining the land. Proof would be a written notice from an appropriate licenced health professional
- The works are listed in the Annual HRCC Operational Plan or the precinct has been prioritised in consultation with a member Council
- A decision is made by an Authorised Officer in relation to the General Biosecurity Duty that the weed/s are posing a significant risk to an asset and warrants the attention of HRCC.

### OTHER WEEDS

If a weed is not listed in Schedule 1, 2 or 3 it is not considered to warrant the priority attention and resources of the County Council (HRCC 2017). However, it may still be deemed a biosecurity risk by an Authorised Officer and control, education or enforcement action may be taken if the process described in this policy for determining priority is followed. Any such weed should be included in the Schedule 3 of this policy in due course. If a new weed within HRCC's jurisdiction is suspected of being found, then the process outlined in the "Sydney New Incursion Plan" will be followed.

### REPORTING NOTIFIABLE WEEDS

A notifiable weed is a weed which lists a notification requirement in the guidelines for its management under Schedules 1, 2 and 3. All notifiable weeds within HRCC's jurisdiction must be reported in the following manner:

- Phone: (02) 4574 9600
- In-Person: directly to a HRCC Authorised Officer, or by visiting HRCC Office, 6 Walker St, South Windsor
- Email: council@hrcc.nsw.gov.au
- Post: PO Box 6021, South Windsor DC, NSW, 2756

### 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*.

### 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 the increased run-off from the hard surfaces created by the associated residential development.

Revegetation works within the Managed Ecological Zone must be undertaken in accordance with NSW Rural Fire Service's *Planning for Bushfire Protection* (2006). 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 will need to 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 maximum rate of attrition of 10% is to be tolerated, with any plant loss above this rate to be replaced at the contractor's expense.

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 is to be installed in any areas of potential erosion i.e. steep creek banks. Jute matting, where required, must be comprised of 100% biodegradable jute fibres with a minimum weight of 680g/m2 (~6 mm thickness). Jute must be pegged with at least 3 x 150 mm pins per m2 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 within proximity (i.e. <20km) to the site. However, soil type, climate and aspect of the collection site(s) should also be considered. Native grasses and wetland species 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 SSTF 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. The bush regeneration contractor is responsible for recording this information and providing it to Hornsby Shire Council.

**Bush regeneration contractors**

All vegetation management works in the establishment phase will be undertaken by suitably qualified and experienced bush regeneration contractors who are members of the Australian Association of Bush Regenerators (AABR) or fulfil the membership criteria. Additionally, team leaders should have, as a minimum, a Certificate III in Conservation & Land Management or equivalent. The contractor will need to carry out 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.

**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*'.

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.

### 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.

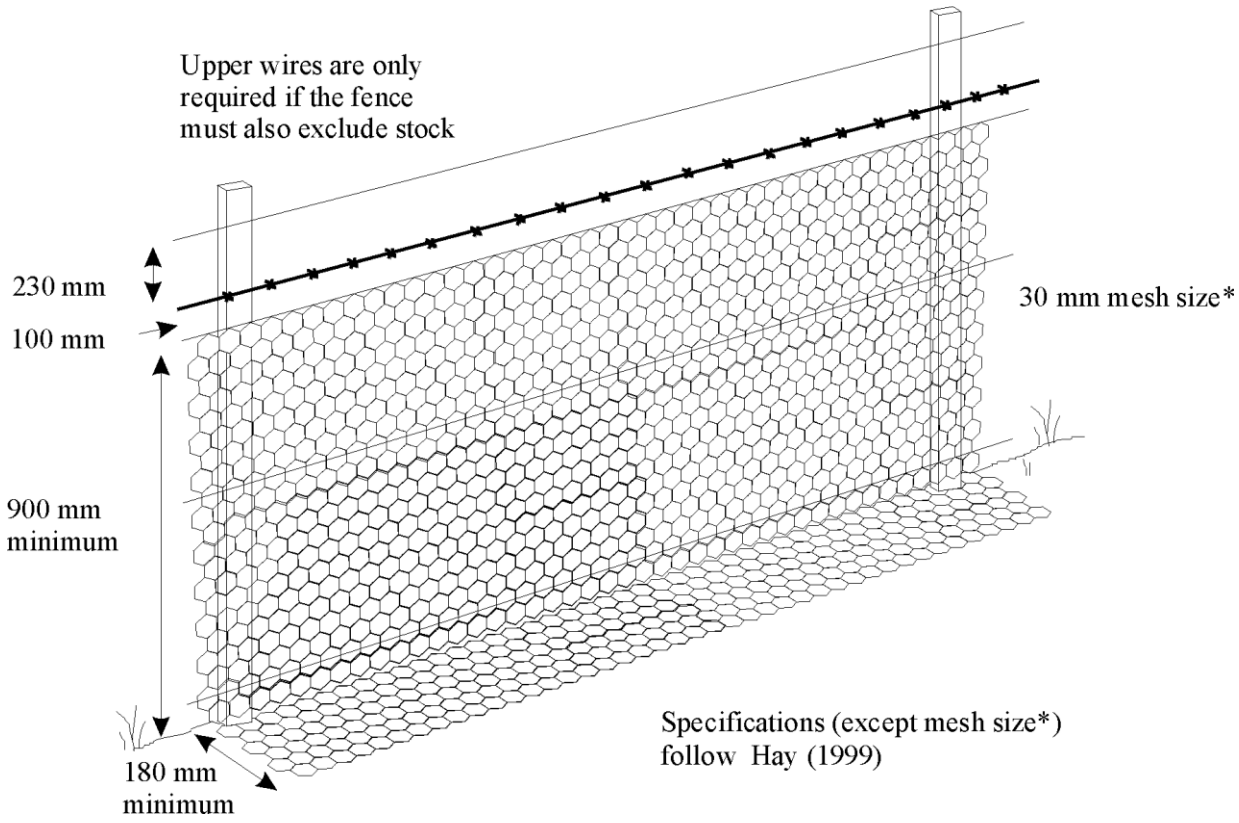


**Figure C1: Recommended fencing for rabbit exclusion (DoEE 2004)**

# Appendix D : Recommended Planting List

**Table 12: Recommended planting list[5]**

| Stratum | *Scientific Name* | Common Name | MZ2 & MZ3 - STIF Species | MZ2 - Riparian Species |
|---|---|---|---|---|
| Midstorey | *Acacia decurrens* | Black Wattle | | |
| | *Acacia falcata* | Sickle Wattle | X | |
| | *Acacia floribunda* | White Sally Wattle | X | |
| | *Acacia implexa* | Hickory Wattle | X | |
| | *Acacia longifolia* | | X | |
| | *Acacia parramattensis* | Parramatta Wattle | X | |
| | *Billardiera scandens* | Hairy Apple Berry | X | |
| | *Breynia oblongifolia* | Coffee Bush | X | |
| | *Bursaria spinosa* | Blackthorn | X | |
| | *Clerodendrum tomentosum* | Hairy Clerodendrum | X | |
| | *Daviesia ulicifolia* | Gorse Bitter Pea | X | |
| | *Denhamia silvestris* | Narrow-leaved Orangebark | X | |
| | *Dodonaea triquetra* | Large-leaf Hop-bush | X | |
| | *Elaeocarpus reticulatus* | Blueberry Ash | X | |
| | *Exocarpos cupressiformis* | Cherry Ballart | X | |
| | *Glochidion ferdinandi* var. *ferdinandi* | Cheese Tree | X | |
| | *Indigofera australis* | Australian indigo | X | |
| | *Kunzea ambigua* | Tick Bush | X | |
| | *Leucopogon juniperinus* | Prickly Beard-heath | X | |
| | *Notelaea longifolia* | Large Mock-olive | X | |
| | *Ozothamnus diosmifolius* | White Dogwood | X | |
| | *Persoonia levis* | | | |
| | *Persoonia linearis* | Narrow-leaved Geebung | X | |
| | *Pittosporum revolutum* | Rough fruit Pittosporum | X | |
| | *Pittosporum undulatum* | Sweet Pittosporum | X | |
| | *Polyscias sambucifolia* | Elderberry Panax | X | |
| | *Pomaderris intermedia* | | X | |
| | *Pultenaea villosa* | Hairy Bush Pea | X | |
| | *Rubus parvifolius* | Native Raspberry | X | |

[5] This list includes diagnostic species from Sydney Turpentine-Ironbark Forest and Sydney Sandstone Gully Forest communities listed in CMA and OEH 2013: *Native Vegetation of the Sydney Metropolitan Area, Volume 2: Vegetation Community Profiles.*

| Stratum | *Scientific Name* | Common Name | MZ2 & MZ3 - STIF Species | MZ2 - Riparian Species |
|---|---|---|---|---|
| | *Trema tomentosa* var. *aspera* | Native Peach | X | |
| | *Zieria smithii* | Sandfly Zieria | X | |
| Groundcovers: Grasses/Forbes/ Sedges/Rushes | *Adiantum aethiopicum* | Common Maidenhair | X | |
| | *Anisopogon avenaceus* | Oat Speargrass | X | |
| | *Aristida ramosa* | Purple Wiregrass | X | |
| | *Aristida vagans* | Threeawn Speargrass | X | |
| | *Arthropodium milleflorum* | Pale Vanilla-lily | X | |
| | *Austrostipa pubescens* | | X | |
| | *Austrostipa rudis* | | X | |
| | *Bolboschoenus caldwellii* | Marsh Club-rush | | X |
| | *Bolboschoenus fluviatilis* | Marsh Club-rush | | X |
| | *Bossiaea heterophylla* | | X | |
| | *Brunoniella australis* | Blue Trumpet | X | |
| | *Brunoniella pumilio* | Dwarf Brunoniella | X | |
| | *Calochlaena dubia* | Soft Bracken | X | |
| | *Carex fascicularis* | Tassell Sedge | | X |
| | *Carex gaudichaudiana* | | | X |
| | *Carex inversa* | Knob Sedge | | X |
| | *Caustis flexuosa* | Curly Sedge | X | |
| | *Cayratia clematidea* | Native Grape | X | |
| | *Cheilanthes sieberi* | | X | |
| | *Clematis aristata* | Old Man's Beard | X | |
| | *Clematis glycinoides* var. *glycinoides* | Headache Vine | X | |
| | *Commelina cyanea* | | X | |
| | *Cyperus trinervis* | | | X |
| | *Cyperus vaginatus* | Stiff Flat-sedge | | X |
| | *Desmodium rhytidophyllum* | | X | |
| | *Desmodium varians* | Slender Tick-trefoil | X | |
| | *Dianella caerulea* | Blue Flax-lily | X | |
| | *Dianella longifolia* | Blueberry Lily | X | |
| | *Dichelachne inaequiglumis* | | X | |
| | *Dichelachne rara* | | X | |
| | *Dichondra spp.* | | X | |
| | *Digitaria parviflora* | Small-flowered Finger Grass | X | |
| | *Doodia aspera* | Prickly Rasp Fern | X | |

| Stratum | *Scientific Name* | Common Name | MZ2 & MZ3 - STIF Species | MZ2 - Riparian Species |
|---|---|---|---|---|
| | *Echinopogon caespitosus* var. *caespitosus* | Tufted Hedgehog Grass | X | |
| | *Echinopogon ovatus* | Forest Hedgehog Grass | X | |
| | *Einadia hastata* | Berry Saltbush | X | |
| | *Entolasia marginata* | Bordered Panic | X | |
| | *Entolasia stricta* | Right-angle Grass | X | |
| | *Eragrostis brownii* | Brown's Love Grass | X | |
| | *Eustrephus latifolius* | Wombat Berry | X | |
| | *Gahnia aspera* | Rough Saw-sedge | X | |
| | *Gahnia sieberiana* | Red-fruit Saw-sedge | X | |
| | *Geranium solanderi* var. *solanderi* | Native Geranium | X | |
| | *Glycine clandestina* | | X | |
| | *Glycine microphylla* | Small-leaf Glycine | X | |
| | *Glycine tabacina* | | X | |
| | *Gonocarpus tetragynus* | | X | |
| | *Gonocarpus teucrioides* | Raspwort | X | |
| | *Goodenia hederaceae* | Forest Goodenia | X | |
| | *Goodenia heterophylla* | | X | |
| | *Hardenbergia violacea* | False Sarsaparilla | X | |
| | *Hibbertia aspera* subsp. *aspera* | | X | |
| | *Hibbertia diffusa* | Wedge Guinea Flower | X | |
| | *Hydrocotyle sibthorpioides* | | X | |
| | *Imperata cylindrica* | Blady Grass | X | |
| | *Isolepsis inundata* | Swamp Club Rush | | X |
| | *Juncus usitatus* | Common Rush | | X |
| | *Kennedia rubicunda* | Dusky Coral Pea | X | |
| | *Lepidosperma laterale* | Variable Sword-sedge | X | |
| | *Lepidosperma laterale* | Variable Sword-sedge | | X |
| | *Lindsaea microphylla* | Lacy Wedge Fern | X | |
| | *Lobelia purpurascens* | Whiteroot | X | |
| | *Lomandra filiformis* subsp. *filiformis* | Wattle Mat-rush | X | |
| | *Lomandra longifolia* | Spiny-headed Mat-rush | X | X |
| | *Lomatia silaifolia* | | X | |
| | *Microlaena stipoides* | Weeping Grass | X | |

| Stratum | *Scientific Name* | Common Name | MZ2 & MZ3 - STIF Species | MZ2 - Riparian Species |
|---|---|---|---|---|
| | *Myrsine variabilis* | | X | |
| | *Opercularia hispida* | Hairy Stinkweed | X | |
| | *Opercularia varia* | Variable Stinkweed | X | |
| | *Oplismenus aemulus* | Australian Basket Grass | X | |
| | *Oplismenus imbecillis* | Creeping Beard Grass | X | |
| | *Oxalis exilis* | | X | |
| | *Pandorea pandorana* | Wonga Womga Vine | X | |
| | *Panicum simile* | Two-colour Panic | X | |
| | *Paspalidium distans* | | X | |
| | *Passiflora herbertiana* subsp. *herbertiana* | Native Passionfruit | X | |
| | *Poa affinis* | | X | |
| | *Poa sieberiana var. sieberiana* | Snowgrass | X | |
| | *Poranthera microphylla* | | X | |
| | *Pseuderanthemum variabile* | Pastel Flower | X | |
| | *Rumex brownii* | Swamp Dock | X | |
| | *Sarcopetalum harveyanum* | Pear Vine | X | |
| | *Schoenoplectus mucronatus* | | | X |
| | *Sigesbeckia orientalis* | Indian Weed | X | |
| | *Smilax australis* | Lawyer Vine | X | |
| | *Smilax glyciphylla* | Sweet Sarsaparilla | X | |
| | *Solanum prinophyllum* | Forest Nightshade | X | |
| | *Themeda triandra* | Kangaroo Grass | X | |
| | *Tylophora barbata* | Bearded Tylophora | X | |
| | *Veronica plebeia* | Trailing Speedwell | X | |

# Appendix E : Threatened Species Profile

## *Epacris purpurascens* var. *purpurascens*

### DESCRIPTION

An erect shrub, 50 - 180 cm high; older stems with prominent short, broad leaf scars. Leaves are spreading and recurved above, ovate to heart-shaped, 7 - 21 mm long, 4.4 - 9 mm wide, with sharply pointed tips. Flowers are showy, 7 - 10 mm diam., covering much of the branchlets, white or sometimes pinkish. Fruit approximately 2 mm long (OEH 2020).

### DISTRIBUTION

Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South.

**Conservation status in NSW**: Vulnerable

**Commonwealth status**: Not listed

### HABITAT AND ECOLOGY

*Epacris purpurascens* var. *purpurascens* is found in a range of habitats types, most of which have a strong shale soil influence.

Existing populations are directly threatened by urban run-off leading to flooding, erosion, nitrification of soil substrate, altered pH, weed invasion, and introduction of plant pathogens.

Other threats include altered fire regimes, uncontrolled vehicular access, soil compaction, slashing e.g. powerline easements, fill and rubbish dumping, and trampling through inappropriate pedestrian access.

An additional threat is the potential for inappropriate slashing and/or spraying activities to have detrimental impacts on the species in the various patches where it occurs.

14 individuals of this species were identified within the Sydney Sandstone Gully Forest within the south-west of the VMP area.

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