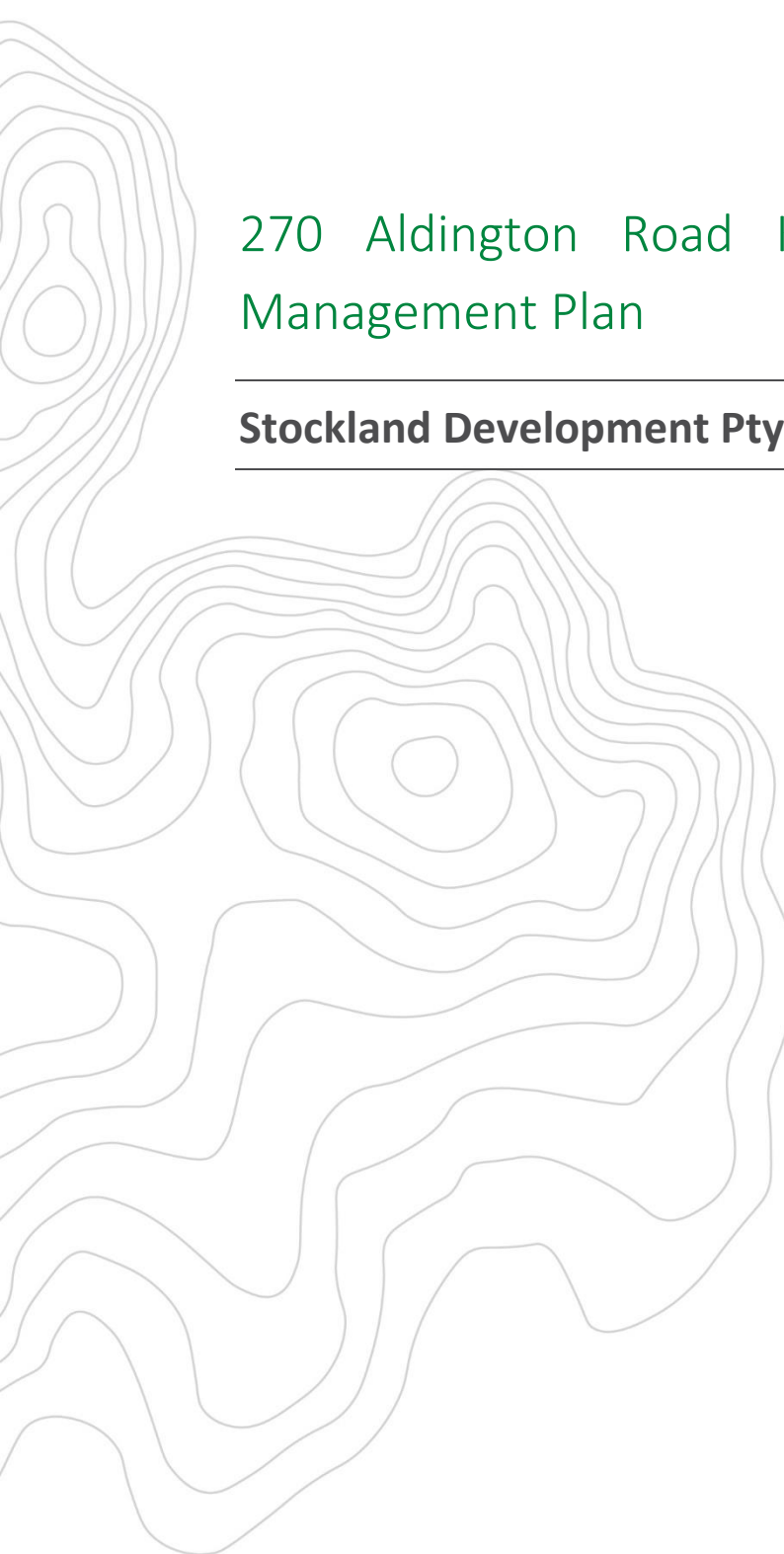




270 Aldington Road Kemp's Creek – Vegetation Management Plan

Stockland Development Pty Ltd

DOCUMENT TRACKING

Project Name	270 Aldington Road Kemps Creek – Vegetation Management Plan
Project Number	23SYD5214
Project Manager	Courtney Blick
Prepared by	Kody Kemp and Courtney Blick
Reviewed by	Andrew Whitford
Approved by	David Bonjer
Status	Final
Version Number	4
Last saved on	20 February 2025

This report should be cited as ‘Eco Logical Australia 2023. 270 Aldington Road Kemps Creek – Vegetation Management Plan. Prepared for Stockland Development Pty Ltd.’

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Stockland and AT&L.

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Template 2.8.1

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Abbreviations

Abbreviation	Description
AABR	Australian Association of Bush Regenerators
CPW	Cumberland Plain Woodland
DCP	Development Control Plan
DDP	Dam Dewatering Plan
ELA	Eco Logical Australia
FFA	Flora and Fauna Assessment
LGA	Local Government Area
PCT	Plant Community Type
VMP	Vegetation Management Plan
WEMP	Weed Eradication Management Plan

1. Introduction

This Vegetation Management Plan (VMP) has been prepared by Eco Logical Australia (ELA) on behalf of Stockland Development Pty Ltd (Stockland) for the development of 270 Aldington Road, Kemps Creek NSW. This VMP applies to the proposed Sydney Water trunk drainage channel, being a 20 m wide channel along the western boundary and 10 m wide channel along the northwest, in Lot 17 (Figure 1).

The study area is located across the entirety of Lots 16 and 17 and the northern portion of Lot 15 in Deposited Plan (DP) 253503 within the Penrith City Council (herein referred to as Council) Local Government Area (LGA).

1.1 Background

The proposed development will subdivide the property into four (4) lots and associated infrastructure works, including the following:

- Subdivision of lots and subdivision works
- Construction of estate and collector road across boundary (within Lot 15)
- Construction of trunk drainage channels that form part of the Mamre Road Precinct Stormwater Scheme to be managed by Sydney Water

To facilitate these works vegetation and dam removal is required prior to construction. Dam removal will be guided by the Dam Dewatering Plan (DDP) prepared by ELA (2023a). The removal of vegetation has been assessed under a Flora and Fauna Assessment (FFA) (ELA 2023b). The study area contains a small, isolated patch (approximately 0.21 ha) of remnant Cumberland Plain Woodland (CPW) with the remaining land consisting of farm dams, exotic vegetation and cleared/built areas (Figure 2). This report includes the results of vegetation validation and hydrological features within the study area, determining that no watercourses were present throughout the study area at the time of assessment. Lot 18 (north of the study area) has since been developed, including a defined channel. Council referred the application to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Water Group who issued general terms of approval (GTA) requiring a Controlled Activity Approval (CAA) before commencing any controlled activity on waterfront land. Proof of development consent must be included in the CAA application by the consent holder.

The establishment of vegetation within the trunk drainage channels will be guided by this VMP. This VMP has been prepared in accordance with the *Stormwater Scheme Infrastructure Design Guideline Draft – Western Sydney* (Version 2022-1.0) prepared by Sydney Water. This scheme provides technical, design and revegetation guidelines for trunk drainage systems within the Mamre Road Precinct Stormwater Scheme. The trunk drainage channel area will be subject to an easement for maintenance by Sydney Water following an agreed establishment period.

This VMP has also been prepared based on current best practice and is consistent with the Natural Resources Access Regulator (NRAR) Guidelines, including provision of indicative costs for management actions.

1.2 Scope and Objectives of the Vegetation Management Plan

The objective of this VMP are to improve ecological health and integrity, maintain and enhance habitat values within the VMP area, associated with a trunk drainage channel to be constructed.

This includes the revegetation of PCT 3320: Cumberland Plain Shale Woodland (CPW) canopy, shrubs, and grasses at the northwest boundary of the study area, to be managed as a trunk drainage system, and to clear weed species and regenerate all structural layers in the Category 2 riparian land area (per Figure 5).

This VMP covers an establishment period (estimated to be 6 months) and a five-year maintenance period, or until the objectives and performance criteria outlined in this VMP are met. The objectives for the VMP area summarised in Table 1.

Table 1: VMP Objectives

Objectives	Approach
Reinstate native vegetation along the trunk drainage channel and maintain ecological health (species composition and structure) within 5 years	• Rehabilitate and revegetate riparian corridor using appropriate native species. • Control weeds and prevent new outbreaks. • Assist in the natural regeneration of species. • Addition of logs and artificial hollows
Improve ecological health and integrity	• Control woody weeds. • Maximisation of biodiversity and ecological values. • Revegetate using appropriate native species. • Undertake ongoing weed maintenance.
Stabilise bed and bank along the trunk drainage system	• Installation of rip rap at potential scout locations, including upstream and downstream of culverts • “Soft engineering” approach with a focus on planting locally native species

1.3 Preparation and implementation of this plan

This VMP has been prepared by a Restoration Ecologist/s with over 5 years’ experience in environmental consultancy and a relevant Bachelor of Science degree.

A suitably qualified and experience 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 conduct best practice bush regeneration techniques as described by Buchanan (2009).



Figure 1: Study area and VMP area

2. Description of the environment

2.1 Location

The study area encompasses entirety of Lot 16 and 17 and the northern portion of Lot 15 DP 253503, located at 244 – 270 Aldington Road, Kemps Creek NSW. The land within the study area is zoned IN1 (General Industrial) in accordance with *State Environmental Planning Policy (Industry and Employment)*.

The VMP area is located in the northwest portion of the study area of Lot 17 (Figure 1).

2.2 Existing vegetation

Vegetation mapping provided within the FFA (ELA 2023b) details the Plant Community Types (PCT) and their condition per Figure 2. The study area is comprised of historically cleared land with remnant native vegetation, native paddock trees, exotic planted vegetation and exotic grass. The VMP area consists of exotic and native planted vegetation with small amounts of PCT 3975: *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney basin Bioregion (Figure 2).

A patch of PCT 3320 is present within the study area, outside the VMP area (Figure 2).

Habitat features were mapped throughout the study area (Figure 2), noting that no hollow-bearing trees (HBTs) will be removed within the VMP area. Removal of habitat features elsewhere in the study area for the proposed development is unavoidable and cut hollows will be relocated to the VMP area as habitat in accordance with Section 3.5.

2.2.1 PCT 3320 Cumberland Shale Plains woodland

This PCT is characterised by a tall open sclerophyll forest to woodland with a spare midstratum of soft leaved shrubs and small trees with a grassy ground cover on the undulating shale plains of western Sydney. *Eucalyptus tereticornis* and *Eucalyptus moluccana* mixed with *Eucalyptus crebra* are the typical dominant canopy species. *Acacia falcata*, *Acacia parramattensis*, *Acacia decurrens* and *Bursaria spinosa* are most frequently seen throughout the midstratum layer. The groundcover layer of this pct is primarily comprised of *Microlaena stipoides*, *Themeda triandra*, *dichondra repens*, *Desmodium varians*, *Aristida vagans* and *glycine tabacina*.

Table 2: Plant community types present within the study area

Vegetation Community	PCT ID and Name	BC Status	Act Status	EPBC Act Status	Area (ha)
Coastal Floodplain Wetland Communities	PCT 3975: <i>Southern Lower Floodplain Freshwater Wetland</i>	-	-	-	0.28
Cumberland Shale Plain Woodland in the Sydney Basin Bioregion	PCT 3320: Cumberland Shale Plain woodland	CE		Does not meeting listing criteria	0.21
Total					0.49



Figure 2: Vegetation and habitat features in relation to the VMP boundary



Figure 3: Watercourse validation and aquatic habitat

2.3 Topography and hydrology

The topography of the study area gently slopes from the eastern boundary to Aldington Road. The site contains two unnamed first order streams. These mapped streams were field validated and are considered to not meet the definition of a 'river' under the WM Act due to the absence of a defined channel, bed or bank. Validation was carried out under previous assessment (ELA 2021, ELA 2023b). No vegetation associated with the mapped Strahler streams is present within the study area. PCT 3975 is associated with the farm dam within the VMP area. Watercourse validation is presented in Figure 3. This has been superseded by assessment of the site by DCCEEW Water Group under an integrated development referral, which determined the need for a Controlled Activity Approval (CAA) following development consent before any works can commence on waterfront land.

The proposed Sydney Water trunk drainage channel subject to this VMP provides a connection to the site immediately north of the study area (Lot 18), which contains a channelised watercourse diverted underneath a road via culvert as a result of the development.

Mapped watercourses, watercourse validation (as completed by ELA in 2021) and context of the surrounding site are shown in Figure 3.

2.4 Priority weeds

The *Biosecurity Act 2015* (Biosecurity Act) and regulations provide specific legal requirements for the state level priority weeds (Table 3). Under the Biosecurity 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 reasonably practicable.

Specific legal requirements apply to State determine priorities under the *Greater Sydney Regional Strategic Weed Management Plan 2017-2022*, while regional priorities include outcomes to demonstrate compliance with the general biosecurity duty and strategic responses in the region to achieve relevant management objectives (Greater Sydney LLS 2017). Weeds listed as 'other weeds of regional concern' under the plan warrant resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, agriculture etc.

Weed species identified during the field survey for this VMP include six (6) Weeds of National Significance (WoNS), and nine (9) weeds listed as Regional Level Priority. There were ten (10) weeds listed as other weeds of regional concern. The weeds present, their priority listing under the Biosecurity Act, the associated asset or value at risk and whether they are WoNS is presented in Table 3.

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

Table 3: Priority weeds identified within the study area.

Scientific Name	Common Name	WoNS	Regional level priority weeds	Other weeds of regional concern	Biosecurity Act listing
<i>Asparagus asparagoides</i>	Ground Asparagus	Yes	Yes	Yes	Environment
<i>Asparagus densiflorum</i>	Foxtail Fern	Yes	Yes	Yes	Environment
<i>Bryophyllum sp.</i>	Mother of Millions	No	Yes	Yes	Environment
<i>Cestrum parqui</i>	Green Cestrum	No	Yes	Yes	Environment
<i>Ligustrum lucidum</i>	Broad Leaf Privet	No	No	Yes	Environment, Human health
<i>Lantana camara</i>	Lantana	yes	Yes	Yes	Environment, Human health
<i>Nassella neesiana</i>	Chilean Needle Grass	Yes	Yes	Yes	Environment
<i>Olea europaea</i>	African Olive	No	Yes	yes	Environment
<i>Rubus fruticosus</i>	Blackberry	Yes	Yes	Yes	Environment
<i>Senecio madagascariensis</i>	Fireweed	Yes	Yes	Yes	Environment, Human health

3. Construction and preliminary works

The developer will be responsible for the following works.

3.1 Temporary fencing and signage

The edge of the trunk drainage channel where it borders the development footprint is to be fenced with temporary construction fencing following construction channel, in accordance with the relevant fencing plan. This is to prevent unnecessary civil construction machinery from entering the VMP area unless under supervision from appropriate personnel (e.g. a suitably qualified ecologist or bush regenerator) while maintaining maintenance entry as required for restoration works.

Following the construction of the trunk drainage channel, informational signage must be installed on the construction fencing that identifies that there is to be no entry into the VMP area without appropriate personnel (Sydney Water maintenance staff, ecologist or bush regenerator) present.

The VMP area should be fenced permanently or similarly protected following completion of construction works to minimise long-term adverse impacts. Any fencing (per relevant fencing plan) should incorporate suitable access for VMP activities and other works such as stormwater maintenance.

3.2 Soil and water management

An Erosion and Sediment Control Plan, will be prepared as part of the Construction Environmental Management Plan (CEMP), and implemented prior to the commencement of any on-ground works.

The VMP area contains one dam that requires dewatering and removal prior to the construction of the trunk drainage channel. All dam dewatering and associated works must follow the Dam Dewatering Plan (ELA 2023a). Following dam dewatering activities and construction of the drainage channel, sediment controls are to be installed at to prevent sediment running into the trunk drainage channel area and limit the spread of weed propagules in soil sediments during the construction period.

The VMP area is to encompass the 10 and 20 m proposed trunk drainage channels along the northern and western boundaries, respectively, of the study area. This area will be required to be constructed during the civil works to conform to the *Stormwater Scheme Infrastructure Design Guideline Draft: Western Sydney* (Sydney Water 2022).

3.3 Preclearance and earthworks supervision

During construction activities, when clearing areas of existing vegetation, earthworks and tree removal should be undertaken with a fauna ecologist or wildlife carer present to capture and release any displaced fauna in suitable habitat adjacent to the development footprint, with assistance provided by wildlife carers to attend to and care for injured fauna as needed. All-natural timber (i.e., fallen logs and branches) should be retained on-site for use within the Management Zone 3 of the VMP area. Placement of timber within in this area must be undertaken with consultation of the project hydrologist or civil designer. Efforts to collect viable seed and genetic material from areas of native vegetation to be cleared (i.e. the patch of PCT 3320 within the study area) will be made for plant propagation uses and all native timber is to be cut into logs to be utilised as ground habitat for native fauna.

3.4 Pest control

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

3.5 Fauna habitat enhancement

During vegetation removal, hollow stems or sections of trees if found, should be cut out and used as habitat in the VMP area. Likewise, large woody material (> 10 cm diameter) removed from within the development footprint/impact area can be used as habitat structures within the VMP area. Woody material provides microhabitat for fauna species, soil stability and nutrients cycling. Exotic vegetation is to be taken off-site and should not be used in habitat enhancement. The placement of all fauna habitat augmentation/relocation is to be carried out under the supervision of a qualified ecologist.

3.6 Removal of existing vegetation

Where required, the civil contractor will organise the removal of existing vegetation throughout the VMP area in accordance with the above sections and consideration of Section 7.2 of this report.

3.7 Soil preparation prior to revegetation

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

After all construction works, including haul roads, are complete and civil construction vehicle movements are excluded then surfaces should be treated with appropriate topsoils, compost and ameliorants to finished levels, ripped (where necessary) and cultivated to a light friable consistency. It is assumed that the Civil Contractor will undertake the soil preparation works but the exact requirements should be finalised in consultation with a suitably qualified and experienced Restoration Ecologist.

For this VMP, it is assumed that earthworks will be required for all areas impacted by the installation of stormwater drainage, rock riprap installation, vegetation removal and other development impacts. As such, it is assumed that all areas within the VMP will require soil preparation works as identified in Table 4 below.

Table 4: Soil preparation works requirements

Task
Form and shape subgrade to 300 mm below final levels
Install 225 mm of suitable topsoil consistent with the natural local soils
Install 75 mm compost complying with AS4454-2012
Undertake soil testing and install suitable ameliorants depending on the results. An indicative example of what might be required includes: • 100 g/m² Gypsum • 20 g/m² microbial soil conditioner (e.g., Bactivate granular or equivalent) • 20 g/m² quick-release multi-source 5:2:8 NPK organic granular fertiliser (e.g., Terralift TX10 + MYCORRHIZA or equivalent) • 120 g/m² slow-release microbial native 14:1:4 NPK granular fertiliser (e.g., Troforte M Native, or equivalent)
Work in topsoil, compost, and ameliorants together at 25% volume (3 parts soil plus 1 part compost)
Install to a depth of 300 mm over subgrade
Rip and cultivate until light and friable

4. Vegetation management works

4.1 VMP management zones

The total VMP area is approximately 0.49 ha and encompasses three (3) management zones, as follows and shown in Figure 5:

- Zone 1: Low flow channel (Lower bank ephemeral planting)
- Zone 2: High flow channel (Upper bank ephemeral planting)
- Zone 3: Riparian zone (Riparian edge planting)

The VMP zones are represented in the concept plan (Appendix A) and the cross section in Figure 4 below (AT&L 2025).

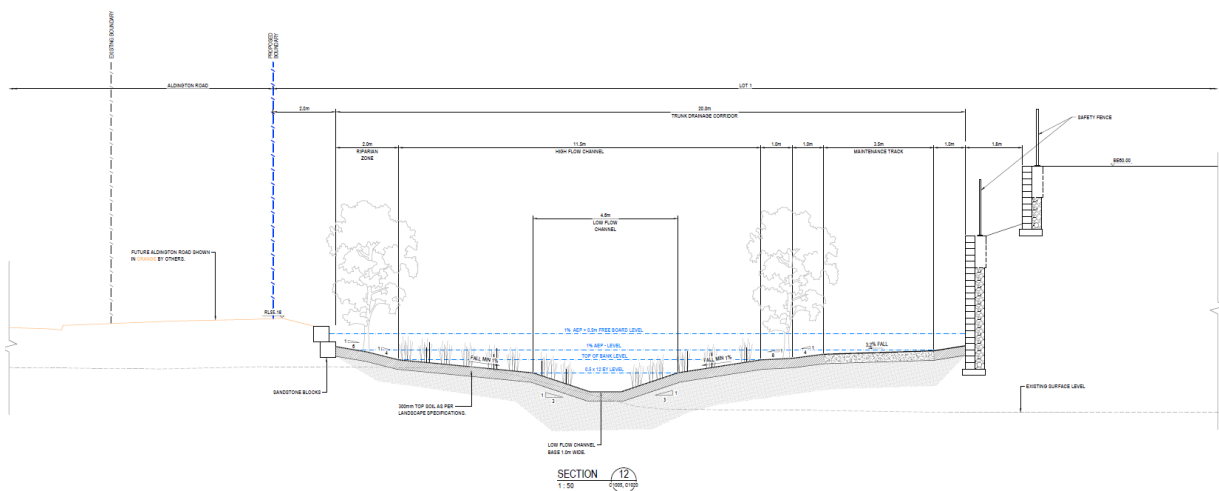


Figure 4: Trunk drainage channel cross-section, showing low flow, high flow and riparian zone extents

4.1.1 Zone 1: Low flow channel (Lower bank ephemeral planting)

Zone 1 (approximately 0.11 ha) will be constructed as per the Sydney Water design guidelines. This will be revegetated with native aquatic macrophyte species creating a low flow channel with a minimum width of 4.6 m. Once construction has been completed in this area, approximately 80% of this zone is expected to require revegetation.

The key management priorities within this zone are:

- Undertake vegetation removal
- Completion of civil construction works
- Enhance habitat features across the zone (e.g., rocks)
- Install jute matting
- Install native tubestock species at densities specified in the Sydney Water planting palette and within this VMP
- Irrigate until established and as needed ongoing
- Control of exotic grasses and other exotic species
- Monitor native vegetation and weed densities

4.1.2 Zone 2: High flow channel (Upper bank ephemeral planting)

Zone 2, approximately 0.14 ha, will be constructed as per the Sydney Water design guidelines to a width of 11.5 m including the low channel. Following construction of this zone, 100% of this zone will require revegetation.

- Undertake vegetation removal
- Completion of civil construction works
- Enhance habitat features across the zone (e.g., rocks, logs, etc.)
- Install jute matting
- Install native tubestock species at densities specified in the Sydney Water planting palette and within this VMP
- Irrigate until established and as needed ongoing
- Control of exotic grasses and other exotic species
- Monitor native vegetation and weed densities

4.1.3 Zone 3: Riparian Zone (Riparian edge planting)

Zone 3, approximately 0.18 ha, will be constructed as per the Sydney Water design guidelines. Following construction of this zone, 100% of this zone will require revegetation.

- Undertake vegetation removal
- Completion of civil construction works
- Enhance habitat features across the zone (e.g., rocks logs, etc.)
- Install jute matting and mulching
- Install native tubestock species at densities specified in the Sydney Water planting palette and within this VMP
- Irrigate until established and as needed ongoing
- Control of exotic grasses and other exotic species
- Monitor native vegetation and weed densities



Figure 5: VMP Management Zones

4.2 Weed Control

4.2.1 Primary and secondary weed control

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

Primary weed control will include the removal of all woody and herbaceous exotic species outlined in the WEMP (ELA 2023c).

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 Section 7.2.2 and the WEMP prepared by ELA (2023c).

4.2.2 Maintenance

Following primary and secondary weed removal works, 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 Section 5.

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

4.3 Revegetation

All zones will require revegetation. Revegetation works will include planting of native groundcover, grass shrub and canopy species. All revegetation will be using tube stock and Hiko/Viro cells. The revegetation area within each management zone is shown in Table 5.

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

Jute matting will be required in areas of higher inundation and flows expected during high rainfall periods. Due to the VMP area encompassing a trunk drainage channel all management zones are required to have jute matting installed. Jute matting must be comprised of 100% biodegradable jute fibres with a minimum weight of 680 g/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.

Existing vegetation is described in Appendix B. Planting densities for each management zone are provided in Table 6. Revegetation will be completed with species consistent with vegetation

communities that would naturally occur in *Cumberland Shale Plains woodland*. All plantings are to be sourced from local provenance stock as per the Florabank guidelines (Mortlock, 2000).

Table 5: Planting Assumptions

Zone	Description	Sum of Area (m ²)	Reveg Area (%)	Reveg area (m ²)	Jute Area (%)	Jute Area (m ²)	Mulch Area (%)	Mulch Area (m ²)
1	Low Flow channel	1,076	100	1,076	100	1,076	0	0
2	High Flow channel	1,400	100	1,400	100	1,400	0	0
3	Riparian zone	1,752	100	1,752	100	1,752	0	0
TOTAL		4,229		4,229		4,229	-	-

Table 6: Revegetation Densities

Zone	Description	Revegetation (m ²)	Revegetation densities (m ²)				Totals
			Tree	Shrub	Herbs / Scramblers	Sedge / Grass	
1	Low Flow channel	1,076	-	-	-	4	4,305
2	High Flow channel	1,400	-	-	4	4	5,601
3	Riparian zone	1,752	1/25	1/12	4	4	14,235
TOTAL		4,229	70	146	7,009	16,916	24,141

5. Implementation Schedule

5.1 Implementation schedule

The VMP area will be managed with an untimed establishment period, assumed to be 6-months, and a subsequent five-year maintenance period.

An indicative implementation schedule has been provided in Table 7.

5.2 Adaptive management

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

The success of the works will be determined by meeting the performance criteria identified in Table 8. Contractors have the flexibility to implement different techniques to those specified here providing that performance criteria are met. Any major departures from the VMP or proposed changes to performance criteria must be undertaken after the opportunity for inspection with Sydney Water and approved in writing by Sydney Water.

5.3 VMP management after the initial five-year period (in perpetuity)

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

5.4 Training

The site manager and relevant staff will require training and/or inductions into the requirements of this VMP, including the location and requirements of tree/vegetation protection zones (if implemented prior to or concurrently with onsite construction works).

Table 7: Implementation Schedule

Task	Preliminary	Establishment	Year 1				Year 2				Year 3				Year 4				Year 5				
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Preliminary works																							
Earthworks and construction of drainage channel																							
Site mark out/fencing																							
Revegetation																							
Seed collection, cleaning, storage																							
Site Preparation																							
Jute Matting / Mulch																							
Tubestock, supply and install																							
Replacement tubestock, supply and install																							
Irrigation																							
Weed control																							
Establishment																							
Maintenance - Years 1-2																							
Maintenance - Year 3-5																							
Associated works																							
Monitoring & Reporting																							
Key	Civil construction activities																						
	Vegetation management works																						

6. Monitoring and reporting

The bush regeneration contractor 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 control 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 the cost effectiveness of the VMP.

Monitoring will be undertaken by photo monitoring and vegetation surveys. Monitoring will need to be implemented prior to works commencing to establish a benchmark for performance, and to occur on a six-monthly basis for year 1 and 2 then annually until the completion of the project. Monitoring results will be included in the progress report.

6.1 Vegetation surveys

Quadrat data points will be set up within the VMP area at each photo point to monitor changes in the vegetation through time. The quadrat data forms the baseline for monitoring against the performance criteria for the duration of the VMP. Floristic plot data is to be collected including species richness, cover and abundance in a 5 x 5 m minimum sized quadrat.

6.2 Photo monitoring

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

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

6.3 Progress reports

Progress reports are to be provided at the end of the establishment period then annually until the completion of the project. This reporting includes the implementation of the monitoring actions

specified in **Section 6** and a description of the works that have been undertaken. These reports will be submitted to Sydney Water. Reports will include at a minimum:

- The time period the report relates to,
- Qualifications and experience of contractors,
- Certification of seed and local provenance stock,
- A summary of works carried out within the period including:
 - Date and time of site visits,
 - Works completed on the site at each visit,
 - A table detailing total person hours for each task carried out on-site,
 - Methods of weeding undertaken and details of herbicide use,
 - Numbers of tube stock planted if applicable,
 - Methods implemented for Assisted Natural Regeneration,
- Photo monitoring results to date,
- A description of any problems encountered in implementing the works outlined in this VMP and how they were overcome,
- Any observations made, including new plant species recorded (native and weed species), comments on rates of regeneration and any problems which impact on the implementation of the VMP,
- If applicable, the results of the implementation works in relation to the relevant performance criteria.

6.4 Performance criteria

The performance criteria are detailed in Table 8.

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

If monitoring indicates that the VMP tasks are not resulting in achievement of the performance criteria, the task program will be revised. Stockland Development Pty Ltd and the bush regeneration contractor, in consultation with Sydney Water can adapt these criteria as required in response to the success of rehabilitation works.

Once the performance criteria in Table 8 are achieved, the following performance criteria will need to be achieved in perpetuity:

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

Table 8: Performance criteria

Management Zones	Establishment	Year 1	Year 2	Year 3	Year 4	Year 5
All Zones	- Commencement of all tasks outlined in the VMP or evidence of planning for their implementation. <i>Civil construction works:</i> - All Construction and sediment fencing installed - Information signage installed - Removal and disposal of all exotic vegetation throughout the VMP, completed under the supervision of a qualified ecologist - Dam dewatering and aquatic fauna relocation undertaken as per the sites Dam dewatering plan - All earthworks completed under the supervision of an ecologist or bush regenerator - All rubbish and debris and debris are removed - All soil preparation works completed to provide suitable conditions for revegetation <i>Vegetation management works:</i> - Revegetation is to be undertaken with a minimum of 40% of the benchmark levels for species diversity provided in Table 9 85% survival of native vegetation or equivalent regeneration and no areas with more than 2mx2m without surviving native plants - Maintenance replanting is to replace plants by the same species or where that species is unavailable 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. - Treatment of any new weed infestations - No woody weeds present capable of producing seed - No erosion or sedimentation beyond the boundary of the development lot - Monitoring and reporting undertaken in accordance with Section 6					
All Zones	Undertake all revegetation as per VMP	Native vegetation cover no less than 50% of non-rock areas	Native vegetation cover no less than 60% of non-rock areas	Native vegetation cover no less than 70% of non-rock areas	Native vegetation cover no less than 80% of non-rock areas	Native vegetation cover no less than 90% of non-rock areas
	Treat 100% of priority weeds	No greater than 15% cover by priority weeds	No greater than 10% cover by priority weeds	No greater than 5% cover by priority weeds	No greater than 2% cover by priority weeds	No greater than 2% cover by priority weeds
	Treat 95% of other weeds	No greater than 30% cover by other weeds	No greater than 20% cover by other weeds	No greater than 10% cover by other weeds	No greater than 5% cover by other weeds	No greater than 5% cover by other weeds

Table 9: PCT benchmark condition

PCT ID	PCT Common name (BioNet 2025)	Species richness			Cover (%)		
		Canopy	Shrub	Ground cover	Canopy	Shrub	Ground cover
3320	Cumberland Shale Plain Woodland	5	8	26	52	15	68

7. Cost

The cost of implementation for the five-year period is approximately **\$300,000** exclusive of GST and CPI. An indicative annual costing timeline for the establishment period to Year 5 is provided Table 10. Costs should be reassessed at the end of Year 2 based on the results of the management undertaken to that point. Rates and costs are based on typical commercial rates. Assumptions that have been made regarding the estimation of costs have been outlined below.

7.1 Construction and preparation works

It is assumed that all soil preparation works and vegetation clearing including primary weed removal will be undertaken by the civil contractor under the supervision of a qualified Ecologist or Bush Regenerator. No costs have been provided in this VMP for the soil preparation, vegetation clearing or supervision by a suitably qualified and experienced restoration ecologist.

Civil construction activities are identified in Table 7 and have not been included in Table 10.

7.2 Vegetation management works

7.2.1 Site preparation techniques

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

7.2.2 Weed control techniques

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

Specific weed control techniques are available in Appendix C

7.2.3 Revegetation treatments

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

A total of approximately **25,000** plants are assumed to be required to achieve the densities identified in the VMP, plus a 10% rate for replacement plantings to be installed throughout the remainder of the VMP period after initial revegetation works.

7.2.4 Seed collection

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

7.2.5 Monitoring and reporting

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

This includes:

- The initial set up of the photo points and conducting the baseline surveys at the beginning of the establishment period
- Preparing monitoring reports, including photo points and vegetation surveying at the end of the establishment period and annually until the end of year 3.

7.3 Pest control

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

Table 10: Indicative costing of VMP Implementation

Treatment	Establishment	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Revegetation							
Seed collection, cleaning, storage	\$ 3,621	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,621
Site Preparation	\$ 4,229	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,229
Jute Matting / Mulch	\$ 31,717	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 31,717
Tubestock, supply and install	\$ 61,001	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 61,001
Replacement tubestock, supply and install	\$ -	\$ 6,100	\$ -	\$ -	\$ -	\$ -	\$ 6,100
Irrigation	\$ 9,515	\$ 1,057	\$ -	\$ -	\$ -	\$ -	\$ 10,572
Weed control							
Establishment	\$ 12,687	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 12,687
Maintenance - Years 1-2	\$ -	\$ 30,237	\$ 24,739	\$ -	\$ -	\$ -	\$ 54,975
Maintenance - Years 3-5	\$ -	\$ -	\$ -	\$ 22,836	\$ 20,933	\$ 19,664	\$ 63,433
Associated costs							
Disbursements	\$ 1,269	\$ 3,024	\$ 2,474	\$ 2,284	\$ 2,093	\$ 1,966	\$ 13,110
Monitoring & Reporting	\$ 6,343	\$ 6,343	\$ 6,343	\$ 6,343	\$ 6,343	\$ 6,343	\$ 38,060
Total	\$ 130,381	\$ 46,761	\$ 33,556	\$ 31,463	\$ 29,370	\$ 27,974	\$ 299,505

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Appendix A VMP Concept Plan

The concept plan provided below (Figure 6) is intended for illustrative purposes only. This concept plan is not intended to prescribe specific locations for the planting of species under this VMP, and should not be treated as such. Instead, the objectives and revegetation criteria are to be met under this VMP, with the concept plan provided in Figure 6 to be referenced as an indication of the treatments within each of the three (3) VMP zones. The performance criteria (Table 8) are the most important indicators of successful implementation of this VMP.

The placement of trees and shrubs in Zone 3 is indicative only and has been based on the densities calculated in Table 6 of this VMP. A random scatter of points to represent the planting of 70 trees (based on 1/25 m² density) and 146 shrubs (based on 1/12 m² density) within Zone 3 has been applied using ArcGIS Pro tool. Locations for the prescribed number of trees and shrubs (along with herbs, scramblers, sedges and grasses which are not indicated by points in Figure 6 due to the large numbers) are to be determined by the appointed qualified bush regeneration contractor implementing this plan.



Figure 6: Vegetation Management Plan – Concept Plan

Appendix B Existing Vegetation

Botanical Name	Common Name
<i>Anagallis arvensis</i>	Scarlet Pimpernel
<i>Araujia sericifera</i>	Moth Vine
<i>Aristida ramosa</i>	Purplish Wiregrass
<i>Asparagus asparagoides</i>	Bridal Veil Creeper
<i>Asparagus densiflorum</i>	Foxtail Fern
<i>Araucaria norfolkensis</i>	Norfolk Island Pine
<i>Avena</i>	Wild Oats
<i>Bauhinia variegata.</i>	Mountain Ebony
<i>Bougainvillea</i> sp.	Bougainvillea sp.
<i>Briza subaristata</i>	
<i>Bromus</i> sp.	
<i>Callistemon wimmerensis</i>	
<i>Casuarina glauca</i>	Swamp She-Oak*
<i>Centaureum pulcherri</i>	Lesser Centaury
<i>Cerastium glomeratum</i>	Mouse Ear Chickweed
<i>Cestrum parqui</i>	Green Cestrum
<i>Chloris gayana</i>	Rhodes Grass
<i>Chloris ventricosa</i>	Tall Windmill Grass*
<i>Cirsium vulgare</i>	Black Spear Thistle
<i>Cymbopogon refractus</i>	Barbed Wire Grass*
<i>Cynodon dactylon</i>	Common Couch
<i>Cyperus gracilis</i>	Slender Flat Sedge*
<i>Dichondra repens</i>	Kidney Weed*
<i>Einadia nutans</i>	Climbing Saltbush *
<i>Entolasia stricta</i>	Wiry Panic*
<i>Eragrostis curvula</i>	African Lovegrass
<i>Eucalyptus moluccana</i>	Grey Box*
<i>Eucalyptus tereticornis</i>	Forest Red Gum*
<i>Fimbristylis dichotoma</i>	Common Fringe Sedge*
<i>Foeniculum vulgare</i>	Fennel
<i>Geranium solanderi</i>	Native Geranium*
<i>Glycine clandestina</i>	Twining Glycine*
<i>Glycine tabacina</i>	*
<i>Grevillia linearifolia</i>	*

Botanical Name	Common Name
<i>Grevillia robusta</i>	Silky Oak *
<i>Hypochaeris radicata</i>	Cats Ear
<i>Juncus usitatus</i>	Common Rush*
<i>Lantana camara</i>	Lantana
<i>Ligustrum lucidum</i>	Broad Leaved Privet
<i>Lolium spp.</i>	Rye Grass
<i>Melaleuca styphelioides</i>	Prickly Leaved Tea Tree*
<i>Melia azedarach</i>	White Cedar*
<i>Microlaena stipoides</i>	Weeping Grass*
<i>Modiola carolina</i>	Red Flowered Mallow
<i>Olea europaea</i>	Olive
<i>Paspalum dilatatum</i>	Paspalum
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Phoenix canariensis</i>	Canary Island Date Palm
<i>Phytolacca octandra</i>	Inkweed
<i>Pinus radiata</i>	Radiata Pine
<i>Plantago lanceolata</i>	Lambs Tongue
<i>Rubus fruticosus</i>	Blackberry
<i>Rumex sp.</i>	Dock spp.
<i>Senecio madagascariensis</i>	Fireweed
<i>Setaria parviflora</i>	Setaria
<i>Sida rhombifolia</i>	Paddy's Lucerne
<i>Solanum sisymbodium</i>	Sticky Nightshade
<i>Sonchus oleracea</i>	Sow Thistle
<i>Sporobolus africanus</i>	Parramatta Grass
<i>Sporobolus creber</i>	Western Rats Tail Grass*
<i>Sporobolus fertilis</i>	Giant Parramatta Grass
<i>Themeda triandra</i>	Kangaroo Grass*
<i>Trifolium repens</i>	White Clover
<i>Typha orientalis</i>	Broadleaf Cumbungee*
<i>Verbena bonariensis</i>	Purple Top
<i>Verbena officinalis</i>	Common Verbena
<i>Vicia sativa</i>	Common Vetch

Appendix C Recommended planting scheme

Stata	Botanical Name	Common name	Zone 1	Zone 2	Zone 3
Trees	<i>Acacia implexa</i>	Hickory wattle			X
	<i>Acacia parramattensis</i>	Sydney Green Wattle			X
	<i>Angophora floribunda</i>	Rough-barked Apple			X
	<i>Casuarina glauca</i>	Swamp Oak			X
	<i>Corymbia maculata</i>	Spotted Gum			X
	<i>Eucalyptus amplifolia</i>	Cabbage Gum			X
	<i>Eucalyptus crebra</i>	Narrow-Leaved Ironbark			X
	<i>Eucalyptus elata</i>	River White Gum			X
	<i>Eucalyptus eugenoides</i>	White Stringybark			X
	<i>Eucalyptus fibrosa</i>	Red Ironbark			X
	<i>Eucalyptus moluccana</i>	Grey Box			X
	<i>Eucalyptus tereticornis</i>	Forest Redgum			X
	<i>Melaleuca linariifolia</i>	Snow in Summer			X
	<i>Melaleuca styphelioides</i>	Prickly-Leaved Paperbark			X
	<i>Melia azedarach</i>	White Cedar			X
	<i>Ozothamnus diosmifolius</i>	Rice Flower			X
Shrubs	<i>Tristanopsis laurina</i>	Water Gum			X
	<i>Acacia falcata</i>	Sickle Wattle			X
	<i>Acmena smithii</i>	Lilly Pilly			X
	<i>Breynia oblongifolia</i>	Coffee Bush			X
	<i>Bursaria spinosa</i>	Blackthorn			X
	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea			X
	<i>Dillwynia sieberi</i>	Prickly-Parrot Pea			X
	<i>Indigofera australis</i>	Australian Indigo			X
Grasses and groundcovers	<i>Melaleuca decora</i>	White Feather Honey Myrtle			X
	<i>Carex appressa</i>	Tall Sedge	x	X	X
	<i>Aristida ramosa</i>	Purple Wiregrass		X	X
	<i>Aristida ramosa</i>	Purple Wiregrass		X	X
	<i>Aristida vagans</i>	Three awn Speargrass		X	X
	<i>Arthropodium milleflorum</i>	Vanilla Lily		X	X
	<i>Austrostipa ramosissima</i>	Stout Bamboo Grass		X	X
	<i>Brunoniella australis</i>	Blue Trumpet		X	X
	<i>Centella asiatica</i>	Centella		X	X

Stata	Botanical Name	Common name	Zone 1	Zone 2	Zone 3
	<i>Cheilanthes sieberi</i>	Mulga Fern		X	X
	<i>Chloris truncata</i>	Windmill Grass		X	X
	<i>Chloris truncata</i>	Windmill Grass		X	X
	<i>Chloris ventricosa</i>	Plump Windmill Grass		X	X
	<i>Clematis glycinoides</i> var.			X	X
	<i>Commelina cyanea</i>	Scurvy Weed		X	X
	<i>Cymbopogon refractus</i>	Barbed Wiregrass		X	X
	<i>Cymbopogon refractus</i>	Barbed Wiregrass		X	X
	<i>Desmodium varians</i>	Slender Tick-trefoil		X	X
	<i>Dianella longifolia</i>	Smooth Flax Lily	x	X	X
	<i>Dianella longifolia</i>	Smooth Flax Lily		X	X
	<i>Dichelachne micrantha</i>	Short-hair Plume Grass		X	X
	<i>Dichelachne micrantha</i>	Short-hair Plume Grass		X	X
	<i>Dichondra repens</i>	Kidney Weed		X	X
	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass		X	X
	<i>Einadia hastata</i>	Berry Saltbush		X	X
	<i>Einadia trigonos</i> subsp.	Trigonos Fishweed		X	X
	<i>Entolasia marginata</i>	Boarded Panic		X	X
	<i>Eremophila debilis</i>	Winter Apple		X	X
	<i>Euchiton sphaericus</i>	Cudweed		X	X
	<i>Ficinia nodosa</i>	Knobby Club Rush	x	X	X
	<i>Geranium solanderi</i>	Native Geranium		X	X
	<i>Glycine clandestine</i>	Twining Glycine		X	X
	<i>Glycine tabacina</i>	Love Creeper		X	X
	<i>Goodenia hederacea</i>	Forest Goodenia		X	X
	<i>Hardenbergia violacea</i>	Purple Coral Pea		X	X
	<i>Hibbertia diffusa</i>	Wedge Guinea Flower		X	X
	<i>Imperata cylindrica</i>	Blady Grass		X	X
	<i>Juncus usitatus</i>	Common Rush	x	X	X
	<i>Lepidosperma laterale</i>	Variable Sword Sedge		X	X
	<i>Lomandra filiformis</i>	Wattle Mat-rush		X	X
	<i>Lomandra filiformis</i>	Wattle Mat-rush	x	X	X
	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Meadow Grass		X	X
	<i>Opismenus aemulus</i>	Creeping Beard Grass		X	X
	<i>Oxalis perennans</i>	Grassland Wood-Sorrel		X	X
	<i>Panicum simile</i>	Two Colour Panic Grass		X	X

Stata	Botanical Name	Common name	Zone 1	Zone 2	Zone 3
	<i>Paspalidium distans</i>	Shot Grass		X	X
	<i>Poa labillardieri</i>	Tussock Grass		X	X
	<i>Poa labillardieri</i>	Tussock Grass		X	X
	<i>Pratia purpurascens</i>	Whiteroot		X	X
	<i>Solanum prinophyllum</i>	Forest Nightshade		X	X
	<i>Themeda australis</i>	Kangaroo Grass		X	X
	<i>Veronica cinerea</i>	Speedwell		X	X
	<i>Viola hederacea</i>	Native Violet		X	X
	<i>Wahlenbergia gracilis</i>	Native Bluebell		X	X

Appendix D 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 weeds present,
- Resources available (time, labour, equipment, and finances),
- weather condition on the day.

WEED CONTROL TECHNIQUES

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

Annual grasses

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

Perennial grasses

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

Woody weeds

Primary control of trees such as *Olea europaea* subsp. *cuspidata* (African Olive) and *Ligustrum lucidum* (Privet) following vegetation removal, should be implemented by using the cut and paint or drill and fill

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

Follow up treatment of woody weeds, including *Ligustrum lucidum* (Broad Leaf Privet) will be controlled by the cut and paint or drill and fill method using a non-selective herbicide.

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

Creepers and climbers

The control of exotic vines should be managed by skirting at chest height then spraying the target once it is on the ground. This should be done with a dicot specific herbicide such as Grazon®. Follow up treatments will be necessary and should be done as the germinating vines are still saplings. The target species on site included, but are not limited to, *Araujia sericifera* (Moth Vine).

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

Management of weed waste

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

Herbicide use

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

component of an integrated weed management approach and can be the most appropriate method for the control and eventual eradications of some weed species.

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

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

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

REVEGETATION WORKS

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

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

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

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

Jute matting, where required, must be comprised of 100% biodegradable jute fibres with a minimum weight of 680g/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 as within close proximity (i.e., < 20 km) to the site. However, soil type, climate and aspect of the collection site(s) should also be considered. Native grasses typically have much larger dispersal mechanisms and are to be collected from within the Sydney basin.

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

Record keeping of seed collection and planting locations are to follow the Florabank guidelines (Mortlock, 2000). A Section 132C licence under the NSW *National Parks and Wildlife Act 1974* (NPW Act) will be required to undertake seed collection works. The bush regeneration contractor is responsible for recording this information and providing it to Sydney Water.

BUSH REGENERATION CONTRACTORS

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

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

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

HYGIENE PROTOCOLS

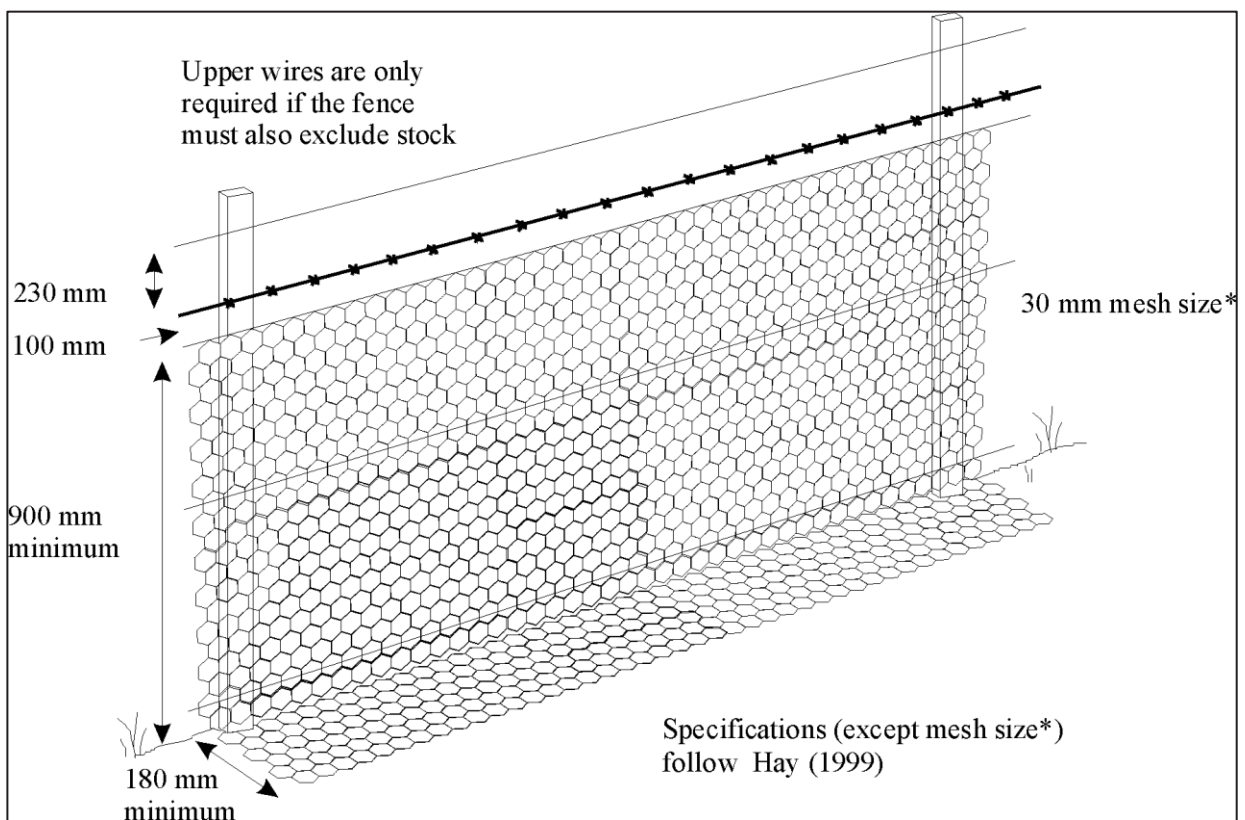
To avoid introducing soil pathogens / diseases, in particular *Phytophthora cinnamomi* (Root rot disease), onto site a hygiene protocol should be undertaken as per the guidelines developed by the Royal Botanic Gardens in 'Best Practice Management Guidelines for *Phytophthora cinnamomi* with the Sydney 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

Introduced feral animals in Australia pose a serious risk to native flora and fauna communities. The Department of the Environment and Water Resources recognises in particular the impacts of European red foxes (*Vulpes vulpes*), feral cats (*Felis catus*), feral goats (*Capra hircus*), feral pigs (*Sus scrofa*) and feral rabbits (*Oryctolagus cuniculus*) as key threatening processes under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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 900mm high, with a 180 mm skirt as per the figure below. Consultation with the bush regenerator regarding the presence of pests and need for any exclusion fencing is to be carried out during implementation.



Recommended fencing for rabbit exclusion (DoEE 2004)

