# Tumbi Umbi Retirement Living Project

## Vegetation Management Plan

prepared for

Mingara Leisure Group Pty Ltd

écologique | environmental consulting

# SSD-63475709 Tumbi Umbi Retirement Living Project - Vegetation Management Plan

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### Statement of Authorship

The author of the report is Kathryn Duchatel with over 25 years' experience and the following relevant qualifications:

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## Revision Schedule

| Rev No | Date | Description | Issued to |
|---|---|---|---|
| 1 | 27/03/2024 | Vegetation Management Plan Draft for Review | Mingara Leisure Group Pty Ltd |
| 2 | 17/04/2024 | Vegetation Management Plan Final | Mingara Leisure Group Pty Ltd |
| 3 | 18/07/2024 | Vegetation Management Plan Final - amended | Mingara Leisure Group Pty Ltd |
| 4 | 22/07/2024 | Vegetation Management Plan Final – amended and reviewed | Mingara Leisure Group Pty Ltd |

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# Glossary / Abbreviations

| | |
|---|---|
| BC Act | NSW *Biodiversity Conservation Act 2016* |
| BC Reg. | NSW *Biodiversity Conservation Regulation 2017* |
| Biosecurity Act | NSW *Biodiversity Security Act 2015* |
| CAA | Controlled activity approval |
| CEMP | Construction Environmental Management Plan |
| Council | Central Coast Council |
| DCCEEW | NSW Department of Climate Change, Energy, the Environment and Water |
| DPE | NSW Department of Planning and Environment |
| DPE - Water | NSW Department of Planning and Environment |
| EEC | Endangered Ecological Community |
| EP&A Act | NSW *Environmental Planning and Assessment Act 1979* |
| MLG | Mingara Leisure Group Pty Ltd |
| MRC | Mingara Recreation Club |
| PCT | Plant Community Type |
| SSD | State Significant Development |
| TEC | Threatened Ecological Community |
| VMP | Vegetation Management Plan |
| WM Act | NSW *Water Management Act 2000* |

# 1 Introduction

## 1.1 Background

Mingara Leisure Group Pty Ltd (MLG) are proposing to construct and operate a retirement village (including high care apartments) within the Mingara Recreation Club (MRC) located at 14 Mingara Drive, Tumbi Umbi NSW.

Located in the Central Coast Local Government Area (LGA) the MRC primarily fronts Wyong Road to its northern boundary with residential and industrial uses surrounding the east, south and western boundaries.

The MRC occupies four parcels of land shown in Figure 1-1 and described legally as:

+ Lot 1 Deposited Plan 1010532 (club building)
+ Lot 2 Deposited Plan 1010532 (club building)
+ Lot 13 Deposited Plan 1204397 (remaining land)
+ Lot 71 Deposited Plan 1011971 (athletics track)

The proposed retirement village will be located on vacant land (within Lot 13 DP 1204697) west of the club and south of the athletics field.

As part of the proposed development MLG intends on landscaping the drainage easement located to the west of the retirement village to provide an improved aesthetic and ecological corridor.

## 1.2 Purpose of the VMP

This Vegetation Management Plan (VMP) has been prepared to guide how the proposed landscaping shall be implemented and maintained with particular regard to the following site constraints:

+ The flood prone nature of the land, and
+ Bush fire prone land immediately west of the drainage easement

The extent of the VMP covers approximately 1.91 ha (or 19,130 $m^2$) and is shown in Figure 1-2.


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Figure 1-1. Site context

**Legend**

Subject site

Disturbance footprint

N

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Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 12 August 2023


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Figure 1-2. VMP extent

**Legend**

Vegetation Management Plan (VMP) extent

N

Coordinate system: MGA Zone 56 (GDA 2020)
Image source: Nearmap 12 August 2023

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# 2 Site Description

## 2.1 Drainage easement

Assessment of historical imagery (provided in **Appendix A**) shows that the drainage easement and channel was constructed in the early 2000s in tandem with the constructed wetland (downstream of the drainage swale).

Historical imagery from 1965 to 2005 only indicates man-made channels with no evidence of a naturally occurring watercourse within the locality.

The NSW *Water Management (General) Regulation 2018* (WM Reg.) hydro line spatial data[1] identifies the drainage line as a first order watercourse, which would indicate the presence of waterfront land (i.e., that land contained within 40m from the top of the bank of the watercourse).

However, waterfront land is negated in this instance as the drainage line is concrete lined and exempted under the WM Reg. specifically Schedule 4 Exemptions - Part 2 Controlled activities exemptions:

**28 Activities on waterfront land if river is concrete lined or in pipe**

*Any activity carried out on waterfront land relating to a river where the channel of the river is fully concrete lined or is a fully enclosed pipe channel.*

Thus a riparian buffer zone either side of the channel is not required and this VMP is not a legal requirement nor required as a condition of the future retirement village's development consent.

## 2.2 Native Vegetation

### 2.2.1 Plant Community Types

The drainage easement is not mapped under Central Coast Council vegetation mapping by Stephen Bell (2019) and is mapped as non-native vegetation by the NSW State Vegetation Type Mapping (DPE 2022).

Bell 2019 maps the nearest native plant community as Swamp Mahogany Paperbark Forest - decommissioned PCT 1718 and replaced by Northern Creekflat Eucalypt-Paperbark Mesic Swamp Forest (PCT 4044).

State Vegetation Type Mapping (DPE 2022) maps the nearest native plant community as Coastal Creekflat Layered Grass-Sedge Swamp Forest (PCT 4020).

Both PCTs 4020 and 4044 relate to the NSW threatened ecological community (TEC) 'Swamp Sclerophyll Forest on Coastal Floodplains' and the EPBC Act listed TEC 'Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland'.

[1] Hydro Line spatial data contains mapped information about watercourses and waterbodies in NSW, Australia. It is based on the Spatial Services (Department of Finance, Services & Innovation) NSW Hydro Line dataset.

The purpose of the Hydro Line spatial data is to determine the Strahler stream order of a stream. This information can help identify exemptions from water licences/approvals: determine whether a watercourse is exempt from requiring a water licence or approval under the WM Reg.

Both PCTs 4020 and 4044 have a large overlap in diagnostic species (listed in Table 2-1), with many found in existing vegetation (listed in Table 2-2) and are considered appropriate for revegetation of the drainage easement.

**Table 2-1. Diagnostic species found in PCTs 4020 and 4044**

| Species | %frequency | |
|---|---|---|
| | PCT 4020 | PCT 4044 |
| **Tree (TG)** | | |
| *Eucalyptus robusta* | 64 | 24 |
| *Eucalyptus tereticornis* | 53 | 7 |
| *Glochidion ferdinandi* | 50 | 99 |
| *Melaleuca quinquenervia* | 35 | 14 |
| *Casuarina glauca* | 22 | 23 |
| *Notelaea longifolia* | 5 | 48 |
| **Shrub (SG)** | | |
| *Melaleuca linariifolia* | 94 | 77 |
| *Breynia oblongifolia* | 46 | 60 |
| *Callistemon salignus* | 46 | 63 |
| *Acacia longifolia* | 33 | 9 |
| *Leptospermum polygalifolium* | 31 | 33 |
| *Melaleuca styphelioides* | 22 | 48 |
| *Melaleuca ericifolia* | 29 | 2 |
| *Melaleuca decora* | 20 | 2 |
| *Acacia irrorata* | 14 | 48 |
| *Polyscias sambucifolia* | 14 | 33 |
| *Acmena smithii* | 7 | 43 |
| **Fern (FG)** | | |
| *Pteridium esculentum* | 33 | 48 |
| *Adiantum aethiopicum* | 18 | 82 |
| *Hypolepis muelleri* | 16 | 31 |
| **Grass & grasslike (GG)** | | |
| *Entolasia marginata* | 81 | 70 |
| *Lomandra longifolia* | 81 | 63 |
| *Imperata cylindrica* | 79 | 48 |
| *Gahnia clarkei* | 79 | 89 |
| *Oplismenus imbecillis* | 72 | 80 |
| *Microlaena stipoides* | 61 | 38 |
| *Entolasia stricta* | 48 | 23 |
| *Oplismenus aemulus* | 27 | 24 |
| *Carex appressa* | 16 | 21 |
| **Forb (FG)** | | |
| *Dianella caerulea* | 81 | 72 |
| *Lobelia purpurascens* | 81 | 55 |
| *Gonocarpus tetragynus* | 68 | 6 |

| Species | %frequency | |
|---|---|---|
| | PCT 4020 | PCT 4044 |
| *Centella asiatica* | 72 | 31 |
| *Dichondra repens* | 55 | 50 |
| *Viola hederacea* | 40 | 38 |
| *Pseuderanthemum variabile* | 9 | 50 |
| **Other (OG)** | | |
| *Parsonsia straminea* | 70 | 70 |
| *Glycine clandestina* | 48 | 39 |
| *Kennedia rubicunda* | 40 | 17 |
| *Polymeria calycina* | 33 | 24 |
| *Livistona australis* | 22 | 12 |
| *Billardiera scandens* | 16 | 21 |
| *Geitonoplesium cymosum* | 14 | 70 |
| *Eustrephus latifolius* | 11 | 41 |
| *Calochlaena dubia* | 11 | 46 |
| *Hibbertia scandens* | 11 | 28 |
| *Gynochthodes jasminoides* | 5 | 60 |
| *Smilax glyciphylla* | 5 | 23 |
| *Stephania japonica* var. *discolor* | 3 | 43 |
| *Smilax australis* | 3 | 34 |

### 2.2.2 Flora species

Table 2-2 lists the native flora observed within the drainage easement and photographic plates illustrate the nature of the drainage easement.

**Table 2-2. Native species observed in drainage easement**

| Scientific Name | Common Name | Habitat Features |
|---|---|---|
| **Trees** | | |
| *Casuarina glauca* | Swamp oak | Existing woodland area |
| *Cupaniopsis anacardioides* | Tuckeroo | Existing woodland area |
| *Eucalyptus robusta* | Swamp mahogany | Existing woodland area |
| *Leptospermum polygalifolium* | Tantoon | Existing woodland area |
| *Melaleuca armillaris* | Bracelet honey myrtle | Existing woodland area |
| *Melaleuca ericifolia* | Swamp paperbark | Existing woodland area |
| *Melaleuca linariifolia* | Flax-leaved paperbark | Existing woodland area |
| *Melaleuca nodosa* | Prickly-leaved paperbark | Existing woodland area |
| **Shrubs** | | |
| *Acacia longifolia* | Sydney golden wattle | Existing woodland area |

| Scientific Name | Common Name | Habitat Features |
|---|---|---|
| *Baeckea linifolia* | Weeping baeckea | Around channel and grassland |
| **Groundlayer** | | |
| *Centella asiatica* | Gotu Kola | Existing woodland area |
| *Commelina cyanea* | Scurvy weed | Present in all parts of the site |
| *Goodenia bellidifolia* | | Alongside channel |
| *Hypolepis muelleri* | Harsh ground fern | Existing woodland area |
| *Lomandra longifolia* | Spiny-headed mat-rush | Throughout |
| *Sphaeropteris medullaris** | Black tree fern | Existing woodland area |
| *Stephania japonica* | Tape-vine | Existing woodland area |
| **Aquatic-semi aquatic** | | |
| *Carex appressa* | | Alongside channel |
| *Hydrocotyle tripartita* | Pennywort | Alongside channel |
| *Juncus usitatus* | Common rush | Alongside channel |
| *Ranunculus inundatus* | River buttercup | Alongside channel |
| *Tyha orientalis* | Broad leaved cumbungi | Alongside channel |

## 2.3 Weed infestations

Table 2-3 lists weed and introduced species observed in the drainage easement.

**Table 2-3. Weeds observed in the drainage easement**

| Scientific Name | Common Name |
|---|---|
| **Woody weeds** | |
| *Cinnamomum camphora* | Camphor Tree |
| *Lantana camara* | Lantana |
| *Sambucus canadensis* | American elder |
| *Senna pendula* | Cassia |
| **Grasses** | |
| *Cenchrus clandestinum* | Kikuyu |
| *Paspalum dilatatum* | Paspalum |
| *Paspalum urvillei* | Vasey grass |
| *Setaria sphacelata* | Pigeon grass |
| *Stenotaphrum secundatum* | Buffalo grass |
| **Herbs/forbs** | |
| *Ageratina adenophora* | Crofton weed |
| *Bidens pilosa* | Cobbler's pegs |
| *Conyza canadensis* | - |

| Scientific Name | Common Name |
|---|---|
| *Conyza sumatrensis* | Tall fleabane |
| *Fagopyrum esculentum* | Common buckweed |
| *Hydrocotyle bonariensis* | Largeleaf pennywort |
| *Rumex crispus* | Curly leaf dock |
| *Plantago lanceolata* | Lamb's tongue |
| *Ranunculus repens* | Creeping buttercup |
| *Senecio madagascariensis* | Fireweed |
| *Sida rhombifolia* | Paddy's lucerne |
| *Trifolium repens* | Clover |
| *Verbena bonariensis* | Purpletops |

**Photo plate 1:** VMP eastern boundary viewed from north to south

**Photo plate 2:** VMP eastern boundary viewed from south to north

**Photo plate 3:** Western VMP boundary viewed from north

**Photo plate 4:** outflow to downstream wetland system

**Photo plate 5:** drainage channel viewed from north to south (reed canary grass, kikuyu,

**Photo plate 6:** drainage channel

**Photo plate 7:** drainage channel viewed from north to south (crofton weed widespread)

**Photo plate 8:** drainage channel viewed from northeast to southwest (dense weeds either side of channel)

**Photo plate 9:** existing vegetation west of channel (fern understorey in foreground)

**Photo plate 10:** inflow surrounded by fern understorey and instream cumbungi

**Photo plate 11:** existing vegetation (lantana in foreground), camphor laurel, crofton weed and introduced grasses

**Photo plate 12:** paperbark / spiny-leaved mat rush in existing vegetation

**Photo plate 13:** south eastern end of VMP area, viewed from south, retaining wall in mid-foreground

**Photo plate 14:** general location of swale looking towards southeastern corner of development site

# 3 Revegetation Approach

## 3.1 Overview

A combination of restoration through revegetation and rehabilitation will be undertaken in the five management zones (see Table 3-1).

**Table 3-1. VMP management zones**

| Zone | Management | Area (ha) |
|---|---|---|
| 1. existing wooded vegetation | Rehabilitation – assisted bush regeneration | 0.89 |
| 2. western grassed batter | Rehabilitation – fuel management | 0.35 |
| 3. eastern grassed batters | Restoration – fuel management | 0.51 |
| 4. drainage channel & ponds | Reconstruction – engineered reconstruction of channel to provide a more natural drainage line | 0.16 |
| | **Subtotal VMP area** | **1.91** |
| 5. drainage swale | Restoration – groundlayer plantings | 0.15 |
| | **Total area** | **2.06** |

Figure 3-1 shows the landscape schematic of the intended outcome and Figure 3-2 shows each zone overlaying the existing drainage easement.

## 3.2 Bushland Regeneration

Assisted bushland regeneration works shall be implemented in zone 1 (existing woodland) where natural regeneration is likely, by removing obstacles and making amendments to abiotic conditions to affect the regeneration of remnant native vegetation with varying resilience levels.

The aim of assisted bushland regeneration is to create conditions that favour the ecosystem's own recovery processes.

Relevant to this VMP, regeneration activities will generally entail targeted weed control of woody weeds, introduced grasses, herbs and forbs.

## 3.3 Restoration through revegetation

Restoration through revegetation will be undertaken in all existing grassland areas (zone 2), which will generally entail the following:

+ Stabilisation following reconstruction works associated with the drainage line;
+ Weed control; and
+ Planting of local tree, shrub and groundlayer species.

Zones 2 and 3 require regular slashing of the understorey to ensure it does not become a bushfire hazard (see Section 4.6.1. Fuel reduction maintenance).

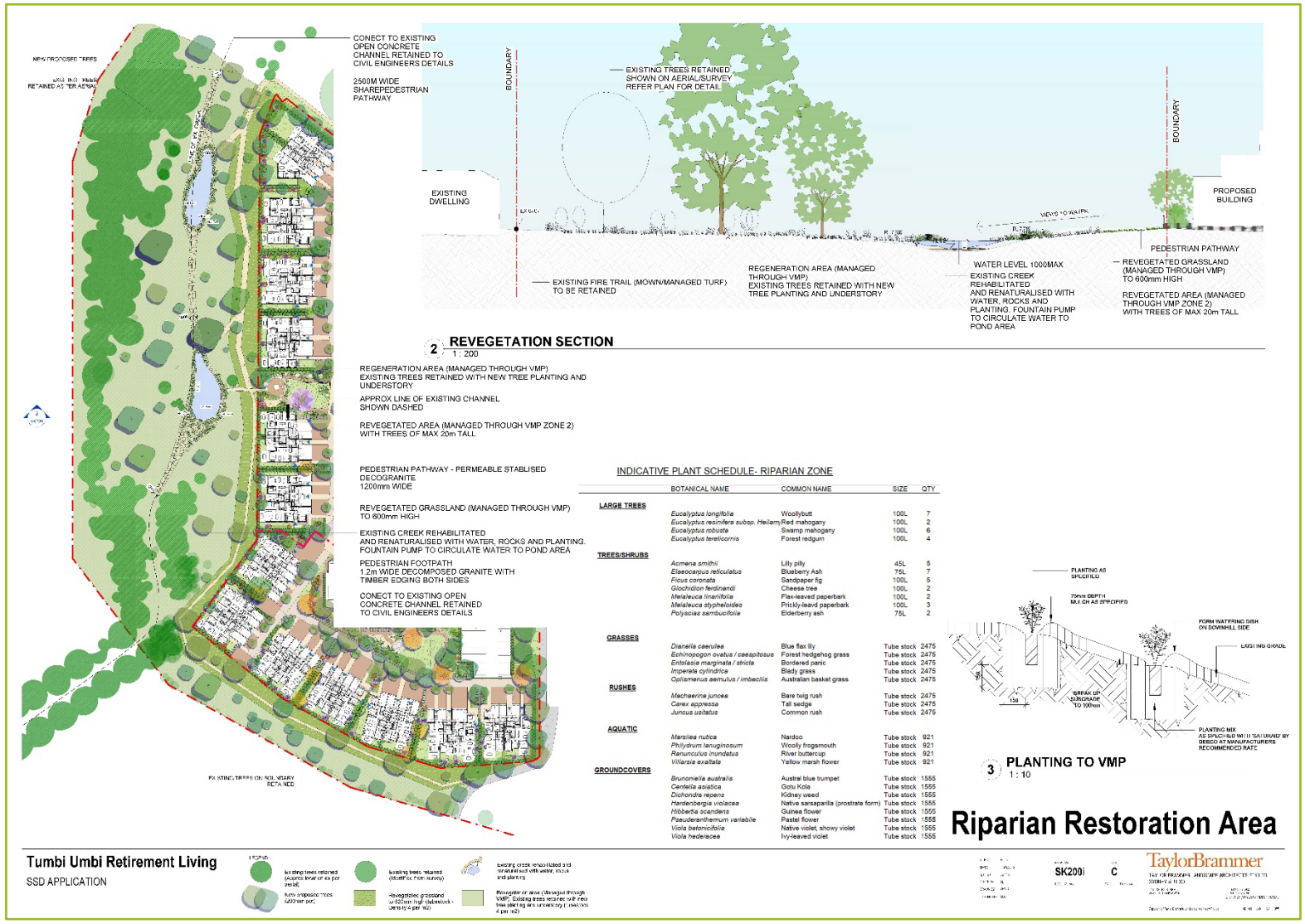


**Figure 3-1. Riparian restoration plan**


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Figure 3.2. VMP management zones

**Legend**

- VMP area
- Zone 1: Rehabilitation
- Zone 2: Rehabilitation - fuel management
- Zone 3: Revegetation - fuel management
- Zone 4: Channel
- Zone 4: Ponds
- Zone 5: Drainage swale revegetation

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Coordinate system: MGA Zone 56 (GDA 2020)
Image source: Nearmap 22 May 2024

# 4 Management Actions

## 4.1 Requirements

Only qualified bush regenerators should implement bush regeneration works in Zone 1. The bush regenerator team leader or supervisor responsible for implementation will need to demonstrate the following minimum qualifications and experience:

- A Certificate III in Conservation and Land Management and/or Certificate III in Natural Area Restoration.
- Membership of the Association of Australian Bush Regenerators (or the prerequisite qualifications and experience for membership).
- A minimum of 500 hours practical bushland regeneration under an experienced supervisor.

The use of pesticides must comply with the *Pesticides Act 1999*, which aims to reduce risks to human health, the environment, property, industry and trade, and promote collaborative and integrated policies for pesticide use. Under this Act, all pesticide users in NSW must:

- Only use pesticides registered or permitted by the Australian Pesticides and Veterinary Medicines Authority (APVMA).
- Obtain an APVMA permit if planning to use a pesticide in a way not covered by the label.
- Read the approved label and/or APVMA permit for the pesticide product (or have the label/permit read to them) and strictly follow their directions.
- Only keep registered pesticides in containers bearing an approved label Prevent injury to people, damage to property and harm to nontarget plants and animals from using a pesticide.

## 4.2 Weed Control

### 4.2.1 Primary weeding

Primary weeding is required on all VMP management zones, which requires a range of weed control techniques such as: slashing to remove biomass, selective spraying of weeds with herbicides; cutting/scraping and painting deep rooted woody weeds and climbers with hand tools, chainsaws and brushcutters and painting cut stumps with herbicide; and selective hand removal of weeds.

A number of introduced woody weeds are present in Zone 1, which should be targeted gradually using cut and paint methods.

Damage to native plant species should be avoided during any weeding works. Herbicide shall not be allowed to fall into a watercourse and shall not be applied when wind conditions could cause drift outside the area to be treated or onto desirable plants.

All seed, flowering and invasive vegetative parts of weeds should be bagged and disposed of appropriately off site.

**NOTE:** Zones 2 and 3 must be managed to prevent bushfire hazard and shall be slashed to remove foliage (fuel build up) so that the height of all understorey vegetation (either existing or planted) is maintained at a height of 100mm.

### 4.2.2 Secondary weeding

Secondary weeding involves the selective removal or treatment of weeds, whilst allowing regenerating or planted native plants to increase in size, abundance and percentage cover.

Secondary weeding should be undertaken at intervals of not more than four weeks following the completion of primary weeding and continue throughout the plant establishment period in reconstruction areas and as an ongoing task in assisted bush regeneration areas.

All herbaceous weeds should be managed to be at very-low percentage cover levels.

Particularly problematic herbaceous weeds with wind-blown seeds should be prevented from seeding throughout the site.

### 4.2.3 Maintenance weeding

It can be expected that the remnant and revegetated areas in the riparian zone will always require a certain level of maintenance weeding, as weed seeds and vegetative propagules make their way on site from the soil stored seedbank, via water, wind and bird droppings. However, the amount of weeding required will decrease once the regenerating native plants grow, recover and become more resistant to disturbance and weed colonisation.

Contractors will need to ensure sufficient resources are forecasted to meet the VMP requirements throughout each of the Practical Completion (i.e., completion of planting program and establishment phase) and any defects liability phases.

On completion of the defect liability phase, the VMP scope of works are to be updated and any recommendations (e.g., constraints, opportunities, recurring issues) detailed for handover from the development to the operational phase of the VMP.

## 4.3 Soil amelioration

In areas not subject to construction disturbance it is anticipated that existing soils will be suitable for revegetation following weed control without the need for amelioration.

Where construction activities disturb site soils (e.g., compaction, loss of topsoil) the following shall apply:

+ All debris, stones and left-over building materials (arising from the works) are to be removed from site.
+ Stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during excavation or cultivation, must be removed.
+ Supply and cultivate/spread 50mm layer of organic compost within 50mm layer of topsoil.
+ Organic compost to be pH neutral; low in phosphorus suitable for planting Australian natives; free from clods of soil, rock, rubbish, and other non-organic matter.

## 4.4 Stabilisation

### 4.4.1 Mulching

Mulching is not recommended within the revegetation areas due to the flood prone nature of the site.

Mulching may be used on the eastern and western periphery of the VMP area as follows:

- To limit exotic grass encroachment on the western edge of existing vegetation, and
- In the proposed landscaped pathway area in between the easement and the future retirement village (as shown in Figure 3-1).

Mulch is to be placed to the required depth, clear of plant stems, and raked to an even surface flush with the surrounding finished levels. Mulch is to be spread so that after settling it is:

- Smooth and evenly graded between design surface levels
- Flush with adjacent finished levels
- Of the required depths (minimum 75mm, 100 mm depth preferred)
- Sloped towards the base of plant stems, but not in contact with the stem

### 4.4.2 Jute matting

700gm and pre-slitted jute matting should be used where required on the easement's batters.

## 4.5 Planting program

### 4.5.1 Plant procurement

Plant procurement involves the sourcing of plant species listed in the Planting Schedule (provided in **Appendix A**). Plant procurement shall either be undertaken by the Principal or the Contractor (to be determined on engagement of Contractor).

Most commercial nurseries that supply native plant stock have the capacity to provide suitable seed or other propagative materials (from provenance source) without the need for targeted collection of seed/ propagation materials. However at least six months advance notice will be required to ensure that the species listed the Planting Schedule (provided in **Appendix A**) are able to be supplied at the intended commencement of planting.

Plant stock is to be inspected by the Principal or Contractor (or otherwise appointed representative) at least one month prior to commencement of planting works and again on delivery to the site.

Plants that are not: true to species; vigorous and healthy; with a well-developed root system; free from disease / pests; and are not without scars or dead wood; are to be rejected at delivery.

Planting shall be undertaken immediately after acceptance of plant delivery. If this is not possible: appropriate storage to keep the plants in good condition on the site, adequately protected from frost, wind, sun and vermin, and secured from vandals; shall be facilitated.

### 4.5.2 Planting procedure

Planting shall generally entail the following:

- Dig hole sufficient for root ball of plant. The removal from the container and the positioning of the plant is to be done with minimum disturbance to the roots.
- Slow-release native plant fertiliser (low phosphorous formulated native plant fertiliser tablet/granules) and water saving crystals shall be placed into the planting hole.
- After planting, the soil shall be replaced and carefully firmed, leaving a slight depression around each plant to allow for water collection. Soil is to be replaced in the hole so that the base of the stem is level with the soil surface, not set below the soil, or sitting above.

- All plants should be watered-in thoroughly after planting to settle any air pockets around the root ball of the plant and to give the plant a good initial supply of water.

### 4.5.3 Practical completion (6 months)

It is anticipated that Practical Completion can be achieved within six months from commencement of the bush regeneration/restoration works in each VMP zone. During this time planting establishment is to be achieved through watering, weeding, pest/disease control, replacing dead plant material and repairing/replacing erosion control matting/mulch (as applicable and as required). All plants should be watered thoroughly on at least 4 to 6 occasions, during this period.

Failure to maintain each VMP management zone in a stable and healthy condition may result in the Principal arranging for the maintenance work to be carried out by others at the expense of the Contractor.

Practical Completion shall require a minimum 90 per cent survival rate of each species planted and a maximum of:

- 10 per cent weed cover in restoration zones (unless option to retain existing grassland is undertaken); and
- 20 percent weed cover in rehabilitation zones.

The above 20 percent weed cover in rehabilitation zones allows for the staged retention of any potential habitat provided by introduced shrub and ground layer patches/clumps.

### 4.5.4 Defects liability (24 months)

The Plant Establishment / Defects Liability Period shall be in force for 24 months (2 years) after Practical Completion of each stage of the works or until the site is stable, whichever is the longer period.

Any defective work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or of any other cause, shall be removed and replaced at the Contractor's expense by work or materials of the required standard.

## 4.6 Maintenance

The drainage easement will require a reasonable level of maintenance in perpetuity to ensure that:

- Weed growth is kept under control to ensure:
  - pre-maintenance weed control cost and effort are not wasted,
  - biodiversity values and ecological function are maintained.
- The channel is kept clear of fallen debris, rubbish or other potential impediments that may impact on flood flows.
- Build-up of fuel is routinely removed to reduce bush fire hazard.

### 4.6.1 Fuel reduction maintenance

Slashing is undertaken to reduce the potential intensity of a fire in grassed areas throughout the year but especially prior to the bushfire season.

VMP Zones 2 and 3 need to be managed as follows (to ensure it does not become a bushfire hazard):

a. Trees
   - tree canopy cover should be less than 15% at maturity
   - trees at maturity should not touch or overhang buildings
   - lower limbs should be removed up to a height of 2m above the ground
   - tree canopies should be separated by 2 to 5m
   - preference should be given to smooth barked and evergreen trees

b. Shrubs
   - creation of 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
   - clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation

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

## 4.7 Performance measures

Performance targets are necessary to objectively measure the progress and the achievement of the VMP objectives.

The anticipated timing of VMP management activities and related performance measures are outlined below:

1) All environmental and priority weeds are to be continuously suppressed and, if possible, eradicated from the site using recognised appropriate bush regeneration methods in accordance with best practice.
2) Weed control and revegetation works are to be carried out by a qualified bushland regeneration contractor.
3) Reconstruction specified vegetation communities with a minimum 90% cover of native species achieved.
4) Weed control targets of 5% (or less) at the end of the development's implementation of the VMP (i.e., after 30 months or 2½ years)

## 4.8 Monitoring and reporting

Table 4-1 summarise the anticipated monitoring and reporting requirements and frequency of reporting required.

**Table 4-1. Anticipated monitoring and reporting requirements**

| Item | Report type | Frequency |
|---|---|---|
| 1 | Plant procurement | + Final plant schedule and order confirmed<br>+ Nursery inspection (minimum 1 month pre-delivery to site) |
| 2 | Completion of primary and secondary weed control works | Site inspection and compliance verification (at least once with follow up inspections as required) |
| 3 | Delivery of plant materials prior to commencement of planting works | To be determined in consultation with nursery and VMP personnel or contractor |
| 4 | Practical completion (PC) of planting program | Site inspection and compliance verification (at least once with follow up inspections as required) |
| 5 | Completion of plant establishment period (PEP) | Site inspection and compliance verification (at least once with follow up inspections as required) |
| 6 | Post PEP progress reporting | Submitted monthly with invoicing. To include:<br>+ Records of slashing – frequency required to maintain fuels levels as specified and for scheduling guidance<br>+ Records of herbicides used (including herbicide application/spray record sheets)<br>+ Monitoring photographs<br>+ Identification of any issues that require a management response. |
| 7 | Defects Liability Period | Site inspection and compliance verification (at least once with follow up inspections as required) |
| 8 | Handover | Ltr report including:<br>+ Identification of any issues that ongoing maintenance staff should be aware of<br>+ Recommended frequency of maintenance tasks required<br>+ Estimate of costs |
| 9 | Operational (ongoing maintenance) phase reporting | Quarterly reporting as per Item 6 progress reporting |

# 5 Implementation summary

The implementation summary in Table 5-1 is provided to assist in scheduling of MLG personnel or for tendering purposes should MLG choose to engage contractors to undertake, part or all of, the VMP works.

As the VMP is being undertaken voluntarily, the performance measures in Table 5-1 are provided as a guide and do not a conditional compliance requirement.

**Table 5-1. VMP implementation schedule**

| Task | Timing | Performance measure |
|---|---|---|
| Plant procurement | Minimum 4-6mths pre-commencement of VMP implementation | + Plants that are not: true to species; vigorous and healthy; with a well-developed root system; free from disease / pests; and are not without scars or dead wood; shall be rejected at delivery. |
| Site preparation (demarcation of management zones, set up of photographic monitoring sites) | At commencement | + VMP zones clearly demarcated with GPS measurements and photography from monitoring sites provided to the satisfaction of the VMP superintendent |
| Completion of primary weed control | At commencement – following site preparation | + 100% of revegetation management zones treated (zones 2 & 3)<br>+ 100% of herbaceous weed control and 50-80% of woody weed control completed in Zone 1 (dependent on habitat provision – to be determined during tender phase) |
| Completion of secondary weed control | At intervals of not more than four weeks following the completion of primary weeding | + All areas where primary weed control has been undertaken<br>+ All herbaceous weeds should be managed to be at very-low percentage cover levels, (as a minimum 10% cover, or better in zone 1). |
| Completion of revegetation planting works | Practical Completion | + Mulching or jute matting (supplied & installed)<br>+ 100% of plants installed, including fertiliser and water crystals |
| Practical Completion | 6 months | + Minimum 90% per cent survival rate of each species planted in all zones<br>+ Maximum 20% weed cover in regeneration zones (or as appropriate |

| Task | Timing | Performance measure |
|---|---|---|
| | | depending on any retained weed growth for habitat provision)<br>+ 100% of Zones 2 and 3 maintained by slashing at 100mm height |
| Defects Liability Period | 24 months | + Minimum 90% per cent survival rate of each species planted<br>+ Maximum 5% weed cover in Zone 2<br>+ 100% of Zones 2 and 3 maintained by slashing (and guidance provided as to frequency required to maintain at 100mm height). |
| Maintenance | In perpetuity | The riparian zone will remain under the control and management of MLG.<br>Ongoing maintenance will be required as follows:<br>+ Maintain weed cover at low levels in all zones.<br>+ Ensure that fire hazard in Zones 2 and 3 are minimised, as follows:<br>◦ All understorey vegetation within Zones 2 and 3 must be slashed five (5) times per year.<br>As a guide grass should be kept to no more than 100mm in height) and leaves and vegetation debris should be removed.<br>◦ Lopping/trimming of trees to ensure:<br>▪ lower limbs of trees are removed up to a height of 2m above the ground<br>▪ tree canopies are separated by 2-5m<br>◦ Thinning/trimming of shrubs to ensure that they do not:<br>▪ form greater than 10% of the total ground cover<br>▪ becomes established beneath tree canopies |

| Task | Timing | Performance measure |
|---|---|---|
| | | ▪ creation of large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided<br>◦ Thinning/trimming of shrubs as required to maintain large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings |

# Appendix A. Plant Species Schedule

| Species name | Common name | Location |
|---|---|---|
| **Large trees** | | |
| Angophora floribunda | Rough-barked apple | As shown on landscape plan in Zones 2 and 3 |
| Eucalyptus longifolia | Woollybutt | |
| Eucalyptus resinifera | Red mahogany | |
| Eucalyptus robusta | Swamp mahogany | |
| Eucalyptus tereticornis | Forest redgum | |
| **Trees/shrubs** | | |
| *Breynia oblongifolia* | Coffee bush | As shown on landscape plan in Zone 2 |
| *Ficus coronata* | Sandpaper fig | |
| *Glochidion ferdinandi* | Cheese tree | |
| *Leptospermum polygalifolium* | Tantoon | |
| *Melaleuca linariifolia* | Flax-leaved paperbark | |
| *Melaleuca stypheloides* | Prickly-leavd paperbark | |
| *Polyscias sambucifolia* | Elderberry ash | |
| **Grasses / grass like / sedges** | | |
| *Dianella caerulea* | Native flax lily | As shown on landscape plan in Zone 2 |
| *Echinopogon ovatus / caespitosus* | Forest hedgehog grass | |
| *Entolasia marginata* | Bordered panic | |
| *Hemarthria uncinata* | Matgrass | |
| *Microlaena stipoides* | Weeping meadow grass | |
| *Oplismenus aemulus / imbecilis* | Australian basket grass | |
| **Rushes/Sedges** | | |
| *Machaerina juncea* | Bare twig rush | Zone 2 & 3 lower batters and Zone 5 (swale) |
| *Carex appressa* | Tall sedge | |
| *Juncus usitatus* | Common rush | |
| **Aquatic species** | | |
| *Marsilea nutica* | Nardoo | Zone 4 |
| *Philydrum lanuginosum* | Woolly frogsmouth | |
| *Ranunculus inundatus* | River buttercup | |
| *Liparophyllum (syn. Villarsia) exaltata* | Yellow marsh flower | |
| **Ferns** | | |
| *Hypolepis muelleri* | Harsh ground fern | Zone 2 & 3 lower batters |
| **Groundcovers/scramblers** | | |
| *Brunoniella australis* | Austral blue trumpet | Zone 2 |
| *Centella asiatica* | Gotu Kola | |
| *Goodenia bellidifolia* | - | |
| *Hydrocotyle laxifolia / tripartita* | Native pennywort | |
| *Viola betonicifolia/ hederacea* | Native violets | |

| Species name | Common name | Location |
|---|---|---|
| Groundcovers/scramblers – landscaping edge | | |
| *Brunoniella australis* | Austral blue trumpet | Pathway gardens |
| *Centella asiatica* | Gotu Kola | |
| *Dianella caerulea* | Native flax lily | |
| *Geranium homeanum/solanderi* | Native geraniums | |
| *Hardenbergia violacea* | Native sarsaparilla (prostrate form) | |
| *Hibbertia scandens* | Guinea flower | |
| *Oplismenus aemulus / imbecilis* | Australian basket grass | |
| *Pseuderanthemum variabile* | Pastel flower | |
| *Viola betonicifolia/ hederacea* | Native violets | |

# Appendix B. Historical imagery

**1965**

No evidence of drainage line / channel evident

**1974**

Farm dams and series of channels evident (as faint straight lines).

**1983**

Artificial drainage channels more discernible, evidence moist floodplain conditions (two farm dams highlighted)

**1995**

Clearing for MRC evident

**1997** – dam locations shown, no evidence of drainage lines

**2001** – constructed wetland and drainage evident – former drainage alignment shown

**2005**– residential area to south completed – former drainage alignment shown

**2010** – complete concrete lined channel evident

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